Against All Odds

building Innovative Capabilities in Rural Economics Initiatives in El Salvador

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Publication date:
2007

Document Version
Publisher's PDF, also known as Version of record

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PhD Thesis
Department of Development and Planning
Aalborg University, Denmark
2005

SUDESCA Research Papers No. 40.

Title: Against All Odds: Building Innovative Capabilities in Rural Economic Initiatives in El Salvador.

SUDESCA Research Papers No. 40.

Publisher: Fundación Nacional para el Desarrollo (FUNDE), El Salvador

Year of Publication: 2007

ISBN-13: 978-87-90604-38-7
ISBN-10: 87-90604-38-5

Printer: Talleres Graficos UCA

Financing: SUDESCA Project

Distribution: Fundación Nacional para el Desarrollo (FUNDE)
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The SUDESCA project is a joint research project between Centro Internacional de Política Económica para el Desarrollo Sostenible (CINPE), Universidad Nacional, Costa Rica and IKE/DRUID & Centre for Environment and Development, Aalborg University, Denmark. The project includes research collaboration with Escuela de Economía de la Universidad de El Salvador, Fundación Nacional para el Desarrollo (FUNDE), de El Salvador and Escuela de Economía Agricola (ESECA) de la Universidad Autonoma de Nicaragua (UNAN).

The project aims at the enhancement of the Central American research capacity within the areas of systems of innovation analysis and the implementation of cleaner technology.

The project is financed by the ENRECA program (Enhancement of Research Capacity in Developing Countries) of DANIDA (Danish International Development Assistance), Ministry of Foreign Affairs.

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Acronyms and Abbreviations

ACDSNV	Campesino Development Association from the North of the San Vicente
AGROLEMPA	Agricultural Association of Producers from the South of the Bajo Lempa
ALCA	Free Trade Area of the Americas
APRAINORES	Association of Organic Agro-industrial Producers of El Salvador
BFA	Agricultural Foment Bank
BIOLACT	Agro-industrial Dairy Processing Plant
CAFTA	Central American Free Trade Agreement
CDA	Departmental Mayor's Council
CDM	Municipal Development Committee
CENTA	National Center of Agricultural and Forestry Technology
CENDEPESCA	National Center for Fishing Development
CIT	San Vicente Committee for Technological Innovation
CND	National Development Council
COMURES	Corporation of Municipalities of the Republic of El Salvador
CORDES	Foundation for Cooperation and Communal Development of El Salvador
CRECER	Expanded Access and Economic Opportunities for El Salvador's Rural Poor Families (USAID project)
CRIPDES	Association of Rural Communities for the Development of El Salvador
ECLAC	Economic Commission on Latin America and the Caribbean
ETM	GBL Business Working Group
FEDARES	Federation of Associations of Irrigation System Users of El Salvador
FPL	Popular Liberation Forces
FIS-DL	Social Investment Fund for Local Development
FLO	Fair Trade Labeling Organizations International
FMLN	National Liberation Front-Farabundo Marti
FUNDE	National Development Foundation
FUNPROCOOP	Foundation for the Promotion of Cooperatives
FUSADES	Salvadoran Foundation for Economic and Social Development
GBL	Grupo Bajo Lempa
GOES	Government of El Salvador
GTZ	German Technical Cooperation
HACCP	Hazard Analysis and Critical Control Points

HDI	Human Development Index
IDB	Inter-American Development Bank
IDES	Social and Economic Development Initiative
IFAD	International Fund for Agricultural Development
INA	National Agricultural Institute (Costa Rica)
IICA	Inter-American Cooperation Institute for Agriculture
LED	Local Economic Development
LFR	Less Favored Regions (EU)
MARN	Ministry of the Environment and Natural Resources
MAG	Ministry for Agricultural and Cattle Production
MES	Economic and Social Micro-region
MINEC	Ministry of the Economy
MOP	Ministry of Public Works
NGDO	Non-Governmental Development Organization
PNODT	National Plan for Territorial Development and Land Use
PRA	Program for Agro-business Reconversion (MAG/IDB)
PRISMA	Regional Program for Development and Environmental Studies
PRODAP I & II	Agricultural Development Project for Small Producers in the Paracentral Region (IFAD / GOES, Phase I and II)
PRODAR	Program for the Development of Rural Agro-industry in Latin America
PTT	Land Transfer Program
SAAO	Organic Sugar Agro-industrial System
SAMO	Organic Cashew Agro-industrial System
SCPM	Cooperative Society for Cashew from San Ramón
SES	Social and Economic System
SINALIT	National System of Alliances for Technological Innovation
SMEs	Small and Medium Sized Enterprises
SVP	San Vicente Productivo Program (EU/GOES)
SUDESCA	Sustainable Development Strategies for Central America
UNDP	United Nations Development Program
USAID	United States Agency for International Development
UTCSV	Union of Rural Workers from San Vicente
VMVDU	Vice Ministry of Housing and Urban Development
WTO	World Trade Organization

Acknowledgments and Dedication

The publication of this thesis represents a significant step in my life and I would like to thank the many people who helped me along the way to meet this challenge.

First of all I would like to thank Jens Muller, whose inspiration, guidance and firm support as thesis advisor made finishing this thesis possible, enabling me to get through the difficult times when I was not sure of how to precede. Jens was more than an academic advisor, for both my masters and PhD studies at Aalborg University, he was also an important friend who welcomed me and my family into his house and community in Frugthaven.

I would also like to thank the people connected to the different economic initiatives integrated into the Grupo Bajo Lempa consortium who gave of their valuable time for interviews to provide me with the information I needed for my analysis. I would especially like to thank Emilio Espín, the (ex) general manager of the CORDES Foundation´s regional office in the municipality of Tecoluca, Luis Herazu, coordinator of the Agricultural Program for CORDES in the area, Rafael Rodríguez, CORDE's industrial engineering specialist, Tasso Hettershmidt volunteer researcher with CORDES and Vicente Carranza, the ex-manager at the SAMO-APRAINORES cashew processing plant for their support and knowledgeable contributions to this research effort.

My thesis work was conducted in the context of a joint research project "Sustainable Development Strategies for Central America (SUDESCA) between Aalborg University in Denmark, the International Center for Economic Policy for Sustainable Development (CINPE) in Costa Rica, the School for Agricultural Economics at the Autonomous University of Nicaragua (ESECA/UNAN), the Economics School at the National University of El Salvador and the FUNDE. I would like to express my gratitude to Bjorn Johnson, as project coordinator, as well as all the members of the SUDESCA team, who offered their comments on different versions of my research in progress and moral support to continue advancing. Financing for this project, including the partial grant for my PhD studies and this publication, was provided by DANIDA, through the ENRECA program for research capacity enhancement in the South.

I would also like to recognize the important contribution made by the FUNDE to my doctoral research effort, providing an institutional backing for my involvement in the SUDESCA project and a platform from which to work on the multiple project ventures in Tecoluca and its surrounding regional context starting in 1994, through which I acquired the general knowledge and conducted the specific investigations that provided the empirical basis for my thesis. I would thus like to thank FUNDE's executive director, Roberto Rubio and all my fellow colleagues for providing a supporting and stimulating environment my growth as a foreign development professional and my eventual involvement in masters and PhD studies at Aalborg University.

At Aalborg, I owe special thanks to Dorte Madsen for her expert support and patience both in the context of the SUDESCA project and as Department secretary in charge of PhD student affairs. Thanks also to my colleagues in the Department of Development and Planning who made me a welcome member of their community, their "lunch club," etc. and supported my research efforts in different ways

I wish to thank my parents Frank and Carol for their financial, moral support and motivation to stay on task while working at their house in Suchitoto, El Salvador which served as my office during the final months of thesis writing and revision. My father also took many hours to revise drafts and offer comments to improve my English, deteriorated after many years of work in Spanish, including a final revision before this publication.

I am also grateful to my wife Aracely for her support and patience throughout the many late nights and weekends of work that were involved in the completion of this project as well as my children Ricardo and Laura. We are all grateful for the hospitality and good times shared with our many friends who we met in Denmark during our stays.

Finally, I would like to dedicate this thesis to my mother Carol Francis Riemer Cummings who passed away suddenly in April 2006 after several years of living happily in the small town of Suchitoto in El Salvador. I moved with my family from the capital city to join them in Suchitoto, precisely to be able to get away from it all and focus on finishing my thesis. I will always remember her loving attention bringing coffee and cookies and conversations during the "break" times shared with her during this time.

Introduction

Although El Salvador's 13 year civil war ended over a decade ago, the most serious socio-economic limitations for rural family livelihood improvements remain. Any overly optimistic account of the present situation or future projections reflect insufficient understanding of what is going on or conscious propaganda.

Overly optimistic tales have hidden recipes for disaster in El Salvador's recent past, leading up to the civil war.

> "Before the 1980s, the Salvadoran economy was frequently cited as one of the most successful in Central America and one of the most dynamic in Latin America. The investigators noted its macroeconomic strength … and the entrepreneurial spirit of its inhabitants. During this time there was also a process of import substitution that seemed not to interfere with the promotion of exports, as El Salvador was particularly successful in selling products to the rest of the region after the inauguration of the Central American Common Market.
>
> Now we know, obviously, that the reality was more complex. The capitalist modernization in El Salvador increased total income, but the distribution of the additional resources generated was very unequal, access to land was extremely limited and many poor Salvadorans suffered great hardships. Along with the authoritarian political regime in place in 1979, this situation was a recipe for social revolution, and this was exactly what happened" (Thomas in Segovia 2002: xxv).

A realistic analysis of past and present "development" dynamics in El Salvador paints a generally pessimistic picture for the livelihood possibilities for the majority of its rural population and suggests the continuation of migration as a principal strategy for survival. However, an overly pessimistic outlook also reflects a lack of imagination and recognition of the capabilities of actors to overcome even the greatest odds to improve their livelihoods.[1]

In this thesis I critically analyze the experience of a consortium of local actors involved in innovative economic initiatives in the rural municipality of Tecoluca. This experience of the Grupo Bajo Lempa consortia offers room for cautious optimism as to the possibilities of generating innovative solutions to El Salvador's most pressing socio-economic problems. The significant investment of resources and difficulties confronted on the path these actors have undertaken, however, cautions us against succumbing to undue optimism.

The development of innovative economic initiatives demands interactive learning, and in this sense I seek greater understanding and lessons from the analysis of the economic initiatives in the Bajo Lempa as a contribution to the creation and strengthening of similar efforts in rural El Salvador and comparable Southern contexts.

An Innovative Experience Emerging in Rural El Salvador

Salvadoran society must face the challenge of how to enable rural families to strengthen their capabilities to maintain and improve their livelihood conditions. This is necessary if the country as a whole is to make a break from its historical "development" dynamics of economic growth based principally on the exploitation of workers and environmental destruction. This has led to unsustainable dynamics of extreme concentration of wealth, social marginalization, increasing divergence between livelihood opportunities in urban and rural areas, chaotic urbanization, and economic dependence on remittances from Salvadorans forced to migrate, mostly to the United States of America. These general development problems are discussed in Chapter 1.

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[1] "As Jevtusjenko, a Russian writer, recently said in a TV-interview: "The optimist has too little information" (about what is going on), but "the pessimist has lost his imagination" (about what might still happen)," (Muller 2005, forthcoming).

The emergence of a more sustainable development path in rural El Salvador will require structural changes to create local contexts that provide opportunities that families are able to take advantage of to improve their livelihoods. This will imply the recognition and strengthening of the capabilities that many of these families have demonstrated through maintenance and sometimes improvement of their livelihoods, when faced with seemingly insurmountable odds. Also important is the recognition and capitalization on the capabilities demonstrated by other local actors, especially municipal governments, non-governmental development organizations (NGDOs)[2] and diverse territorial development programs, to provide opportunities for rural family livelihood improvements.

In the context of these national dynamics, the present research effort has a territorial focus on the rural Salvadoran municipality of Tecoluca (see Map 1).[3] The historical dynamics of development in Tecoluca reflect the generally unsustainable development process experienced by the country as a whole. However it is also among the few territories where innovative local economic development processes are emerging that offer hope for the construction of a more sustainable development path for El Salvador.

In Tecoluca, the once majestic forests on the Salvadoran Pacific Coastal Plain were destroyed in the 1950´s and 1960´s through the state supported development of large cotton, cattle and sugar cane estates. These production systems were dependent on imported chemical inputs and cheap wage labor. In the 1970's increasingly intensified production on these estates denied local *campesino* peasant families access to the small plots of land that they had rented for subsistence production and made their livelihoods untenable.

Partly for this reason, Tecoluca was the birth place of one of the most important national peasant organizations that was later integrated into a national social movement that sought peaceful changes in the country's social and economic situation towards the end of the 1970´s. When this movement was met with repression by the Salvadoran Government's armed forces, much of the organized population from Tecoluca and other similar localities was integrated in one way or another into the Farabunto Martí guerilla movement for national liberation (FMLN) or was displaced internally or as refugees. Government security forces, backed by the government of the United States of America, fought the FMLN in the country's civil war that lasted from 1979 to 1992. Tecoluca was a highly conflictive zone and an FMLN stronghold during the war.

During these 13 years of fighting, the cotton, cattle and sugar plantations were abandoned and converted naturally into a secondary growth forest. Beginning in 1987, some of these same fertile and much coveted lands were occupied through an organized return of refugees and internally displaced people. These lands were then formally transferred by the State to these groups, together with FMLN ex-combatants, under the Land Transfer Program of the Peace Accords in 1992. The majority of the repopulated families are not from Tecoluca and many of these families are headed by women. This process of resettlement and land transfer to newly formed rural communities was a basic condition necessary for the emergence of the local economic development process which is the focus of this thesis.

These resettled families had few productive resources except for their intelligence and motivation to create a new life. They faced significant difficulties sheltering themselves, growing enough food and creating the other conditions necessary for subsistence during resettlement. The civil war had destroyed

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[2] NGDOs are a sub-set of non-governmental organizations (NGOs) that are more exclusively focused on development activities as opposed to other types dedicated to charitable purposes or other types of civic tasks. In El Salvador they are generally legally constituted as not-for profit organizations with professional hired staff to carry out their different development project activities, generally externally financed. I thus differentiate NGDOs from grass-roots, community or territorial base organizations which may also play important roles in local development. These types of organizations in contrast to NGDOs have a larger "popular" membership base and elected leadership. For more in depth discussion of NGDOs see Fowler (1999) and Fowler et al. (1992).

[3] The historical accounts that follow concerning the situation in Tecoluca are based on research carried out by Cummings (1995) and Blandon de Grajeda et al. (1995).

basic social and economic infrastructure which made initial living conditions even more difficult. These families have also had to overcome several years of floods caused by the deterioration of dikes along the Lempa River and the opening of hydroelectric dam floodgates upriver during heavy rains, including the Tropical Storm Mitch in 1998, followed by two devastating earthquakes in early 2001.

These families, however, were not alone in facing the difficult situation of resettlement and community development; taking these lands and constructing a viable path for local development in Tecoluca was a coordinated effort from the outset. From the beginning, these families were accompanied by the Salvadoran NGDO, the CORDES Foundation, the community base organization CRIPDES, Tecoluca's municipal government and other local actors that have coordinated efforts (with significant international cooperation) to support the realization of their aspirations an improved livelihood.

An important step along this road was the formation of the Grupo Bajo Lempa (GBL) consortium in 2002. This was the culmination of a process to create and integrate a group of social base organizations, associative business initiatives and supporting local NGDOs, in a collective effort to promote sustainable rural development. This effort has focused on improving the livelihoods of families resettled in what are now 50 rural communities in Tecoluca and the adjoining municipality of Zacatecoluca. The efforts being made by the GBL have wider implications through the participation of its members in promoting local economic development in the surrounding region and also (through the diffusion of this experience) throughout El Salvador and the Central American region.

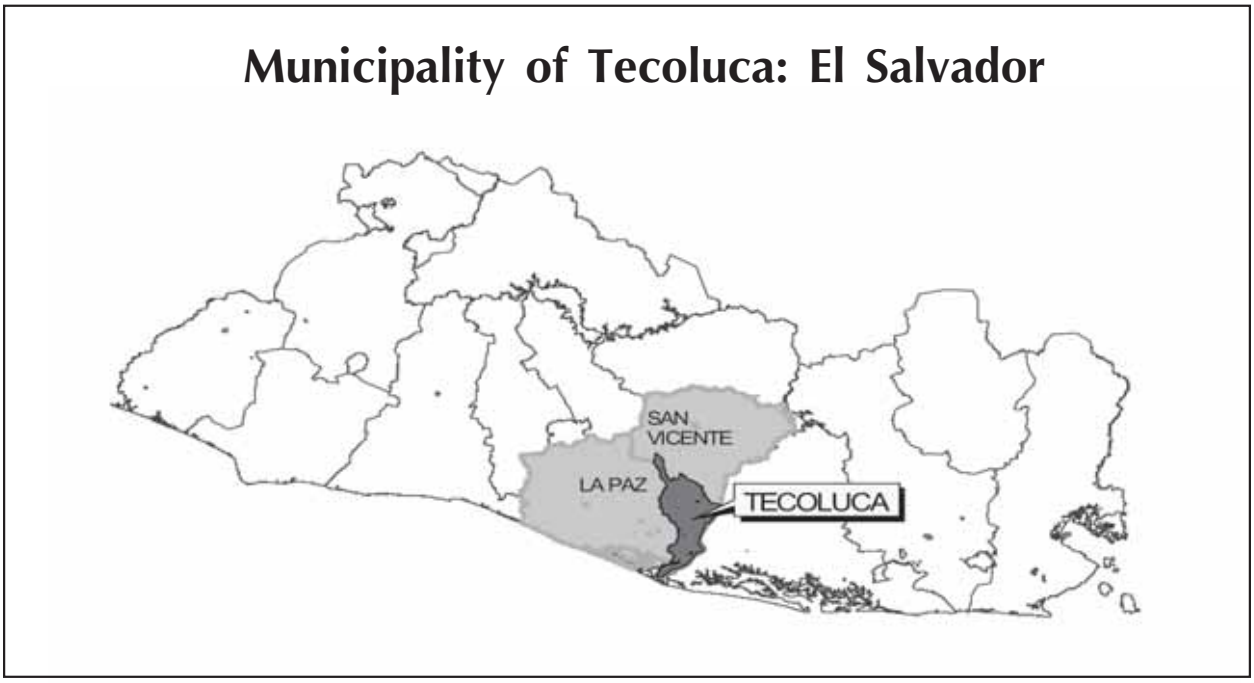
Of special interest for the present research effort are the innovative capabilities demonstrated by the actors involved in local economic initiatives integrated in the GBL. The main actors involved in creating and strengthening these initiatives are associative organizations of small scale producers and the regional office of the CORDES Foundation, referred to as CORDES Bajo Lempa. Over the span of more than ten years, this core network of actors has been able to mobilize local and external capital and knowledge resources from diverse public and private sources to introduce significant technological transformations that have led to modest but progressively important improvements in the livelihood conditions for the rural families involved.

Key elements of the strategy to build and strengthen these initiatives are technological innovation in organic agriculture and cleaner cattle production, agro-processing, and product differentiation for niche market commercialization. The innovative efforts to link small-scale producers as suppliers but also owners of agro-processing and commercialization businesses and the integration of these diverse economic initiatives within the GBL are also fundamental to the overall development strategy.

The case study analysis places significant emphasis on the relevance of the regional context and especially what is described as Tecoluca's emerging regional innovation system in which these initiatives are embedded. Within this regional context a key actor has been the municipal government in Tecoluca. In 1994 the FMLN won the municipal elections in Tecoluca and has maintained control of the local government by winning elections in 1997, 2000 and 2003 by ever wider margins.

As Tecoluca celebrates the tenth anniversary of FMLN government and its local development process, there is also a significant recognition that there is much left to be accomplished. Especially important are the challenges faced by the conglomeration of local actors to strengthen the competitiveness and sustainability of the territory's economic activities. The analysis of these challenges, especially facilitating strengthening of the innovative capabilities of the actors involved in the GBL's economic initiatives, is a crucial to the research task undertaken in this thesis.

Map 1



Research Motivation

My personal motivation for the thematic and territorial focus of my thesis research is based on my direct involvement in the local development process in Tecoluca for over a decade as a researcher for the Salvadoran NGDO, National Foundation for Development (FUNDE).

On the one hand, I was interested in taking a step back from the applied work I have been doing, to reflect critically on key aspects of the local economic development process, especially in relation to the GBL's innovative economic initiatives and Tecoluca's emerging regional innovation system. I see this as a necessary step in my personal evolution as a development practitioner. It represents a transition from practice to reflection on practice, crucial for enhancing my capabilities to be applied in future development research, training, technical advising, policy advocacy, etc.

On the other hand, I see this analytical effort and the search for lessons that can be applied to strengthening future local economic development practice in Tecoluca and other similar rural Southern contexts, as an important contribution in itself. It represents a potential contribution to the on-going process in Tecoluca and El Salvador through local presentations and discussion of this material; as well as to practice in similar Southern context through wider dissemination to the international audience of development practitioners.

Having said this, it is necessary to understand the exploratory nature of this research project. The analysis of this multi-faceted case study represents a continued approximation towards understanding the complex research problems being dealt with; representing a significant advance with respect to my previous research efforts dealing with similar issues in a more preliminary way. However, as suggested in the final chapter, the research challenges that remain are significant.

This study is also an exploratory case study into the application of a novel conceptual framework, that integrates and adds to a diversity of theoretical perspectives from different research fields, as applied to the analysis of innovative capabilities expressed in local economic initiatives in the context of an emerging regional innovation system in a rural, Central American context. Thus, this thesis is also intended as a modest contribution to the wider literature concerning technological innovation, innovation capabilities and regional innovation systems, especially as it is applied to experiences emerging in Southern contexts.

Thesis Organization[4]

The thesis is divided into four parts: (i) problem statement and research methodology, (ii) conceptual framework, (iii) characterization and analysis of the multifaceted case study and (iv) conclusions, lessons for practice, final critical conceptual reflections and future research challenges.

Part I builds on the Introduction, providing context and rationale for the case study analysis, conclusions and lessons that follow. Chapter 1 discusses the socio-economic problems limiting the efforts of rural Salvadoran families to improve their livelihood situations and for local actors to construct endogenous economic development dynamics in rural regions. Chapter 2 presents the research objectives, questions and methodology that have oriented this research to understand the capabilities demonstrated by one group of actors integrated in the GBL consortium, attempting to deal with these problems by developing innovative economic initiatives and conforming what is considered to be an emerging regional innovation system around Tecoluca.

Part II develops the conceptual framework applied and further developed through the analysis of the multifaceted case study of the *Grupo Bajo Lempa's* innovative economic initiatives embedded in Tecoluca's emerging regional innovation system in Part III. The sub-sections titled Applying the Concepts at the end of each section in these two chapters provides a guide to the reader as to how the concepts developed therein will be used together in the case study analysis. The conceptual framework is also used for structuring the lessons which are derived from the case study analysis in Chapter 8.

Part II is divided into two complementary chapters. Chapter 3 focuses on the conceptualization of the capabilities that enable the innovative practice of the actors involved in the GBL's economic initiatives. Chapter 4 analyzes the relevance of the regional, national and international context in which these initiatives are embedded. It emphasizes the dynamics of the emerging regional system of innovation that enable or constrain innovative practice in the GBL's initiatives, as well as the proactive mediation by local actors of the influence of other exogenous factors.

Part III presents the empirical characterization and analysis of the multifaceted case study of the GBL's economic initiatives and the emerging regional innovation system of which they form an integral part. Chapter 5 presents a basic characterization of the Grupo Bajo Lempa consortium, the principal and most innovative economic initiatives integrated in this associative effort, as well as the role of the NGDO CORDES Bajo Lempa in forming the GBL and supporting the emergence and initial consolidation of these initiatives. It ends with a comparative characterization of the innovation capabilities demonstrated by the task-networks involved in these initiatives. Chapter 6 than applies and further develops the conceptual framework from Chapter 3 through a more in-depth analysis of the technological transformations being implemented in the GBL's initiatives and the innovation capabilities of the task-networks of actors involved. Chapter 7 widens the case study focus to describe and analyze the dynamics of Tecoluca's emerging regional innovation system and the relevance of these dynamics for innovative practice in the GBL's and other examples of regional economic initiatives.

[4] A more detailed description of the different chapters is included in the introduction to each one.

Part IV includes two chapters that conclude the thesis. Chapter 8 integrates a summary discussion of the main research findings with a critical reflection on lessons to be learned from the case study analysis for enhancing future local development practice in the Tecoluca region, as well as similar rural contexts in El Salvador and the rural South. Chapter 9 then finalizes the thesis providing an integral reflection on the achievements and limitations of this research effort, the applicability of the conceptual framework to this type of case study analysis and challenges for future research to build on the main findings of the thesis.

PART I

Problem Statement,
Research Questions and Methodology

CHAPTER 1

El Salvador's Rural Development Problems

The socio-economic problems expressed in the structural poverty among rural Salvadoran families demand a systematic effort to transform the structures that perpetuate this situation. This chapter gives a synthetic overview of El Salvador's principal socio-economic development problems constraining the efforts of rural families to maintain and improve the results from economic livelihood activities and their overall quality of life.

Section 1.1 discusses the historical transformations in the Salvadoran economy and the associated structural nature of rural poverty. Section 1.2 highlights the structural divide between urban and rural livelihood opportunities, and then discusses the diversity of rural family livelihood strategies, their outcomes in terms of the evolution and nature of rural poverty and some important internal limits to the viability of these strategies. Section 1.3 then changes focus to outline the adverse structural conditions that constrain the efforts of rural families to improve the returns from their economic activities.

Section 1.4 offers a pessimistic conclusion to the chapter, synthesizing the main odds against which rural families must struggle to survive and highlighting the current unsustainability of many of their livelihoods. Section 1.5 in contrast, argues that there are indeed sensible proposals that set out alternatives for solving the country's rural development problems, but the problem is their implementation. Section 1.6 then suggests that analysis of innovative economic development initiatives, such as those integrated into the GBL, offers reason for cautious optimism and thus the rational for this study to better understand their innovative nature and potentials.

1.1 Economic Transformation and Poverty in Rural El Salvador

El Salvador is the smallest and most densely populated country in Central America. It experienced an important process of population growth throughout the last half of the 20th century. The population increased by a factor of 3.7, from approximately 1.9 to 6.8 million people between 1950 and 2000. This growth would have been even more explosive, had there not also been an important out-migration, of approximately 2 million people, especially towards the United States of America. Over this same period, the population density increased from 93 people/km2 to 344 people/km.2 Important areas of the country have densities above 550 people/km2, similar to many metropolitan areas (PNODT 2003).[5]

During the last decades El Salvador experienced an increasing population concentration in urban centers, especially in the Metropolitan Area of the capital San Salvador. This concentration of population is drawn from the rural areas and small towns by the agglomeration of industrial, commercial and service activities in the urban areas and pushed by the crisis in the rural economy and generalized collapse of traditional rural livelihoods (PRISMA 1995). However, 41% percent of the population still resides in rural areas (UNDP 2003) and another significant proportion of the population still lives in small towns with livelihoods that are intricately linked to the economic activities of the surrounding rural areas.

In El Salvador the livelihoods of the rural population have been directly related to the evolution of the agro-export model of development that has been predominant throughout the country's economic history. Many rural families worked as part time, often migrant, salaried laborers on plantations devoted to coffee, cotton, sugar cane and cattle. This salaried work complemented their own subsistence production as small-holders or renters engaged in the production of staple grains on small marginal plots, generally not apt for large-scale commercial production.

As suggested by Thomas earlier, the agro-export model for "development" in El Salvador did generate economic growth but at the expense of a legacy of structural poverty. The impoverishment of the majority of Salvadorans, especially from rural areas, was directly associated with the functioning of the economic system itself. The agro-export production systems required an abundant unqualified and low wage work force. This was the basis for their strategy to compete internationally in commodity

[5] El Salvador's total land area is 20,720 km2 (Compact World Atlas 2001: 140).

markets and to secure high rates of economic gain that concentrated wealth in the hands of a few notable constellations of families (Segovia 2002: 176-77).

In the 1980's the delicate, often conflictive balance that existed between agricultural day labor and subsistence production was broken and the livelihood strategies of the rural poor entered into crisis. On the one hand, the options for earning a living decreased drastically in rural areas as the number of salaried agricultural jobs diminished (due mostly to reduced coffee and cotton production), real rural wages were greatly reduced, access by small producers to land (rented or owned) was decreased, technical assistance and credit was limited, and prices for their grain crops dropped. In addition, the armed conflict made life and productive activities exceedingly difficult in significant areas of the countryside (PRISMA 1995).

With the transition from civil war to relative peace in the decade of the 1990's, came a fundamental structural change in the Salvadoran economy. The export of traditional crops (primarily coffee, sugar cane and cotton) complemented by the limited process of import substitution industrialization, have ceased to be the dynamic forces driving the Salvadoran economy.[6]

The economic transformation still underway is tending to consolidate in favor of a "new economic model." This new model in formation is dominated by the concentrated financial sector. The most important economic activities are increasingly commercial service industries and the export oriented *maquila* garment assembly industries; both of which generate mostly low paying urban job opportunities. The model is viable only due to the high level of remittances (estimated by FUSADES to reach 16% of GNP in 2005) sent from the North by migrants who could no longer make a living in El Salvador. This model also shares one of the principal problems of the traditional agro-export model, its dependence on frozen or even decreasing real wages to maintain its limited "competitiveness" (Segovia 2002: 248; La Prensa Grafica 11/10/04). [7]

Another fundamental problem with this new model in formation is the concentration of economic activities in urban areas which has led to a persistent influx of poor and poorly educated people from the countryside to the cities ill equipped to house them. Even the *maquila* industries (that could be subsidized under WTO rules to support development in marginalized regions), are concentrated in the central area of the country on the outskirts of San Salvador (UNDP 2003). The poorest families which obtain their income from agricultural activities are excluded from the benefits of the unstable economic growth.

Not all is negative however. This transition away from the traditional agro-export economic model has also been accompanied by an important process of democratization on the national and municipal levels, which offers potentially important opportunities for development in El Salvador. Segovia argues that, "… even though it has brought new problems and challenges, new windows of opportunity have been opened and the country has been liberated from the old shackles and prejudices that limited advances towards the resolutions of the principal problems" (2002: 252).

1.2 Rural Economic Livelihood Strategies and Rural Poverty

The results of development dynamics on a municipal and regional level are very unequal, especially comparing predominantly rural and urban territories. This situation is expressed nationally in the

[6] Mercedes Llort argues that the overall importance of the agricultural sector within the Salvadoran economy has deteriorated substantially since the 1970s. Measured as a percentage of GNP, the contribution of the agricultural sector has diminished from approximately 25% in the 1970s to 17% in 1990. This contribution deteriorated further in the 1990s to 13% in 1998 and 12% in 2001. She attributes the diminished growth and importance of the agrarian sector to factors such as the civil war and the agrarian reform in the 1980s and the devaluation of the exchange rate, the reduction of the import duties for primary agricultural products in the 1990s (Llort 2002: 3).

[7] "Besides not representing any guarantee for international competitiveness in the medium term, [the dependence on low wages], works against the expansion of the internal market, which is one of the pillars of the new economic model," based on remittances (Segovia 2002: 248).

profound divergence between indicators that suggest the accumulated outcomes of these development processes. For example, there are significant differences registered in UNDP's Human Development Index for the 14 departments in El Salvador. However, the differences in this Index and each of the indicator's component parts are especially extreme between urban and rural areas across the country, as indicated in Box. 1, which also presents the urban / rural divergence between the related Human and Income Poverty Indexes.

Box 1
Urban/ Rural Divide in Human Development Indicators, 2033

Human Development Index (HDI)

- The average HDI for urban areas was 0.781 as compared to 0.632 for rural areas
- Urban inhabitants can expect to live 6 years longer than their rural counterparts.
- The illiteracy rate was 30% in rural areas as compared to 11% in urban areas.
- The combined rates for school attendance were 16 percentage points higher in urban areas (72% vs. 56%).
- The estimated GDP per capita in urban areas (US$ 7,124) was almost three times as high as that for rural areas (US$ 2.579).[1]

Human Poverty Index[2]

- Urban areas have a human poverty index of 9% compared to 28% for rural areas.
- Fifty two percent of rural families have no access to potable water, compared to 8% of urban families.
- Thirteen percent of children in rural areas are under weight, compared to 7% in urban areas.

Income poverty[3]

- Fifty six percent of the rural population lives in poverty with 30% of them living in absolute po verty, compared to 34% of the urban population being poor and 12% living in absolute poverty.
- Urban areas concentrate 59% of the population but only 47% of the poor and 38% of the people in absolute poverty.
- Forty one percent of the population lives in rural areas, but 53% of the poor and 62% of the people in absolute poverty live in rural areas.

Source: UNDP El Salvador, *Human Development Report for El Salvador 2003*, p. 42, 50.

The limited development and the persistent level of structural poverty, especially in rural areas is recognized as the most serious socio-economic and political problem facing El Salvador as it emerges from 12 years of civil war and seeks to become economically competitive in globalizing markets. The historical development dynamics that have shaped Salvadoran society, especially recent structural changes, have created conditions that severely constrain the capabilities of many rural families to

8 Figures based on the 2002 Multiple Use Household Survey. The estimated GDP per capita figures are adjusted for the parity of purchasing power.

9 HPI-1 is a composite index reflecting deprivation in terms of life expectancy and health (% of population not expected to live 40 years), knowledge (% of illiterate adults) and economic wellbeing (% of population with access to potable water and % of children who are moderately or severely under weight). Values closer to 100 indicate a higher level of deprivation.

10 Figures based on unadjusted family income figures from the 2002 Multiple Use Household Survey. Extreme poverty indicates family income insufficient to purchase their estimated basic food needs (adjusted for place of residence) and relative poverty indicates incapacity to purchase an amplified range of basic goods and services, estimated to be twice the cost of basic food needs (UNDP 2003: 370).

produce food and generate income through self employment or diverse types of salaried labor. The reproduction of basic livelihood conditions is complicated for many rural families and few possess the capabilities (knowledge, resources, etc.) necessary to achieve economic accumulation and thus qualitative improvements in their quality of life.

Progressive diversification of rural family economic livelihood strategies

In their effort to survive and adapt to the rapidly changing rural context, rural families in El Salvador have diversified their livelihood strategies. In this sense, there has been a general tendency for agricultural income to decline in relation to other sources, as shown in Table 1. This reflects the structural transformation in the Salvadoran economy over the last 20 years, especially the reduction in the importance of agricultural production as a percentage of GNP (FUSADES 2004: 10).

Table 1

Rural Family Economic Livelihood Diversity

Rural family income sources	Percentages
Agricultural income	20%
Own production	9%
Salaried agricultural work	11%
Non-agricultural income	65%
Own business activity	20%
Salaried non-agricultural work	42%
Other non agricultural income	3%
External help and remittances	15%
International remittances	12%
Support from family in E. Salv.	3%

Source: FUSADES/BASIS (2004: 11), DIGESTYC, Multiple Use Household Survey

The evolution and nature of rural incomes and poverty

Based on his analysis of the evolution, characteristics and determinants of poverty in the 1990's, Segovia (2002: 217-19) concludes:

- There was a significant reduction in poverty, especially among families living in urban areas and households headed by women, who benefited from their labor market insertion in the [formal and informal] service sector and *maquila* manufacturing industry, as well as increased remittances. This improvement however must be relativized due to the increase in extreme poverty in rural households, especially those led by men, "for whom the decade of the nineties meant more privations and marginalization."
- This dynamic is explained by the urban based growth of the service economy that not only did not benefit the poorest households living off of agricultural work, but worked against them. They experienced both a reduction in the profitability of their activities and an erosion of their real wages as compared to their urban counterparts.
- The remittances had a strong positive effect maintaining many families out of poverty, especially those headed by women. This cautions against any mechanical association of the structural

adjustment policies applied in this decade and the relative decrease in poverty, as officially measured. Instead the analysis of the determinants of poverty suggests that policies that erode real wages and reduce public social expenditures are clearly counterproductive in terms of poverty reduction.

- Finally, poverty in El Salvador continues to be a widespread, essentially rural, structurally determined problem, directly related to limited income generated from agricultural activities. Thus, one of the most important challenges that El Salvador faces is to "achieve more balanced economic growth that incorporates rural areas and the agricultural sector."

Although governmental statistics register a reduction in El Salvador's overall poverty rate over the last decades, the measured reduction has been significantly less in rural areas and is based on a questionable definition of the poverty line.[11]

In addition to the structurally persistent nature of rural poverty, a recent study by the Salvadoran Foundation for Economical and Social Development (FUSADES) of a representative panel sample of rural families further demonstrates the vulnerability of many rural families' livelihoods. Although the average income of the families included in this study has improved slightly during the 1990s, it is characteristically volatile. Due to this income volatility or insecurity, a full 62% of these rural families can be characterized as sporadically poor, i.e. their income dropped them into poverty in at least one of the survey years. Among these families, 28% registered yearly incomes that generally placed them below the poverty line and 34% were generally not poor. Another 25% of the families surveyed can be considered structurally poor as their yearly income was consistently below the poverty line and only 13% could be considered not-poor (FUSADES 2004: 12, citing Beneke de Sanfelin and Shi 2004).

Limits on rural family livelihoods in rural El Salvador

Rural families are embedded in regional (sub-national), national and international contexts that do not support or give opportunities for improvement of their livelihoods, but rather impose constraints on their attempts to develop viable economic activities. The persistence of rural poverty is associated with the reduction of the real income from agricultural activities, either from the sale of agricultural products or through increasingly scarce salaried agricultural work. In addition, the possibilities of obtaining non-agricultural salaried work in rural areas remains limited (Llort 2002: 8). Especially relevant for the majority of small subsistence farmers in El Salvador has been the decrease in basic grain prices which are one-half of what they were, in real terms, twenty years ago (Clerix and Goitia 2004).

Key factors identified by FUSADES as positively affecting rural family income are increased educational level, access to markets, diversification of family income sources (principally towards non agricultural sources), land area cultivated and number of family members living outside El Salvador. Conversely dependency on agricultural production, especially basic grains, is related to lower and more volatile family income levels (2004: 12, citing Beneke de Sanfelin and Shi 2004).

Although increasing numbers of families are searching for non-agricultural options, the limited capabilities and opportunities to create viable rural businesses are reflected in the territorial distribution of firms and thus employment opportunities as well. The industrial and commercial enterprises registered in official census figures (DIGESTYC 1998) are highly concentrated in or near the metropolitan area, and to a lesser degree in departmental capitals and a few other municipalities with important border crossings or that have developed a specialization in some particular artisanal product. The remaining 187 municipalities (71% of total) have less than 10 enterprises per 1,000 inhabitants. The major industries integrated in the Salvadoran Asociation of Industrialists are even

[11] As the 2003 UNDP Human Development Report for El Salvador indicates it is quite possible that the overall percentage of families living in poverty and the much cited reductions over the last decade are significantly over estimated due to methodological problems. They argue that the methodology used under-estimates the income necessary to meet basic food needs (the absolute poverty line) and also that needed to purchase the wider range of goods that delimit the line below which a family is considered to be in relative poverty (2003: 60-62).

more concentrated, with 67% in the department of San Salvador and 27% more in the adjoining department of La Libertad in the center of the country (UNDP Salvador 2003:223-5).

1.3 Adverse Structural Conditions for Rural Economic Initiatives

Llort (2002: 5) argues that, in general, the limited profitability of the Salvadoran agricultural sector has to do, on the one hand, with the downward tendency in the prices of primary products on the international market and the protectionism and unfair commercial practices applied by developed countries. On the other, it has to do with the public policies which have "configured a very unfavorable internal economic context." For example, there has been a combination of the relative appreciation in the exchange rate over the last decades due to monetary policy[12] and an indiscriminate commercial opening, lowering or elimination of import tariffs, which "instead of lessening the external distortions has increased the deterioration in the real agricultural prices and favored the development of an economy of services and urban consumption." As a cumulative result, agricultural exports have become comparatively more expensive and small-scale agricultural producers and agro-industrial business ventures in many rural territories are struggling to compete in the local markets against increasing competition from lower priced imported goods (due to cheaper labor, public subsidies, lower valued currencies, etc.).[13] Further distortions of the internal markets for agricultural goods, especially fruits and vegetables, is due to the unrestricted power of monopolistic import/wholesale business associations and super-markets to impose severely restrictive price and purchasing conditions on national producers (Lopez 2005).

There is also significant concern about the potentially negative impacts of a Free Trade Agreement between Central America the United States on agriculture and rural development, especially the activities of small-scale farmers.[14] Only a limited number of specialized small and medium agricultural producers are able to meet the increasing quality and quantity demands of the market opportunities that exist to export to the Central American region, Mexico and North America or Europe.

Additional contextual factors that undermine the competitiveness of rural agricultural and non-agricultural enterprises and increase the costs of living in rural areas are related to the deficient coverage and high cost of many basic services like electricity, adequate roads, telephone communications and affordable housing, as well as water for household and agricultural or industrial use. The coverage and quality of education and health services are also severely deficient. Although there have been significant improvements in these areas since the Peace Accords in 1992, these efforts have been insufficient as compared to the structural deficit that existed and the economic policies that have increased the prices of many of the services that do exist (Llort 2002; UNDP 2003).

Land distribution schemes, such as the process of land reform in the 1980´s (in the context of governmental counterinsurgency efforts) and after the Peace Accords with the Land Transfer Program (PTT) represent opportunities. However, they have been limited to transferring the land, many times without individual legal title.[15] The producers have frequently received only limited production, marketing and business support services. Although financing was available for cooperatives, borrowing against their land and significant management problems by their directive councils "supported" by paid public servants, led many of these cooperatives into un-payable debts through production activities, bank

[12] For most of the 1990s the Salvadoran currency was pegged to the US Dollar and in 2001 the economy was officially *dolarized* without any significant devaluation. Over the same period other Central American countries have progressively devaluated their currencies in relation to the dollar.

[13] See also Foro Agropecuario and FUNDE, 1998 and Rivera 1997 for analysis of how economic policies implemented as part of the structural adjustment programs in El Salvador have negatively affected rural development initiatives.

[14] For an in-depth discussion of this issue see the recent publications from the Mesoamerican Initiative on Trade, Integration and Sustainable Development (CID) at http://www.iniciativacid.org.

[15] This problem with titles persists in the case of many agrarian reform cooperatives and was only recently resolved in the PTT communities through a nation-wide project funded by USAID.

embargoes and land sales to make payments. Thus the real opportunities for economic accumulation that possessing these lands represents are effectively out of the reach of many of the families that own them. Many of them see no option but to sell to urban developers and/or to migrate to the North.

In general, there seems to be widely seperate interests between small-scale agricultural producers and micro, small and medium scale enterprises in rural areas like Tecoluca (the GBL's economic initiatives for example) and the policy makers and implementers in the legislative and executive branches.

State withdrawal from promoting rural development

The deterioration of prices and competitiveness of the agricultural sector is also related to specific problems including the deficient provision of strategic services like rural financing and technical assistance and training, as well as distortions in terms of market access and transparency for rural producers (Llort 2002).

In the context of structural adjustment policies, the centralized Salvadoran State in the 1990s and early 2000s largely withdrew its support for rural development activities. For example, Central governmental agencies no longer play the role of intermediary in the basic grain markets. Public agricultural extension services and financing for small and medium sized agricultural and cattle producers were also greatly curtailed (Clerix and Goitia 2004).

The inefficiency in the organization of the system of technology generation and transfer poses a major limitation for improving agricultural productivity and diversifying current productive options. Especially deficient is the coverage (due to staff reduction and local branch closings) as well as the quality and focus of the public services offered by CENTA-MAG (National Center of Agricultural and Forestry Technology, linked to the Agricultural and Cattle Ministry). The limited technical assistance provided by CENTA has been focused on upgrading traditional subsistence grain crops, introducing high yield seed varieties, etc. while its research functions have been severely curtailed. This weakness is due to severe budget constraints imposed due to the changing role of the State in rural development under the pressures of structural adjustment programs and the market oriented "neoliberal" development model promoted by the State. In addition to its internal problems CENTA is only weakly connected to other public and private, national, regional and international entities specialized in technology generation and transfer (Llort 2002; see also FUSADES 2004).

An additional problem is the limited access by rural producers to adequate financial services. As Llort argues, "the development of rural financial markets is incipient and the access to financial services in rural areas is very limited. Approximately, only 12% of rural families receive credit of any kind, and less than half from formal public or private financial institutions. The commercial banks perceive the sector as very risky and have decreased the percentages and total amounts lent to finance (mostly large scale) agricultural activities over the last decade.[16] The state agricultural development bank, BFA, has not been efficient in complying with its objectives and has been subject to what have been more political than technical management policies that have further limited its response capacity" (2002: 7, my translation).

The contributions of other potentially important actors such as the National University of El Salvador and other private universities are also weak. The National University's educational functions are severely limited and the University has even more limited research and development capabilities related to the generation or adaptation of technologies that could be applied to rural development initiatives like the GBL's economic initiatives.

[16] For example, the percentage of total credits from commercial banks to agricultural activities has been reduced from 20.6% in 1992 and 3.7% in 2004 according to the president of the Agricultural and Agro-industrial Chamber of El Salvador (CAMAGRO). Just between 2001 and 2004 the total amount lent to finance agricultural activities fell by almost 50% (La Prensa Grafica: 22/04/05).

Rural development programs and NGDOs

Fill the void left by the state and to promote alternative development models, externally funded NGDOs and territorial development programs have increased their presence in rural areas. This has been especially true since the signing of the Peace Accords in 1992.

It can be increasingly argued that the Salvadoran state's rural territorial development "policy" is that implemented through a series of internationally funded territorial development programs with diverse methodologies and focuses and limited time horizons. These programs are generally externally designed and the financers usually have significant control over how their money is invested. There is a limited integration of local actors, especially municipalities, into these program's decision-making mechanisms, they take a significant time to get established and then are of only a limited duration, achieving only limited results. Development programs may import and further develop innovative methodologies for the promotion of local economic development (LED), along with their service providers and beneficiaries, but there is often a limited ability for territorial actors to further develop or at least maintain processes. After the projects end, the longer term collective processes they may have begun generally have a limited duration.

These publicly, mostly internationally, funded programs are increasingly implementing a significant proportion of their development activities through sub-contracting national NGDOs as service providers. The activities of these programs are also being complemented by a diversity of more independent NGDO initiatives, generally funded by international NGDOs from the North. These different types of NGDOs may promote innovative practices related to local economic development; for example methodologies for the creation of viable rural micro-enterprises. However, in many cases their presence is not sustainable. No matter how innovative and successful these programs or individual NGDOs are, project implementation, per se, cannot solve the structural problems related to rural economic development.

Clerix and Goitia (2004) argue that the challenge is thus to learn from these innovative experiences, to extract lessons and convert them into more generalized good local economic development practices. The Salvadoran State, however, has a very limited capacity to learn from these experiences in order to further develop their own endogenous, national, territorial development policies and strengthen future public agency participation in internationally funded territorial development programs. There are simply no well-established mechanisms by which the lessons from the diversity of territorial development programs or the disperse activities of individual NGDOs can be appropriated by the national state agencies or local governments and applied to future actions.

Weak local capabilities to promote endogenous economic alternatives

In general, local development actors frequently lack the capabilities (knowledge, capital, productive resources) to jointly identify collective challenges and create initiatives to overcome them.

The national government has a weak local presence in the municipalities, except for the construction of major infrastructure projects through bidding with private contractors or small-scale infrastructural projects co-financed by the Social Investment Fund for Local Development (FISDL) in coordination with local governments. Representatives of central government's line ministries at the municipal level have limited decision-making power to assign priorities for the use of their budget allocations. They thus have limited capabilities to adjust their actions to local needs and coordinate with other local actors especially from the political opposition.

Although there is a significant body of discourse in favor of local development in rural areas, the central government has actively resisted the decentralization of resources and competencies towards sub-national actors on a municipal and regional level. There has been a gradual tendency towards decentralization of national state responsibilities towards the regional/local level, however, without sufficient financial and capability strengthening to carry them out.

One significant step towards decentralization was an increase in the national government transfer resources to the municipalities, from less than 1% to 6% of the national budget in 1998. However, this was only achieved after a significant political fight led by the national mayors' association and some civil society organizations, and then over-turning a presidential veto by the opposition parties in the legislature for the first time in Salvadoran history. Currently there is a process to increase this amount to 8% over several years which has again taken significant pressure from the FMLN, the municipalities and different sectors of civil society to achieve.

Most municipal authorities do not have the capabilities to mobilize sufficient resources to meet local needs for public investments nor are they capable of enrolling other actors and coordinating local development processes. In part this is due to a stunted process of decentralization of financial resources, clear decision-making power over territorial development and land use issues, and the support in building the organizational capabilities to carry out these roles. It is also due to the short-sighted vision of many local authorities, especially in the many small rural municipalities, that limits them to the fundamental but limited role of providing basic socio-economic services and implementing basic infrastructure projects.

The role of local governments is especially weak in relation to local economic development, even though they possess several important legal responsibilities in this area. Although, the central government and international development agencies have created the expectation that municipalities do more to promote LED, they have provided very limited resources for them to do so. From below, the municipalities are feeling pressure as local businesses and the population as a whole have turned to the municipality for support in dealing with their increasingly difficult economic situation. Demands for employment creation and support for their diverse economic activities are priorities increasingly expressed by a diversity of local actors.

Analysis of economic considerations in participatory local development planning in El Salvador suggests that municipal governments must learn better how to take economic development needs and strategies into account when determining priorities for municipal investments. Investments are generally focused on consolidating public infrastructure networks (roads, electricity, potable water and sewage systems, schools and clinics, housing, etc.), to meet community needs. A notable difficulty has been facilitating the integration of economic actors into the participatory planning processes and effectively mediating between the interests of private economic actors and community representatives (Cummings and Silva 2001).[17]

It is clear that the excessive centralization of resources and decision-making power in the Salvadoran State severely limits the potentially crucial role of the municipalities in promoting local economic development and providing the conditions necessary for the strengthening of economic initiatives like those integrated in the GBL. There is a significant need to decentralize national policy implementation to support small scale micro and small scale productive initiatives in rural areas. This would imply decentralization of the functions currently held by line ministries responsible for implementing these policies.

Synthesis of structural constraints

In synthesis, the most important structural conditions that constrain the viability of rural family economic livelihood strategies are:

- Historical exclusion of large areas of rural El Salvador from the benefits of economic growth and current concentration of population and economic dynamics in the most urbanized areas,
- Historical deficit and insufficient public investment after the civil war and successive natural disasters to provide adequate access to socio-economic infrastructure (affordable housing, roads, electricity, water, etc.) and public educational and health services,

[17] Cummings and Silva (2001) provide a general analysis of the economic content of a representative sample of participatory local development plans in El Salvador.

- Earlier historical concentration of land ownership and current limited real opportunities to develop viable activities on land distributed through different agrarian reform measures,
- Progressive withdrawal of state support for economic activities in rural areas under structural adjustment policies,
- High degree of dependence on externally funded and uncoordinated infrastructure projects and territorial development projects and NGDOs to make up the deficit in public investment,
- Macro-economic policies that have created a context that increases relative costs of production and reduce returns for many agricultural and other rural economic activities, at the same time that costs of living have increased with privatization of basic services.

1.4 A Dismal Conclusion? Unsustainable livelihoods

In conclusion, rural poverty is a central national development problem that is reflected locally in the deficit of opportunities and the corresponding capabilities of rural families to improve or at least maintain their livelihoods. This situation is expressed in income vulnerability and downward spirals in terms of the sustenance that families are able to achieve through their livelihood strategies.

The livelihoods of the majority of Salvadoran families, both in the urban and rural environments, cannot be considered sustainable as defined by Eade and Williams:

> "For a livelihood to the sustainable, means that an individual or group has the capacity to maintain or improve social, political, economic, and other opportunities in life without jeopardizing the opportunities for others and for their children. To do that they may need to offset a decrease in one aspect of a livelihood (for example, land to cultivate a crop) with an increase in another aspect (for example, skills in clothes manufacture and capital to set up a business). The capacity to resist 'shocks', sudden changes, and to create opportunities are characteristics of sustainable livelihoods" (1995: 63).

Due to insufficient food production and income generation, rural families frequently can hardly provide sufficient nutrition, especially to children and women, or access key social services related to health and education. This involves them in the "vicious cycle of poverty," as low education and poor health hinder future improvements in the livelihoods of the rural poor, within what is generally a very constrictive and exploitative social context. The spiral of negative causation is reflected in the human development indicators on health, education and income, that are significantly lower in rural than urban areas.

Without the means to create sustainable livelihoods, the poor are pushed to overexploit the natural and labor resources of their environment and their families in order to survive. This further contributes to their poverty and that of future generations as their productive resource base is reduced and with it current and future options for more sustainable livelihoods. Children who are forced to work at an early age and are persistently hungry do not receive or benefit from the limited education they do receive in order to improve their future opportunities. As the poor move down this spiral they are increasingly vulnerable to environmental risks such as floods, droughts and earth-quakes.

Rural families are thus faced with the challenge of adapting their livelihood strategies to rapidly changing structural conditions or migration of family members. The latter can result in survival on remittances but also family disintegration and possibly extreme poverty if the migrant cannot pay the significant debts incurred to pay for passage to the North.

1.5 Possible Alternatives? Rural Development Proposals

A diversity of national and international actors are proposing significant investments in rural areas to improve the livelihoods of rural Salvadorans and gradually reduce and possibly reverse the pressures

created by rural/urban/international migration. For example, the vast differences in human development indicators between urban and rural areas, lead the authors of the most recent UNDP report to argue that the implementation of any sustainable development strategy in El Salvador, must emphasize the eradication of rural poverty (UNDP 2003).

Given the rural nature of the most extreme poverty and social exclusion in El Salvador, Segovia argues:

> "… the best strategy to combat poverty consists in incorporating the rural areas and the agricultural sector into the country's overall development. Achieving this, however, is not an easy task as it requires, on the one hand, important public investments in social and economic infrastructure, which is indispensable for integrating the territorially and economically isolated and marginalized zones. On the other hand, it requires the design of an integral rural development strategy that includes among other things, an active minimum wage policy and measures destined to increase the income of agricultural producers and workers, as well as the promotion of non agricultural activities in the rural areas" (2002: 257).

In order to make Salvadoran agriculture viable there must be fundamental transformations made in the productive base and the system of key supporting services. Llort argues that, "the reconversion of the productive activities in rural areas should start with the transformation of traditional agriculture towards more profitable activities and more competitive products. In order for this to be successful *there must be emphasis placed on increasing agricultural diversification, as well as the specialization-differentiation, quality and value added to the products."* This process should include the development of more intensive production systems and adding value to primary products through packaging and agro-industrialization. "Salvadoran agriculture cannot compete on the basis of volume, but must *focus on markets that are willing to pay a premium for special product characteristics and their quality."* This transformation would imply *profound changes not only by the agricultural producers but also the public and private organizational and institutional set-up* that must support this process (2002: 13-14, my italics to highlight relationship to case study analysis).

She continues arguing that technological innovation or access to new agricultural technologies is a fundamental condition necessary for this reconversion process.

> "Given that the principal limitation is the reduced supply of technology for the products that are being promoted in the country, it is necessary to search for the mechanisms that will facilitate the access by producers that wish to innovate to this key service. The state has an important role to play in establishing the schemes that bring together supply and demand. In order to improve access to technology there is currently a process under way to design and create a "national system for technological innovation with the participation of the four principal actors: the producers (demanders of technology) defining their needs, the public and private, national, regional and international entities generating and transferring technology (technological service providers), the agro-industries and the consumers (defining what the market wants), and the government (norm setter and regulator) giving orientations and facilitating the process" (Llort 2002: 14).[18]

Along these lines there are significant advances in proposals for solutions and in some localities there have been important advances in practice, towards the solution of these problems and more sustainable economic development paths.

One proposal is the development of small and medium size agro-industries integrated horizontally and regionally as a priority component to a strategy for achieving social and economic welfare for the majority of the Central American people who live in poverty or extreme poverty in the rural and

[18] The first pilot regional committee for implementing this program is based in San Vicente and includes the CORDES Foundation as a leading representative of the regional NGDO service providers.

marginal urban areas (Lindegaard 1997, citing Atenburg et al., 1990; Stein and Arias Peñate, 1992; Tangermann y Ríos Valdéz, 1994). In particular, Lindegaard argues that:

> Cleaner agro-industrial technologies should be created and /or adapted and transferred to local, sub-regional and international producer and consumer circuits (including NAFTA and EU). In this respect, coffee, bananas, other organic crops [such as cashews] and natural reforestation (traded internationally as CO2 sink), much of which is provided by small and medium-sized enterprises, is already targeted to both regional and international markets, first through "alternative" commercial channels, but increasingly reaching mainstream consumers, as is the case with organic coffee (Boyce et. al, 1994). To this should be added alternative forest uses and agricultural practices in connection with e.g. biotechnology, pharmaceuticals and organic products, forest management and watershed management (1997: 27).

Roberto Rubio et. al (1997) also identify the development of agro-industrial businesses as a fundamental element of the national development strategy. They propose developing investment alternatives for new agro-industrial projects based on the diversification and re-conversion of agricultural production (with specific reference to organic products such as cashews), as well as the consolidation of productive chains.

Authors from the World Bank together with FUSADES (Valdez *et al*. 1997) argue that the diversification of the regional and local economies towards activities like *agro-processing*, services and industrial manufacturing would be an important component of a comprehensive development strategy for rural areas and the reduction of the rural poverty in El Salvador (my emphasis).

Ludmila Ortega working for the Economic Commission on Latin America (ECLAC 1997) argues that an important element in a strategy of agro-industrialization is the capacity to link the small and medium producers of the country with the agro-industrial companies. This would provide benefits to the producers permitting them to diversify and increase the profitability of their production upon having more secure market and financing options. The agro-industries would also benefit by securing more dependable suppliers of the quantity and quality of products that they need. She argues that, especially attractive, would be the promotion of crops that don't require significant economies of scale in the primary production, that are labor intensive to provide paid jobs to nearby people who can't produce, that have a high yield per hectare and at the same time are able to be articulated to chains with increasingly dynamic demand.[19]

1.6 Reasons for Cautious Optimism in Innovative Economic Initiatives

In conclusion, the main limits to substantial improvement of rural livelihoods in El Salvador are not a lack of understanding of the problems nor the development of seemingly sensible proposals for solutions. The problem is one of societal will and building the capabilities to collectively begin reflexive implementation of the proposed alternatives. In general, the institutional set-up and the organizational mechanisms needed to coordinate concrete initiatives to implement these proposals for change are not functional. As suggested in the introduction, however, there are reasons to maintain certain optimism concerning the societal capacity to implement innovative alternatives needed to overcome these challenges. This is based on the existence of emerging local economic initiatives that have the potential to make substantial contributions to improving rural family livelihoods and thus to resolving the larger societal problems associated with widespread rural poverty.

As innovative processes are generally interactive and incremental, the development of innovative solutions to rural development problems demands critical reflection to learn from past experiences

[19] One example would be organic cashews and another would be sugar cane for panela, both of which are being promoted in GBL economic initiatives as is discussed in Chapter 5.

and those currently emerging in places such as Tecoluca. The GBL's innovative economic initiatives could make a greater contribution if they were strengthened, but especially if there were processes in place to identify and diffuse lessons derived from analysis of the their achievements and the problems these actors have faced. It is thus of fundamental importance to understand the nature of the innovative capabilities that are being developed in these local economic initiatives and the contextual factors that are enabling or constraining the innovative practice of the actors involved. The present research effort aims to contribute to greater understanding of these issues that are crucial for the creation and strengthening of innovative local economic initiatives in El Salvador and other similar Southern contexts.

CHAPTER 2

Research Questions and Methodology

Having established a general understanding of the problems and their causes, as well as the general justification and rationale for this study, this chapter presents the methodological design for the research efforts, the results of which are included as the empirical base for the case study characterization and analysis in chapters 5-7. The research design for this thesis looked to take maximum advantage of a diversity of secondary and primary knowledge sources to generate a sufficiently thick empirical description upon which to base the case study analysis and the lessons learned from this analysis to strengthen these and similar efforts to promote local economic development in comparable Southern contexts.

Sections 2.1 and 2.2 present the research objectives and the related research questions which I seek to answer in order to draw lessons from the experience of the actors involved in the GBL's economic initiatives. Section 2.3 then discusses the nature of the GBL case study, the case study research methodology used and the sources for empirical information used.

2.1 Research Objectives

The central purpose of the present research effort is to understand the nature and emergence of the innovative capabilities of the task-networks involved in the GBL's economic initiatives and how exogenous factors enable or constrain their innovative practice. This understanding is then applied, generating lessons that can be applied to:

- Strengthening the innovative capabilities of the actors involved in economic initiatives in Tecoluca and other rural localities in El Salvador and Central America, in order to improve the sustainability of their business performance and, thus, the livelihood strategies of the families involved, and
- Strengthening the capabilities of local actors involved in regional innovation systems to better provide the enabling services and to construct the room for maneuver that are required for the emergence and strengthening of regional innovative economic initiatives.

A further aim of the thesis is to reflect on the needs for further theoretical development and empirical research that emerge from the application of the conceptual framework developed in the North to the analysis of innovative processes in local economic development (LED) initiatives in rural El Salvador. In this way the analysis complements initial efforts by others to apply elements used in the conceptual framework in Southern contexts.

2.2 Research Questions

The multifaceted case study presented in this thesis is focused on characterizing the innovative economic initiatives integrated into the *Grupo Bajo Lempa,* analyzing the innovative capabilities of the actors directly involved in these initiatives and the contextual factors that have enabled or constrained practice, especially those mediated through the dynamics of Tecoluca's emerging regional innovation system.

The four central research questions explored through case study analysis are grouped in two related areas.

Concerning the innovative capabilities of local actors:

- What are the most important capabilities that enable task networks of actors to innovatively transform the technological systems they are managing, related to production and commercialization operations?
- How and why do innovative capabilities emerge in the task-networks of actors involved in innovative economic development initiatives and agglomerations of related initiatives such as the GBL?

Concerning the constraining or enabling contextual factors:

- How and why do regional factors related to the localized production structure, business support network and associational governance structures of Tecoluca's emerging regional innovation system, enable or constrain innovative practice in economic initiatives?

- How and why do specific factors related to the national and international institutional set-up and interaction with national and international actors facilitate or constrain innovative practice in Tecoluca's regionalized economic initiatives?

2.3 Research Methodology

The Case Study

The research methodology used to answer these questions is based on the analysis of an in-depth multifaceted case study of the principal economic initiatives integrated in the Grupo Bajo Lempa and Tecoluca's emerging regional innovation system of which they form an integral part. The presentation and analysis of the case study is divided into three parts in Chapters 5-7.

Grupo Bajo Lempa's economic initiatives

The first part of the case study characterization and analysis focuses on the innovative nature of the economic initiatives integrated in the GBL and the emerging innovative capabilities of the networks of actors involved, expressed through their innovative practice in these initiatives (Chapters 5-6).

Within this part of the case study there is more weight given to the description and analysis of certain initiatives as compared to others, due to my perception of the lessons to be learned from analysis of these initiatives but also to the availability of more detailed information sources concerning their development. The more in-depth characterization and analysis of these initiatives deepens our understanding of the innovative process of technological transformation and the expression of the emerging innovative capabilities of the task-networks of actors involved.

Tecoluca's emerging regional innovation system

The second part of the case study (discussed in Chapter 7) focuses on the characterization and analysis of the emerging regional innovation system and a general assessment of the overall capacity of this system to support the development of innovative regional economic initiatives. The focus is on analyzing the relevance of the dynamics of the regional production structure, the enterprise support system and its different associational governance mechanisms for the implementation of innovative technological alternatives in the GBL's economic initiatives and other exemplary regional economic initiatives.

Motivation and rational for case study methodology

The complex nature of the research problems and questions involved in the thesis suggest the need for an in-depth case study methodology. Through the in-depth case study I aim looking to "clarify the deeper causes behind a given problem" which Flyvbjerg (2004: 425) argues is one of the key benefits of case studies as compared to more extensive social science research methodologies. In this case, the central problems are how and why innovative capabilities emerge in social interfaces between the diversity of actors involved in the initiative task-networks, and how the expression of these capabilities in innovative practice is enabled or constrained by factors from the regional, national and international contexts. I have chosen the Grupo Bajo Lempa initiatives as a suggestive case recognized nationally for its innovative nature.

The justification for this approach is further based on the two principal criteria discussed by Yin (1994) for the selection of a case study research methodology:

- The research deals with the *complex contemporary phenomenon* of the creation and strengthening of local economic development initiatives in a particular territorial context. The *relationship between the actor capabilities involved in these initiatives and the context is itself a central object for analysis* (p. 13).

- Central research questions explore how and why innovative capabilities emerge in networks of actors involved in coordinated action and how and why certain contextual factors enable or constrain their innovative practice (p. 7).

What is this a case of? Why this case?

Some initial qualifications

At this point, it is necessary to make some initial clarifications concerning the nature of the type of story that will be told concerning the Grupo Bajo Lempa's innovative economic initiatives and Tecoluca's emerging regional innovation system.

At times it may seem that I am trying to tell a series of success stories about the GBL's economic initiatives and thus generate lessons that can serve as some kind of bench marks for efforts to promote similar initiatives in comparable contexts. However, as I stress throughout the case study analysis, the "successful" nature of these experiences needs to be qualified. In fact the GBL's economic initiatives are not success stories in the sense of being consolidated competitive businesses with increasing shares in the national and international market. Most are barely able to completely cover their operational costs with a few being minimally profitable, including the most consolidated of these business initiatives: the Organic Cashew Agro-industrial System (SAMO) integrating cashew growing, processing and commercialization operations. In this sense I talk about emerging innovative economic initiatives and not firms as such.

I do argue, however, that the experience accumulated by the GBL's economic initiatives offers a suggestive story with potentially important implications for local economic development practice. The initial conception and design of these initiatives as innovative alternatives for rural development practice is in itself a key facet of the story. The business initiatives being consolidated are innovative in terms of the technological systems they are managing, as compared to similar small and medium sized business initiatives in their regional context and rural El Salvador in general. The organizational proposal of integrating small producers and factory workers as members of the associations that own the processing and commercialization enterprises, as well as progressively improving pay for input providers and industrial working conditions further differentiate them from many rural agribusinesses. These are novel ways of integrating income distribution and social sustainability issues into economic development activities. The effort to integrate and certify organic or at least cleaner production techniques into the whole process in these initiatives and to provide specialized bio-tech pesticide inputs to support this process, are significant eco-innovations (Segura 2000).

Perhaps the most important aspect of this part of the suggestive case is, however, the fact that rural families and the NGDO CORDES have been able to sustain cooperation over time to achieve advances, in the face of the significant structural odds against them (discussed generally in Chapter 1 and specifically in Chapters 5-7). Despite the many setbacks that they have faced along the way, those families that have maintained their participation in these initiatives have been able to at least maintain and sometimes significantly improve their livelihoods. Thus, this is a suggestive case of the attempt being made by a group of local actors (NGDO CORDES, producers and their organizations, small-scale agro businesses) to work together to demonstrate that sustainable rural / local development is possible, against all odds.

The discussion of Tecoluca's regional innovation system, stresses the emergent and as yet un-consolidated state of its systemic configuration and dynamics. In essence, I use the conceptualization of what a regional innovation system should be and how it should function to analyze the systemic elements that do exist and how they are in fact enabling and constraining innovative practice in some regional economic initiatives. Again, however, there are some achievements in configuring this potential regional system of innovation that are remarkable within the complicated context of rural El Salvador, as are discussed in Chapter 7.

A critical case of NGDO promotion of local economic development

In the regional and national context, this integral case study can be argued to be a "critical case" as it has "strategic importance in relation to the general problem," (Flyvbjerg 2004: 426). The problem in this case is how to support the creation and strengthening of innovative capabilities and economic initiatives that provide opportunities that rural families can be take advantage of to improve their livelihoods.

The Grupo Bajo Lempa's initiatives, more specifically, are atypical examples of NGDO supported local economic development initiatives due to a diversity of factors, including:

- The protagonic territorial presence of the NGDO CORDES Bajo Lempa sustained since 1993, which differentiates its practice from that of almost all other national and international NGDOs doing similar work in El Salvador.
- CORDES Bajo Lempa's capability to mobilize financial and technical resources from a diversity of private and public, national and international sources to support the emergence and consolidation of these initiatives within a specific territorial delimitation, which is comparatively greater than the majority of national and even international NGDOs doing similar work in rural El Salvador.
- The complementary capabilities of local base organizations, the local government and a reduced number of other national NGDOs that have also maintained a significant territorial presence and coordinated with CORDES in supporting local development dynamics in the Tecoluca region over a similar period of time.
- The quantity and quality of the productive resources owned by the small-scale producers with whom CORDES works, the majority of whom are beneficiaries of the Land Transfer Program under the 1992 Peace Accords.[20]

This constellation of specific circumstances makes this a type of "most likely" critical case (Flyvbjerg 2004: 426). In other words, it is a case where innovative capabilities would most likely emerge from interaction in local economic initiatives supported by a relatively dynamic regional context of actors, characterized as an emerging regional innovation system. In El Salvador these types of circumstances are present in only a limited number of regions.[21]

In fact it could be argued that this is a "paradigmatic case" for NGDO support of local economic development in El Salvador; paradigmatic in terms of the advances achieved but also the problems encountered and the future challenges faced by the actors involved. I will return to the discussion of to what extent this is true for the Grupo Bajo Lempa case as an entrance to the concluding chapter detailing the lessons learned from the analysis.

Besides these reasons for selecting the GBL initiatives as a suggestive critical and even paradigmatic case, I must acknowledge the pragmatic reasons for selecting it which I believe are equally valid. The in-depth understanding of the GBL's economic initiatives and the regional context from which they have emerged, which I have accumulated through work as a researcher-development practitioner related to the process in Tecoluca over the last decade made this complex case a logical choice.

This argument concerning the value of my direct participation in the local development process in Tecoluca for this research effort is supported by Flyvbjerg (2004: 429).

> "If one thus assumes that the goal of the researcher's work is to understand and learn about the phenomena being studied, then research is simply a form of learning. If one assumes that research, like other learning processes, can be described by the phenomenology for human learning, it then becomes clear that the most advanced form of understanding is

[20] These resources are comparatively more valuable than those possessed by other beneficiaries of the same program and small land holders in general. Although the quality and quantity of the lands transferred under the Land Reform in the 1980s were similar or better, many of these families still do not have clear title to their land, while those in the Bajo Lempa do, and many are struggling under threat of embargo to pay debts.

[21] Providing more concrete comparative details and analysis are tasks for further research.

> achieved when researchers place themselves within the context being studied. Only in this way can researchers understand the viewpoints and the behavior that characterizes social actors. Relevant to this point, Giddens states that valid descriptions of social activities presume that researchers possess those skills necessary to participate in the activities described: 'I have accepted that it is right to say that the condition of generating descriptions of social activity is being able in principle to participate in it. It involves "mutual knowledge", shared by observer and participants whose action constitutes and reconstitutes the social world' (Giddens, 1982: 15)".

This research effort represents the culmination of an incremental learning process as I step back to reflect critically on the knowledge accumulated, as well as the basis for what I hope to be an innovative continuing contribution to this and other similar local economic development processes.

A potential problem with the extent of my own embeddedness in the dynamics of the case study phenomenon that I am studying is that I am some how not "objective" in the analytical interpretation I present. I would argue, however, that all researchers observe and conceptualize empirical phenomenon from a particular perspective and thus the question is not really one of "objectivity," as this does not exist in reality. What I have tried to do in dealing with this "problem" is to provide a sufficiently thick description of the case study phenomenon so as to enable critical readers to agree or disagree with the analytical interpretations I then offer and the lessons I draw from this analysis.[22]

A case of applying the conceptual framework to a Southern context

A further perspective on this research process is to see it as an exploratory case in the application of a conceptual framework which integrates elements developed in the North for the analysis of innovative capabilities of firms, technology and innovation in technological systems and the functioning of regional innovation systems, to the analysis of these issues in rural El Salvador, Central America.

The empirical basis for case study analysis

As Yin (1994: 13) suggests, this multi-faceted case study "relies on multiple sources of evidence, with data needing to converge in a triangulating fashion" on the understanding of the phenomenon under study. As Yin further argues, the coherence of the complex data collection process over time was aided by the use of preliminary elaborations of the conceptual framework presented in the thesis to identify key aspects of the interactive innovation process and essential contextual factors affecting this practice.

The process of coming to understand the nature of the economic initiatives integrated in the GBL and Tecoluca's regional innovation system from which they emerge spans eleven years from 1993 to 2005 in the context of my work as a researcher for the FUNDE. This extended research process can be synthesized in the following way:

- Applied development research including diagnostic studies of family livelihoods, community social and productive organization, local development actors, their roles and specific activities, etc. based on a survey of family income and livelihood activities, interviews with key people and available documentary evidence. The first effort was focused on communities in the south of Tecoluca where CORDES first started its work. This was then partially integrated into a more general municipal study as the basis for subsequent attempts to articulate municipal development strategies. (1993-1997)
- Specific qualitative research efforts to develop initial case studies of specific GBL initiatives (the SAMO cashew and the SAAO panela initiatives) based on semi-structured interviews with key people and available secondary sources such as internal economic data, project evaluations and

[22] For further in-depth and contrasting reflections on this issue see Flybjerg (2001), Danermark et al. (2002) and Yin (1994).

other earlier studies. These initial research efforts are reflected in SUDESCA project working documents Cummings (1999, 2000, 2001a) and my masters thesis (Cummings 2001b) for the program of International Technology Planning at Aalborg University. (1999-2001)

- Participant observation during work coordinated with CORDES Bajo Lempa to elaborate a strategy to strengthen the GBL's economic initiatives and participation in different associational governance mechanisms promoting economic development in Tecoluca and its regional context; complementary interviews with key people concerning GBL's and regional economic initiatives and the functioning of the regional innovation system; coordination of a survey and interview study of economic initiatives in the Nonualcos region and elaboration of a strategy to strengthen these initiatives and the emerging regional system of innovation to support them. (2002-2005)

The Grupo Bajo Lempa's economic initiatives

In general, much of my work as a FUNDE researcher in Tecoluca has implied participation in different processes of collective reflection and planning efforts related to local development, which frequently has involved discussion of the process of emergence and consolidation of the different economic initiatives that are now a part of the GBL. I was also part of many discussions concerning the conformation and strengthening of the different social base organizations that also form part of the GBL. As a trained anthropologist, participation in these processes has been the source of significant insight into the relationships and power relations between the different actors involved as well as specific information as to the evolution of specific initiatives.

More specifically, my understanding of CORDES Bajo Lempa's development strategy has been built up through a series of more structured interviews and more informal conversations with the NGDOs regional manager and other key staff members of the strategic management team including the head of the regional agricultural program and the ex-operational manager. The most recent of these interviews were conducted in 2004.

With specific reference to the SAMO cashew initiative, I have monitored its progress since its conception in 1994. My first research tasks for the FUNDE included participating in one national survey of repopulated communities and then designing and conducting another concerning family income and organization for production in the South of Tecoluca, both of which implied interviews with people from the main cooperative cashew producer group in the Montecristo Island community.

In 2000 I conducted interviews with the industrial engineer working as manager of the processing plant and his assistant, the agricultural engineer in charge of CORDES´ agricultural program in Tecoluca and the local technician directly working with the producers, the general manager of CORDES´ regional office, eleven primary producers (2 women) in individual and sometimes group interviews. I also conducted brief on the job interviews with approximately forty women and men working in different jobs at the processing plant, including supervisors.

More recent information was collected during the period 2002-2005 through follow-up interviews and personal internet communication with key people involved with the initiative. These included the plant manager, an international marketing expert supporting the SAMO, the CORDES Bajo Lempa regional manager, the coordinator and a technician from the CORDES Bajo Lempa Agricultural Program. During this period I also interviewed the people from CORDES' central office in charge of the national agricultural program and the program supporting the business side of processing and commercialization in order to better understand their perspective on regional initiatives and their contributions to their development.

In relation to the GBL's other economic initiatives I have conducted relatively brief interviews with the business managers of each of those discussed in Chapter 5. These interviews focused on the problems they have faced throughout the emergence and initial consolidation of these initiatives, how they have managed to overcome these problems (or not) and their future challenges to become self-

sustainable businesses. Other specifically relevant interviews have been with the head of CORDES' agricultural program concerning the initially aborted and then renewed process of developing raw granulated panela sugar, as well as with an international volunteer who has organized a process of participatory experimentation with vegetable and cashew producers.

Relevant internal documents that have provided insight into the innovative nature of the GBL and its economic initiatives include the GBL's first strategic plan, public presentations concerning this experience, a strategy elaborated together with the FUNDE to strengthen its economic initiatives, project evaluations, feasibility studies for planned investments and internal memorandum from CORDES' regional management assessing the performance and challenges of the different initiatives.

Information obtained from these primary sources has been complemented by a series of relevant studies elaborated by external consultants and university researchers which are cited in Chapter 5.

Tecoluca's emerging regional innovation system

The most important research methods and primary data sources concerning the dynamics of Tecoluca's emerging regional innovation system include:

- Participant observation of the functioning of the different associative governance mechanisms discussed in Chapter 7 and my elaboration of diverse proposals for clarifying their objectives and improving their functioning.
- Methodological facilitation for the participatory elaboration of diverse municipal diagnostic studies and related municipal development plans, as well as more particular diagnostics and action strategies for strengthening *panela* (raw brown sugar) production in San Vicente, irrigated agricultural production in Tecoluca and the management and promotion of a new municipal market in Tecoluca.
- Personal communication with key producers and people from enterprise support organizations involved directly working with the additional examples of regional economic initiatives discussed in Section 7.1.
- A study of the development potential of economic initiatives from 15 rural municipalities including Tecoluca in the Nonualcos Region. This study first characterized a total of 179 initiatives using 10 composite indicators based on initial survey responses, and then entered into greater depth concerning their "demonstrated development potential" through follow up interviews with key people involved with 45 of the highest ranked initiatives.[23]

Complementary information for this task was obtained through the review of a diversity of secondary sources which are cited in Chapter 7. These include the territorial diagnostic studies and development plans for the municipality of Tecoluca and the department of San Vicente, different studies of specific regional economic initiatives, as well as internal evaluations, publicly available systematizations, newspaper articles and other documents concerning the work of the principal territorial development programs working in this regional context.

In conclusion, this research effort has involved a significant effort to pull together diverse sources of primary and secondary information, accumulated over a significant time period, as the basis for the relatively thick case study descriptions and insight incorporated into the analysis presented in Chapters 5-7. A retrospective analysis of the adequacy of this information base and future empirical research challenges is the task of Chapter 9.

[23] The study was conducted by the FUNDE in coordination with CORDES *Bajo Lempa*, contracted as consulting agencies by the GTZ-Economics Ministry program FORTALECE (Martinez et al. 2004). The report also includes a proposal for actions to strengthen these initiatives, stratified on a systemic level and for each of the key actors: the initiatives themselves, public and private supporting agencies and the municipal governments. I co-coordinated this study and was responsible for the research design, editing the diagnostic study and writing the action proposal.

PART II

Conceptual Framework for Case Study Analysis

CHAPTER 3

Developing Innovative Capabilities in Economic Initiatives

Within the context of often severe structural constraints and limited opportunities that are difficult to identify and take advantage of, local actors in Tecoluca have demonstrated their capability to create a diversity of relatively innovative economic initiatives integrated in the *Grupo Bajo Lempa* Consortium. The central purpose of this chapter is to establish the conceptual framework for understanding endogenous causal mechanisms explaining how and why these groups of actors have been able to introduce qualitatively new economic activities and incrementally transform their technological systems in order to slowly improve the performance of their business initiatives and improve the livelihoods of the rural families involved.

The nature of these innovative capabilities is intricately related to the broad and dynamic conceptualization of technology and the transformation of technological systems adopted here. This conceptualization of technology and technological transformation in essence demands an actor centered approach, focusing on the individual but especially the diverse collective capabilities of the groups of actors involved in implementing technological innovations in their economic initiatives. Technological innovation is thus conceptualized as an interactive, multi-dimensional and incremental process driven by "task-networks" of actors involved in localized economic initiatives.

Although the focus is on the endogenous capabilities of these actors (leaving the conceptualization of contextual enabling and constraining forces to Chapter 4), it is stressed that networking with exogenous actors within and beyond the boundaries of regional innovation systems, understanding the demands and functioning of external markets, etc. are central to the innovative capabilities of task-network actors.

The chapter is divided into six sections. Section 3.1 lays out the broad definition of technology and discusses the dynamics of technological systems. Section 3.2 presents the framework for understanding the dynamics of technological transformation and their importance for sustainable business performance and human development. Specific arguments are developed in relation to the social construction of technological change, the micro-dynamics and characterization of technological innovations and how innovation is to be understood in small scale industries in the South. Section 3.3 discusses diverse conceptual perspectives for the characterization of innovative local economic initiatives.

Section 3.4 then goes deeper in developing our understanding of innovative knowledge and interactive learning in relation to innovative practice. Related arguments are presented concerning the importance of networking for learning and how actors learn to network. Section 3.5 discusses the concept of dynamic assimilation of exogenous technological components into local systems and the importance of actors playing boundary spanning roles in this process. Section 3.6 then concludes the chapter further developing the novel concept of innovative technological capabilities and their emergence among task-networks engaged in innovative economic initiatives.

3.1 Technology and Technological Systems

The analysis of small-scale family based agricultural and cattle production as well as the performance of small and medium scale agro-industrial enterprises in the context of the rural South, and El Salvador in particular, demands an integral understanding of the technologies they employ and, especially, their capabilities to implement technological transformations. It is thus not useful to restrict our conceptualization to some limited types of complex technologies, generated in the Northern centers of the globalizing "knowledge economy," but to take a broader view of the generation, diffusion and use of a diversity of technologies in society.

Technology

Based on their analysis of technological change in industrial systems in the South, Bell and Albu (1999: 1717) present the following broad view of technology and technological transformation:

> "… analysis of change in a firm's production technology must encompass much more than just its machinery-embodied technology. Technology is a much more complex bundle of knowledge, with much of it embodied in a wide range of different artifacts, people, procedures and organizational arrangements. These embodiments of knowledge include at least: product specifications and designs; materials and component specifications and properties; machinery and its range of operating characteristics; together with the various kinds of know-how, operating procedures and organizational arrangements needed to integrate these elements in an enormously variable range of different production systems. Moreover, as these elements of technology are highly interconnected, improvement in something as ``simple'' as product quality may require changes to be made across several linked elements of the bundle, e.g., in machine hardware or operating procedures, the organization of production flows, or the specification and treatment of materials."

This definition stresses the multi-dimensional nature of technology and the complexity of even incremental technological transformations in industrial systems in the South, similar to those being deployed in the GBL's economic initiatives. The conceptualization I will use shares these basic characteristics, but differs in the sense that technology is understood as more than a bundle of embodied knowledge.

Müller (2003: 29) presents an extremely broad working definition of technology as "one of the means by which mankind reproduces and expands its living conditions" which he then operationalizes through the conception of technology as a dynamic combination of four interconnected elements: technique, knowledge, organization and product.[24] This definition emphasizes and demands analysis of the purposes for which different technologies are deployed in society, although it leaves us to further delimit "technology" from other means by which humankind might reproduce and expand (or reduce/destroy) its living conditions. With reference to Bell and Albu's definition, knowledge is treated as a discreet element of technology although obviously related and embodied in the other more tangible elements. The main structural contents and related process features of each of the four components and variables for technology analysis are presented in Box 1.

[24] This definition was first forwarded by Müller (1973) in his PhD dissertation analyzing choice of technique in transportation infrastructure in Tanzania and later applied in his analysis of the technological systems of village blacksmiths in Tanzania (1980).

[25] It should be noted here that although I use my native English from the United States of America throughout the text, frequently the author's quoted use English from Great Britain.

[26] Frede Hevelplund also from Aalborg University (personal communication 2004) suggests that this technology concept is incomplete without considering the financial capital inpus embedded in a given technological configuration. It seems to me that this could be best considered as part of the technical process along with other types of inputs.

Box 2
Components of Technology[2]

Technology as technique: The structure of technique is made up of all the physical means of production or implements, hard-ware, involved in the technical process in question. To this come *the raw materials*, *components* and *energy inputs* that are transformed or consumed in the same process; in this sense the process is a transformation and coT process. These processes are set in motion by *physical labour*; we thus have to do with a labour process as well.[3]

Technology as knowledge: The knowledge component or soft-ware is structured according to the empirically acquired *skills, tacit knowledge* and *intuition* of the direct producers and the *scientific insight* and *creativity* of the technology designers. An increasing portion of the soft-ware is being built into the hard-ware as *embodied* knowledge. The processes involved are physical labour processes and searching-learning processes, which include all kinds of information input processing.

Technology as organisation: The internal *division of labour* and *pattern of specialisation* are central to the structure of the organisation component of technology. Sometimes this component is implied in the soft-ware concept. However, for arguments sake, we call this component the "org-ware". The counterpart to the division of labour is co-operation. This requires *management* and *co-ordination* and involves all kinds of communication processes which can also be embodied in the hard-ware and/or soft-ware, or disembodied, i.e. person bound….

Technology as product. The product component of technology stands for the *immediate result* of the combination of all the above mentioned processes. The structure of the product takes indefinitely different kinds of shapes. Here we shall just mention a distinction between material objects and immaterial services.

Source: Muller (2003: 31).

Hillebrand *et al*. (1994: 3-4) adopt a similar broad definition of technology as comprising these same four components [technical hardware, know-how, organization and the product].[27] They argue that this broad definition is more appropriate for the discussion of technological capabilities than one limited to the "know-how required to develop and apply technical procedures" as this excludes the other key factors without which it is difficult to understand the deployment of a given technology. Understanding the dynamics of a given technology implies how it has emerged and is integrated into a given context. The knowledge component of technology includes organizational knowledge and cannot be analyzed in isolation from the organizational structures through which knowledge is applied. Technological change implies organizational change as well.

Muller (2003: 32) further argues that integrating the product "enables us to comprehend the total *purpose*-oriented application of technology… as a means to satisfy needs or solve problems." Considering the product also explicitly links connected production processes where the products of one are input to the technical process in the next and enables a complete life-cycle analysis as the product enters the phases of final use and disposal. Finally, "without a clear perception of the exchange-value attribute of the product, the specific formation of most technologies becomes incomprehensible."

Technological dynamics

A central thesis argued by Muller (2003) related to this conception of technology is that "a qualitative change in any one of the components will eventually result in supplementary, compensatory and/or

[27] No reference is made to Muller's earlier work, possibly explained by the widespread use of this broad definition in "the international discussion on development policy" (Hillebrand et al. 1994: 4).

retaliatory change in the others [and] if this does not happen, the initial change initiative will become abortive." In concordance with Bell and Albu's (1999) arguments, this further emphasizes the systemic nature of technology and transformations in its components and their relations.

In addition to a given set of elements related to these four constituent component areas and their relations, technologies or specifically delimited technological systems are characterized by their particular dynamics of change. This is fundamental for prospective analysis of its future trajectory, given the path dependent nature of technological evolution. In this sense, much as the products of the technological systems are an embodiment of a particular technical process, organized in a certain way and requiring particular knowledge, the current state of the technological system is the embodiment of a particular process of historical transformation. The systemic dynamics of change over time are thus a third configurational characteristic of a given technology, along with its constituent components and their relationships.

Applied to the analysis of the GBL initiatives, technology can thus be understood as a system encompassing the transformative practices of knowledgeable actors organized to combine a diversity of technical inputs through specific processes to produce certain products (goods and/or services) with the main purpose of improving their business performance and the livelihoods of the families involved. Within the context of the GBL's innovative local economic initiatives analyzed, distinctions are made between the delimited technological systems that characterize primary agricultural production, agro-industrial processing and commercialization operations, as well as the provision of different types of production support services (technological research and development, financing, technical assistance, training, etc.).

Applying the concepts

This dynamic conception is applied to the analysis of the technologies being deployed and technological dynamics within the GBL's economic initiatives in Chapter 6 (6.1). This includes a more detailed analysis of the dynamics of the linked systems of cashew production, processing and commercialization in the SAMO initiative.

3.2 Dynamics of Technological Transformation

This section discusses the importance of establishing a virtuous relationship between technological innovation, the competitiveness of firms and sustainable human development and then explores the dynamics of technological transformation in greater depth from two complementary perspectives. The first is a more general view that emphasizes how diverse actors are enrolled in the social construction of specific trajectories of technological development and how their contribution to this process reflects their socio-economic interests as well as their particular criteria for prioritizing problems and specifications for potential solutions. The second perspective complements this one by focusing on the specific nature of the innovative process and the central importance that technological transformation has for improving the sustainability of business performance.

Technological innovation, competitiveness and sustainable human development

Technological innovation is a fundamental component of the competitive strategy of firms and regional and national economies as a whole. Staying in a competitive position within the market requires growing capabilities within a firm to create innovations in its products and in the processes which determine its relative efficiency (Lundvall 1992a; Lindergaard, 1997). Technological innovation is also essential to increase the environmental and social sustainability of production activities (Cummings 2001a, 2001b; Segura 2000; Orozco 2004).

I understand the sustainable performance as defined by Orozco (2004: 28-29). He argues that, at the level of a particular firm, sustainable performance is a relative concept implying a co-evolutionary process between setting and striving to achieve multidimensional "desired scenarios of performance in three dimensions (economic, social and environmental)." Sustainable performance evaluation, which is at the heart of his research effort, demands a "systemic approach, because it considers multidimensional objectives and suggests a systemic way to evaluate targets and strategies."[28]

In a wider sense, Arocena and Sutz (2004a) suggest that technological innovation is fundamentaly linked to the structural causes of socio-economic inequality in Latin America. They argue for establishing a dynamic of proactive equality, whereby processes designed to diminish inequality do so in ways that facilitate collective learning and strengthen innovation capabilities, thus establishing a virtuous circle that enables further economic and social progress.[29]

Technological innovation has been a defining element in the emergence and initial consolidation of the GBL's economic initiatives. Continuing this process of technological transformation is crucial for their future sustainable business performance and achieving their overall goal of improving the livelihoods of the rural families, thus contributing to the goal of sustainable rural development in El Salvador.

The social construction of technological change

Technological transformation is a dynamic, interactive process carried out by a diversity of relevant groups of actors, competing or cooperating within the room for maneuver they are afforded or can construct within the prevailing structural conditions. These relevant actor groups have diverse perspectives on the process of technological transformation and its expected outcomes, on what problems are to be solved and how best to solve them (Bijker 1987). The technological systems in place in a given context can thus be seen as embodying the social, political and economic interests of the particular social groups involved in their emergence and consolidation. Likewise the development of a determined technology is characterized by those whose interests have been excluded from the process (McLoughlin 1999, citing Clausen and Williams 1997).

The transformation of technological systems is a process that can have local, national and global dimensions, depending on the origin of forces affecting it and the delimitation of the system itself. For example, the technological system implied in cashew processing could be seen as the combination of the cashew processing sub-systems in operation in different territories on a global scale. They are linked through flows of knowledge, techniques and sub-products between them, through product specifications and market competition, etc. However, here I use the concept of a technological system to denote the specifically delimited sub-system being operated within a certain regional context by determined task-networks of actors. The wider scope of the global cashew growing and processing technological system can be understood with reference to the concepts of technological paradigms and trajectories (Hull et al. 1999 and Dosi 1982, 1988).

Dosi (1988: 1125-27) echoes Muller (2003) arguing that in general terms "technological innovation involves the solution of problems." However, these problems are typically not clearly specified and

[28] Orozco operationalizes these dimensions as follows: "More operational targets in the economic dimension at firm level are related to competitiveness and to the selection of critical variables of performance in the production chain according to the characteristics of the markets in which the firms compete… In the environmental dimension the targets are related to the reduction of resource consumption (water, energy, chemicals, etc.), the reduction of emissions (wastewater, smoke, noise, solid waste, etc.), internal recycling, separation of organic waste and reuse of it for other purposes (e.g. animal food), to a more efficient use of raw materials, and to the substitution of toxic chemicals and dangerous materials (Gilbert, 1993)…. Operative targets in the social dimension are related to issues such as quality of life of owners and employees (income, health and social security with respect to the rest of the economy) labour satisfaction, and social opportunities. It is of big relevance the study of human resources as a core factor for innovation processes" (2004: 29).

[29] This can be related to Sen's more general argument that the expansion of people's freedoms, especially capabilities to take advantage of opportunities, are not only the primary end of development efforts but are also its principal means (1994, 1995, 1999, cited by Arocena and Sutz, 2004a).

understanding of the problem does not immediately suggest how it can be solved, especially any "optimal" solution. The search for solutions is based on the knowledge base of the firm or actors involved, understood as the "information inputs, knowledge *and capabilities"* they have access to. In order to orient their search activities, firms draw upon what he calls technological paradigms which "embody an outlook, definition of the relevant problems, a pattern of enquiry. A 'technological paradigm' defines contextually the needs that are to be fulfilled, the scientific principles utilized in the task, the material technology to be used." The technological paradigm also suggests procedures to follow, competencies that are needed and the heuristics which suggest strongly which technological alternatives to pursue and those to neglect (see also Dosi 1982).

Within the context of a given technological paradigm, the actual problem solving activities that emerge can be understood as *technological trajectories*. Hull et al. (1997: 188) argue that within the evolutionary economic approach (to which Dosi belongs) the concept of technological trajectories "expresses the cumulative and evolutionary features of the developments and changes in technologies as they emerge, are diffused and are employed in the production of goods and services. The cumulative nature of the process involves the narrowing of the range of potential choices as the evolution of the technology proceeds."[30]

The consolidation of technological regimes within society and the corresponding development of related technological systems along given trajectories will also be intricately linked with other tangible structural conditions, for example, physical infrastructural systems, particular technological standards, the development of complementary technologies, market structures and expectations, etc. (Dosi, 1988).

Within the Social Construction of Technology approach, Bjiker (1995: 191-2) develops a similar and complementary concept of *technological frames*.

> "Technological frames provide the goals, the ideas, and the tools needed for action. They guide thinking and interaction. A technological frame offers both the central problems and the related strategies for solving them. But at the same time the building up of a technological frame will constrain the freedom of members of the relevant social group. A structure is being created by actions and interactions, which in turn constrain further actions and interactions. Within a technological frame not everything is possible anymore (the structure and tradition aspect), but the remaining possibilities are relatively clearly and readily available to all members of the relevant social group (the actor and innovation aspect)."

This concept more clearly reveals the socially constructed nature of technological trajectories and paradigms and the way in which they both enable and constrain the technological innovation process. In this sense, Bijker (1995) makes an additional key distinction between semiotic power embedded over time in the structural phenomenon associated with the way a stabilized technological frame enables or constrains actions and the micro-political power expressed through the practice of specific actors involved in implementing technological transformations.

A process of technological innovation can occur within a dominant technological frame or in a situation where no frame is dominant or there are a diversity of frames, providing competing definitions of socio-technological problems and alternatives for solving them. Innovations embedded within an existing frame will tend to be more incremental and constrained by the limited options perceived by the actors involved. On the other hand, innovations that contradict dominant frames or emerge from situations where no frames are dominant may be more radical in nature, but also very dependent on the capabilities of enrolling the necessary actors to consolidate the process (Bjiker 1995; McLoughlin 1999).

[30] Muller 2003 develops this idea in a multi-layered model of technological innovation that emphasizes the paths not taken as fundamental characteristics of technology dynamics.

In order to further explain the initial selection between an emerging variety of technologies and how trajectories become consolidated as such, evolutionary economics has developed the concept of the *selection environment* where economic, institutional and social factors play a role in "shaping a technology." Technological development implies a continuous co-evolutionary process between the constrained emergence of variety within technological trajectories and the diversity of factors that impinge on the functioning of the selection environment Schot (1991, 1992).[31]

Schot (1992: 38) argues that, "Since technological development is a search process involving trial and error and uncertainty, and various options are implemented and evaluated, it can be conceptualized as a sequence of variation and selection processes." [32] This search process is characterized by varying degrees of uncertainty as technologies under development have yet to demonstrate their technical feasibility, economic viability, social acceptance, etc. Actors involved in promoting or developing a technological system along certain trajectories must enroll a diversity of others in their efforts, motivating them with their projections and maintaining their involvement through the demonstration of tangible results. "Expectations and promises are therefore of crucial importance to technological development and once they are accepted they are converted in heuristics that guide the technical search process. Technological development implies that you have to make your way as you go along" (Schot 1998: 195-197). Following the previous arguments, these heuristics developed for decision-making could become increasingly institutionalized in the technological paradigms or frames in which the actors are positioned.

Schot (1991, 1992; 1998) argues that the creation and strategic management of niches, where new technologies can be developed without the extreme direct pressures of the selection environment, are crucial for the process of technological change. This would be especially true for technologies being developed in environments where there is no dominant technological frame or in juxtaposition to a dominant frame; the development of technological alternatives related to organic agriculture for example.

Niche creation and management is a collaborative process between the particular producers and users of a new technology, as well as third parties drawn in as intermediaries. These actors work to deliberately integrate the variation and selection processes; improving the definition and special advantages of a technological alternative in correspondence to the evolving demands made of it in the environment in which it should function "Accordingly, it is not the case that there must first be a market to bring about the development of a specific technology. Both – market and technologies – are developed at the same time." As the technology matures there is generally a process of diffusion that involves the branching off of the technology into a progressively wider diversity of niches (1992; 1998: 196-197).

Thus, within the context of technological frames, paradigms and specific trajectories, different groups of actors construct positions of relative power and vested interests, related to the maintenance or transformation of key aspects of the technologies. At any one time there may be a diversity of relevant social groups, involved in tense negotiations or conflicts for hegemony in terms of the power to define technological problems and solutions within a given societal context. Participating in this process implies not just accumulating the specific capabilities necessary for constructing a given technological alternative or artifact with certain attributed potentialities for solving a determined set of problems. It also implies those capabilities necessary for the *enrollment* of other actors to collaborate in the effort to develop the technological alternative (creating novelty) and to support its emergence (selection) within the market and society as a whole, through given niches or channels of users.

[31] On the one hand there is a "hard, structured selection environment that exerts an influence on variation that manifest themselves by blocking certain variations and encouraging others in their development." In this sense, "social, political, and economic factors are embedded, as it were, in technological development." However, it is also important to realize that successful development of variations changes the selection environment (Schot 1992: 39-40).

[32] This co-evolutionary characterization of technological trajectories and the selection environment is similar to the suggestion made by advocates of the actor-network approach that markets and technologies are produced simultaneously (Hull et al,: 190).

The micro-dynamics of technological innovation

Building off of Schumpeter's work on technological innovation, authors related to the innovation systems approach, define an *innovation* as a complex process involving the embodiment of new knowledge or a new combination of knowledge already existing within the economy in diverse forms. This can imply, for example, the introduction of new techniques and production processes, new forms of organization for production and firm management, the application of existing technology to new fields, the introduction of new products or services and/or the development of new markets. This conception of innovation as involving the production, diffusion and use of new or newly re-combined knowledge, suggests that it is generally the result of an incremental, cumulative and interactive learning process, as well as the exchange of other vital resources (Lundvall, 1992, Lindergaard, 1997; Niosi *et. al.*1993, cited by Orozco 2004; Edquist, 1997) At the firm level, "the results of innovation are performance improvements, related to the specific kind of targets the firm desires to reach, which are defined in the economic, social and environmental dimensions" (Orozco 2004: 47).

Muller (2003: 30) defines technological innovation more holistically as a generally incremental process characterized by "a qualitative change in any of the four elements of technology that effectively leads to a transformative move and thus change of the other elements." A qualitative change implies a "change in the structure-process relations within and between the different parts."

An area of agreement between these authors is the incremental and cumulative nature of most innovative processes. The main distinction between these definitions is the explicit focus or not on knowledge as the "the most important resource; and learning, the most important process" for achieving innovative performance and thus competitiveness and even sustainable development (Johnson 1997: 2-3).

Within the systems of innovation approach, the emphasis placed on knowledge acquisition and application for the creation of innovation, seems to take for granted the acquisition of other resources necessary for innovative practice such as investment and working capital. The acquisition of these resources is especially fundamental for technological innovation in the South, and certainly for the types of innovative initiatives being developed in by the GBL's economic initiatives in Tecoluca.

This emphasis on knowledge acquisition through interactive learning, furthermore maintains implicit the importance of networking capabilities necessary to establish, exploit and maintain linkages with external resource providers and learning partners. Also implicit is the importance of internal coordination capabilities necessary for the dynamic assimilation of external knowledge and other resources into the technological system. External networking and internal coordination practices related to innovative endeavors certainly require a diversity of general and specific more tacit and contingent knowledge. However, there is a definite relational and organizational component to innovative practice that cannot be reduced to the knowledge of how to carry it out.[33]

Without denying the fundamental importance of learning and knowledge for shaping innovative practice, the conceptualization of technology used here identifies knowledge as one of four interconnected components of technology, and thus brings the other components and the interrelationship between these components more clearly into focus in the innovation process.

Characterizing innovation dynamics

There are a variety of ways suggested in the literature through which innovation dynamics can be categorized. Frequently a distinction is made between innovations in (technological and organizational) processes and products (goods and services) (Edquist 2001: 7). However, with reference to our conceptualization of technology, it is more precise to identify the area of the technological system in which the innovation has been first implemented and how this change influences other system

[33] The importance of interactive learning, external networking and coordination within the task-network is emphasized in the conceptual discussion of innovation capabilities below and revealed empirically in the analysis of innovative practice in the case study economic initiatives.

elements.[34] Changes in the knowledge component of technology become embodied in the other components as soon as people apply new knowledge to transforming them, for example.

A second fundamental distinction to be made is where to place a particular innovation on the continuum between incremental and radical, with respect to its relative novelty and the corresponding level of risk involved in the innovative processes. Freeman (1982) proposes the following typology:

- True uncertainty: fundamental research, fundamental invention.
- Very high degree of uncertainty: radical product innovations, radical process innovations outside firm.
- High degree of uncertainty: Major product innovations, radical process innovations in its own establishment or system.
- Moderate uncertainty: licensed innovation, imitation of product innovation, modification of products and processes, early adoption of established process.
- Very little uncertainty: new model, product differentiation, agency for established product, late adoption of established process innovation in own establishment, minor technical improvements (cited in Lindegaard 1997: 4).

Radical technological innovations introduce major discontinuities in the economic activities of firms, regional, national or possibly global production systems. They may open up new opportunities for related entrepreneurial activities, but can also render competing technologies obsolete in the market context and possibly provoke the destruction of firms, the employment they generate and other social problems. Radical innovations can also introduce new sources of significant environmental risks into the social sphere as in the case of nuclear energy and weapons. The more radical the technological innovation the greater structural changes will be required if it is to be accommodated (selected) within a given socio-economic context.[35] As suggested earlier, radical innovations break new ground and can be associated with the emergence of new technological trajectories and technological regimes.

As Freeman argues, radical innovations "… require different types of research and development, different relationships with basic science, different types of marketing and financing, different types of inputs and lead to a different pattern of productivity gain. By definition they need new skills and management organization and different types of production equipment." However, radical innovations frequently require a diversity of subsequent incremental innovations in their core technologies and the development of new systems of complementary technologies in order to reveal their potential economic, social and/or ecological importance (1992: 80-81).

A final distinction that is directly relevant for analysis of the GBL's innovative economic initiatives is the degree to which an innovation is new in relation to the past activities of the firm in which it is implemented, a specific geographical cluster of firms, a determined regional context, or a specific technological "sector" within the national or international innovation system and also the extent to which it is new to a specific regional or national market or the global market as a whole.[36]

Innovation in small scale industries in the South

Sverrison (2002: 281, 291) argues that technological innovation, far from being absent in the dynamics of small-scale manufacturing firms in the South, is prevalent. His analysis of the introduction of new manufacturing technologies in small-scale enterprises in the South, leads him to suggest that innovation

[34] This imprecision in Equist's typology is also acknowledged in a footnote by Orozco (2004: 47).

[35] In this sense Freeman (1992: 74) argues that "if new infrastructural investment is also needed and the new technology system is so extensive and influential that it affects the performance of the entire economy, this amounts to a change of 'techno-economic paradigm' (Perez, 1983)."

[36] See for example, the distinctions made by Kaufmann and Tödtling, between product innovations that are new to the firm or to the market and the implications this has for the innovation process and the potential performance benefits to be obtained (2001: 792, cited in Orozco 2004).

should be understood as: "the activity of bringing novel technologies into social contexts where they were not before, leading to new products, better quality of old products or lower production costs. Technologies are, as it were, re-innovated each time they are brought into different social contexts. New ways of organizing maintenance, new applications and new ways of organizing work with these technologies and new competence in operating them under local conditions have to be found to make local innovation based on 'technology transfer' work." The subsequent creative adaptation of exogenously acquired technologies is an important part of their assimilation into local contexts.

In a similar way, Parrilli (2002: 144) states that innovation, in the case of the handicraft furniture industry in Nicaragua, generally does not involve "production of 'absolutely new' products, processes or ways of doing things." Rather, he observes more incremental changes in technological systems that enable the small firms to enhance their competitiveness and specifically, "attribute new and attractive elements to the product, fostering its price structure and demand." As examples, Parrilli cites aspects such as changes in design, finishing, marketing and distribution, production inputs, technology, intra- and inter-firm organization and services.

It can thus be argued that, innovation dynamics within small-scale industrial firms and clusters in the South (such as those integrated in the GBL) are generally characterized by the transformation of technological systems in ways that are new to the firm or the regional cluster in terms of production techniques and organizational forms, and/or the introduction of new or substantially improved products into the local or national markets, possibly into niches they had not penetrated before.

Technological innovation is also frequently dependent on exogenous transfer processes and can be understood as part of a larger process of evolutionary diffusion and localized adaptation of externally technologies developed. From the global perspective these adaptations can be considered incremental innovations or even digressions compared to use of designs under more "optimal" conditions; however, from a local perspective the technological transformations introduced in localized systems can be considered radical, involving high degrees of uncertainty and significant capabilities for the dynamic assimilation of exogenous components (Bell 1997; Muller 2003).[37]

Applying the concepts

The framework developed here, integrating the general social constructivist perspective on technological transformation with complementary views on the micro-dynamics of innovative processes, is applied to the description and analysis of the GBL's economic initiatives in Chapter 5 (5.2) and 6 (6.1). The conceptualization of technological trajectories and paradigms is also considered in the analysis of exogenous factors that enable and constrain innovative practice, integrated in Chapter 7 (7.1).

3.3 Innovative Local Economic Initiatives

As stressed in the proceeding sections, technological innovation is an interactive process. Within the set of actors involved in a process of implementing technological innovations in a given economic initiative, a distinction must be made between the central firm or closely linked group of actors directly involved in the implementation process (developing strategies, taking the most important decisions, assuming investment risks, etc.) and others that contribute diverse resources, but are more contingently linked to the process. Generally their linkage is through the active enrollment of the central group, which I refer to as the *task-network*.

In order to discuss the conglomerations of localized economic activities being developed within the GBL in Tecoluca, I further develop the concept of the *innovative local economic initiatives*.

[37] The concept of dynamic technological assimilation is further elaborated on in section 3.4.

By this I refer to a specific configuration of local actors involved in a coordinated effort to create and strengthen a set of interrelated economic activities. The GBL's economic initiatives integrate a diversity of discrete economic activities and technological systems, such as those involved in primary agricultural production, agro-processing and organized commercialization operations. This flexible conceptualization of innovative economic initiatives is thus adopted to facilitate the integrated analysis of coordinated actions between the small-scale agro-industrial enterprises and associations of producer families, as well as with non-firm organizations such as NGDOs.

Innovative economic initiatives must involve task-networks in introducing innovations in the localized technological systems of production and commercialization. Following the arguments from the previous section, they can be considered innovative if the economic activities promoted involve the introduction of qualitatively novel technological dynamics in the local or wider contexts; introducing new technical processes, knowledge requirements, organizational set-ups and/or products marketed. Although the technological systems being managed may represent rather radical breaks with historical technological trajectories being developed locally, it is also true that these novel combinations of endogenous and exogenous components will generally be integrated through incremental innovation processes over significant time periods.

The concept of an economic initiative, as such, also suggests that these organizational entities *may* be differentiated from consolidated micro, small or medium sized firms, in that their economic activities may still be emerging and not yet consolidated. This is not necessarily the case, however, as their ultimate goal is to become self-sustaining profitable businesses. Economic initiatives may (or may not) be formally (legally) constituted businesses and operate under formal institutional set-ups of different types (health and environmental regulations, tax codes, international certification regimes, etc.).

Although innovative initiatives may still be in an early phase of business consolidation, my conceptualization proposes that they must represent alternatives with the potential to make a significant contribution to more competitive and sustainable local economic development dynamics.[38] In this sense, the prime objective of their collective action is to improve the economic, social and ecological sustainability of their economic activities and thus the livelihoods of those families involved. Thus, the intentionality and directionality of the interactive practice of creating and strengthening of initiatives are emphasized, as well as the sustainability of their initial performance outcomes. They could thus also be called innovative local economic development initiatives.[39]

The analysis of the nature and dynamics of the GBL's innovative economic initiatives is carried out in relation to several related concepts discussed in the remainder of this section.

Initiatives as structured interfaces

Although the innovative economic initiatives imply coordinated actions over time between the members of the immediate task-network, the relations between these actors also involve the negotiation of interests and are not free from conflict. The initiatives analyzed here are specific types of structured *social interfaces* involving contested relations between the members of the task-network, as well as networking relations with exogenous actors.

Interactions within social interface situations are generally framed by "some degree of common interest" that brings the actors together. "Continued interaction encourages the development of boundaries and shared expectations that shape interaction of the participants so that over time the interface itself becomes an organizational entity of interlocking relationships and intentionalities." However, these

[38] The concept of local economic development is discussed in depth in Chapter 4.

[39] This longer construction however is not used in the text for reasons of simplicity, and to avoid suggesting that the GBL's economic initiatives have achieved sustainable performance outcomes that are still future targets.

types of situations also bring together a diversity of actors and are thus "complex and multiple in nature, containing within them many different interests, relationships and modes of rationality and power." Due to the intersection of actors from diverse life-worlds, interface situations "also have a propensity to generate conflict due to contradictory interests and objectives or to unequal power relations" (2001: 65-66, 69).[40]

The general analysis of the GBL's initiatives as social interfaces follows Long suggestion aiming to elucidate:

- "… the types and sources of social discontinuity and linkage present in such situations"
- "… how these forms take shape under specific conditions and in relation to past configurations, with a view to examining their viability, self-generating capacities and wider ramifications."
- "… how discrepancies of social interest, cultural interpretation, knowledge and power are mediated and perpetuated or transformed" (2001: 50, 65).

Long stresses the interplay of knowledge and power as key elements in the analysis of social interface situations created in the context of "development" interventions like those CORDES has implemented in Tecoluca, from which the GBL's economic initiatives have emerged. Within intervention contexts, he argues that power "is the outcome of complex struggles and negotiations over authority, status, reputation and resources, and necessitates the enrolment of networks of actors and constituencies (Latour 1994, Callon and Law 1995). Such struggles are founded upon the extent to which specific actors perceive themselves capable of manoeuvring within particular situations and developing effective strategies for doing so. *Creating room for manoeuvre* implies a degree of consent, a degree of negotiation and thus a degree of power, as manifested in the possibility of exerting some control, prerogative, authority and capacity for action, be it frontstage or backstage, for flickering moments or for more sustained periods (Villareal 1992: 256)" (2001: 71).[41]

Task-networks as combined agents of technological change

Muller (2003: 62) argues that within society, technologies and technological change are managed by a diversity of actors operating within the constraints of a structured but changing room for maneuver. These actors may be characterized as current *social carriers of technology*[42] when they satisfy the following six necessary, although not necessarily sufficient, conditions:

- ***Interest*** in applying the technology, i.e. be motivated to obtain and operate the technology;
- ***Power*** to materialise its interest, i.e. be in possession of the required socio-political and economic means;
- ***Organisation*** to exert the power to establish the necessary conditions for applying the technology, i.e. be affiliated in an interactive external task-network;[43]

The actors must further have:

- ***Information*** about the technological options, i.e. be able assess the potential alternatives in relations to the desired need fulfilment;
- ***Access*** to the technology in question, i.e. be able to obtain and procure the hard- and soft-ware of the technology;
- ***Knowledge*** about how to operate the technology i.e. be in possession of the capability to handle the required technique and work organisation.[44]

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[40] Long thus defines a social interface as "a critical point of intersection between lifeworlds, social fields or levels of social organisation where social discontinuities, based upon discrepancies in values, interests, knowledge and power, are most likely to be located" (2001: 243).

[41] Long's conceptualization of knowledge in these contexts is integrated in the discussion on innovative knowledge and learning in Section 3.4.

[42] The concept of social carriers of technology was developed by Muller (1980) to discuss the selection of technology, elaborating on and modifying the original conception of "social carriers of techniques" proposed initially by Edquist and Edqvuist (1979).

[43] I also stress the internal organizational linkages and *quality of interaction* (Orozco 2003) between the task-network actors as crucial aspects of task-network organizational capabilities.

[44] The problems I see with conflating knowledge and capabilities, as Muller seemingly does here, are discussed below.

Following this line of argument, "other actors are potential carriers of technology; if for example, they fulfill the other conditions but do not have the power to materialize their interest…. When different actors cooperate to implement technological innovations they can be called a *combined carrier* of technology, as in the case of a strategic alliance between organizations in a *joint venture*. However, it is not necessary for the actors to have such formal relationships. In the case of an innovation process involving different organizations, possibly in different parts of the world, we have what we could call *linked carriers*" (Muller 2003: 80).

A related term used by Muller (2003) is the task-network, defined as the organizations within the different external domains of the innovation systems with which the social carriers of technology interact in the innovative process. Here I adopt a more limited meaning of this concept to imply the tight network of actors directly involved in the development of the initiatives in question. A task-network is thus a set of actors with rather consolidated and institutionalized relationships, whose collective actions are oriented towards the implementation of a specific set of tasks, including implementing innovative technological alternatives, in order to enhance the performance of their initiatives.

Distinctions in roles within the task-network are made between those actors that are directly involved in production as primary producers and workers in processing or commercialization operations of the initiatives, the business management teams and their associative governance structures, as well as those closely linked actors that provide business support services. There are also meso-level functions/ roles within the task-networks key for innovative practice related to the coordination between actors involved in the initiatives' different technological systems and also, related to establishing, developing and exploiting exogenous networking connections.[45]

This conceptualization of the task-network thus does not include external actors who are contingently enrolled in the development process by the members of the initiative's task-network. I would, for example, not include loosely *linked* technology carriers as part of the same task-networks, but I would include joint venture partners. External networking relationships established with actors from the local, national and international contexts are treated as sources of exogenous resources to be managed by the task-network members. However, it must be said that this boundary is rather fluid as some "external" actors come to exert significant direct influence over decision-making and often make direct tangible contributions to implementing innovative alternatives. [46]

The task-network of actors directly involved in the development innovative economic initiatives can thus also be characterized as combined social carriers of technology if they meet the stated requirements.[47]

Techno economic networks

Callon (1992: 73) defines a techno-economic network as:

> "a coordinated set of heterogeneous actors … who participate collectively in the conception, development, production and distribution or diffusion of procedures for producing goods and services, some of which give rise to market transactions" (cited in Hull et al. 1999).

This concept was proposed by Callon (1991, 1992) to be specifically applicable to the study of "particular innovations or the organizational arrangements within which particular innovative activity is intended to take place, an approach which is applicable to all kinds of innovation: failed or

[45] A more general discussion of the roles played by specific types of actors within the task-networks (associative producer groups, NGDOs, etc.) is integrated into the discussion of the roles of these actors in local economic development processes presented in Chapter 4, Section 4.1.

[46] This distinction, between the initiative task-network and external network connections, is also useful for distinguishing between qualitatively different types of relationships within the context of broader concepts, discussed later such as tecno-economic networks (Callon 1991, 1992) and socio-technical ensembles including different relevant social groups (Bijker et al. 1987).

[47] Muller's "check list" of general conditions that characterize combined social carriers of technological innovation are integrated into the conceptualization of innovative capabilities in section 3.4.

successful, radical or incremental" (Hull et al. 1999). As such, and if interpreted in a narrow way, the techno-economic network is a complementary concept applicable to the analysis of the task-networks involved in innovative practice within the context of the GBL's economic initiatives.

Hull et al. (1999: 187) further argue that, "The idea of actor network suggests a combination of agency and structure, where neither exists independently of the other. Networks cannot exist without the actors which make them up, but neither do actors have any real meaning independently of their linkages with a variety of humans and non-humans—the networks they create in the course of their social existence (including innovation processes), which define who they are and how they function." This concept thus provides additional focus on the integration of agency and structural aspects within the innovative initiatives and the importance of each initiative's particular identity that emerges from the networking practice and interdependencies among its integrants.

Initiatives as interactive learning places

A further complementary way to frame the GBL's innovative economic initiatives is through the concept of *interactive learning places* developed by Sutz and Arrocena which focuses our attention on the collective learning process involved in creating innovative practice (2000, 2002, 2004). They argue that, "The combination of knowledgeable people and the opportunities to solve problems making use of knowledge is a form of collective action. The places where these actions take place can be named 'interactive learning places', for what occurs in them is the gathering of different people, knowing different things, that interact in the search for solutions to problems and, in so doing, learn, that is, acquire new knowledge" (2004b: 9).

They place special importance on collaborative work between those actors that are directly experiencing the problems and other "knowledge" actors - be they faculty teams, public laboratories or high-tech firms--that are "capable of elaborating a knowledge-intensive solution 'tailored' to the specific aspects of the problem under consideration, its scale and available resources. Solutions of this type, particularly when the problems are posed in small peripheral countries are not usually available in the international technological market. Consequently, those problems may induce innovations and learning processes with a strong national dimension" (Arocena and Sutz 2002: 16; 2000). There is increasing emphasis being placed on the development potential of creatively developing and integrating "higher" technology inputs to address specific localized problems for competitiveness and sustainability in "traditional" economic industrial sectors, such as those related to food production and natural resource exploitation, both in the North and the South.[48]

The concept of *innovative learning* spaces is relevant for analysis of the GBL economic initiatives that involve a diversity of actors in relatively complex learning processes oriented towards innovative practice. These authors' more specific emphasis on more complex knowledge intensive technologies, is especially relevant for analysis of the BIOTEC initiative engaged in the production and commercialization of biological pesticides, and their place in the overall GBL strategy of cleaner and/or organic production.

Applying the concepts

These concepts are used to analyze the nature of the task-networks of geographically clustered economic actors and specialized business support service providers, co-operating to strengthen innovative rural business ventures within the context of the GBL (most directly in Section 6.2). The extent to which the task-networks involved in the GBL's initiatives can be categorized as combined Social Technology Carriers is discussed in relation to their demonstrated innovation capabilities in Section 5.3.

[48] Such arguments are being made by Latin American authors such as Sutz (personal communication 2003) as well as mentioned by Katz (2004). This issue was also central to the theme of the 2002 Druid Summer Conference: "Industrial Dynamics of the New and Old Economies—Who is Embracing Whom," for which conference presentations are available at the network website www.druid.dk

3.4 Interactive Learning and Application of Innovative Knowledge

Having established the framework within which innovation and innovative economic development initiatives are to be understood, I now turn to a discussion of the mechanisms which enable initiative task-networks to engage in innovative practice. This section focuses on the process dynamics whereby certain types of innovative knowledge are accumulated through interactive learning with a diverse web of network contacts and applied to the creation of innovative technological alternatives within firms.

Innovative knowledge

Morgan (2004: 7) argues that the wide variation in the performance of firms is related to their divergent knowledge bases and "major differences in their capacity to create knowledge from within and absorb it from without." He argues that tacit knowledge accumulation is of special relevance for firm performance due to its social and spatial dimensions: "socially, because tacit capabilities like team skills and organizational routines constitute the core competence of firms; spatially, because tacit knowledge, being person-embodied and context dependent, is locationally 'sticky', a characteristic which helps to explain the clustering of knowledge intensive activities (Storper, 1997; Maskell et al. 1998; Gertler, 2001b)."[49]

Morgan (2004: 7) states that tacit knowledge can be transformed into "more accessible organizational knowledge through an intensively iterative, spiral-like process of collective learning… But tapping it is not easy because 'knowledge conversion' is a hugely demanding organizational exercise…" This process requires building trusting relationships. "Building trust requires 'the use of mutually understandable, explicit language and often prolonged socialization or two-way, face to face dialogue that provides reassurance about points of doubt and leads to willingness to respect the other party's sincerity' (Nonaka and Takeuchi, 1995)…. The main benefits of trust would seem to be first, that it saves time and effort to be able to rely on others; second, that it reduces risk and uncertainty; and third, that it expedites learning because the parties are privy to thicker and richer information flows on account of the fact that people divulge more to those they trust (Storper, 1995; Cooke and Morgan, 2000)."

Spender (1996: 46, 51) complements Morgan, focusing on the value of "intangible firm-specific knowledge which enables it to add value to the incoming factors of production in a relatively unique manner" as a key source of competitive advantage. He likewise differentiates explicit and tacit knowledge (following Polanyi 1962, 1967; Nonaka and Takeuchi, 1995) but also individual and collective knowledge based on Durkheim's sociological notion of "conscience collective." He argues for the importance of creating an organizational "context especially favorable to the interaction of knowledge creation and knowledge application processes."

Spender's follows Penrose's conception of knowledge, not as an economic asset or commodity, but "as the skilled process of leveraging resources, where that knowledge is permanently embedded in the organization, and… a reflection of our ability to cognize about our experience of these [organizational] processes (Spender 1995)." The core of his argument is that "Individual learning must always be considered in the context of the processes of the social entity that relies on that individual as its active agent." At the same time, "organizations learn and have knowledge only to the extent that their members are malleable beings whose sense of self is influenced by the organization's evolving identity" (1996: 54).

Spender continues his argument stating that:

> "A system's core competencies, which are systemic, do not inhere in its components. Like the system's boundaries they emerge from its activity…. Collective knowledge such as culture is

[49] The relevant spatial dimensions of tacit knowledge accumulation are further discussed in Chapter 4.

> embedded as a background practice and is a public good for the activity system that it holds together. It is not consumed by being incorporated into activity—quite the contrary—like trust, it is an outcome of the system's activity, an emergent systemic property…. At the same time, remembering Latour's quasi objects, a system's processes are also shaped and delimited by the physical artifacts and objectified knowledge which is has embraced. Technology demands particular types of knowledge of the people who are brought into contact with it, and of the activity system in which it is embedded. Far from being a tool, technology becomes our master when it shapes the systemic aspects of our systems" (1996: 57-8).[50]

He thus proposes his knowledge based theory of the firm as a diagnostic and explanatory method for understanding "how individual creativity interacts with the background of collective knowledge that gives each system its meaning and identity." It is to be used in unpacking the complexity of the firm viewed as a "dynamic, evolving, quasi autonomous system of knowledge production and application." Knowledge in this context is understood as inseparable from the ability to take part in practice that makes that knowledge meaningful, "especially in the face of unanticipated uncertainties and challenges" (1996: 59).

Fleck (1997: 389-90) further develops the conceptualization of knowledge that is applied to the case study analysis, focusing on the contextual contingency of important aspects of innovative knowledge. He argues that interactive learning processes, whereby different types of specialized knowledge are creatively combined and applied in innovative practice, occur in determined situational contexts, which when repeated regularly in particular locations can be understood as milieux. "The immediate situation (and milieux which are more sustained over time) comprises the physical surroundings, the artifacts (including technology), the space itself and, of course, the other people present." It is through interaction between people and inanimate objects integrated within these contexts that "the local rules of engagement are established, and certain things become possible or not possible… The eventual practical outcome will emerge from a dynamic process of negotiation and constructive activity in which claims and counter claims will be made, supported by a variety of demonstrations of competence and putative solutions to the particular problem situation."[51]

In developing his argument in relation the implementation of technological innovation, Fleck puts special emphasis on the importance on the characteristics of contingent knowledge as influencing the development of technology in determined contexts.

> "In the case of new technology implementation, [contingent knowledge] covers a host of items that can make, break or delay and application, including: a close familiarity with the operations involved and the idiosyncrasies of the existing equipment and organization; an acquaintance with the set of industrial and commercial contacts necessary to get a project completed; an appreciation of the abilities and attitudes of the personnel involved; and an understanding of the working environment and industrial relations climate. Contingent knowledge… is generally widely distributed through an organization and in network of contacts between organizations, often at the lower levels of the hierarchy… Virtually everyone has access to contingent knowledge to some extent, although, depending on the structures and relations of power within and between organizations, not everyone's contingent knowledge is equally recognized, perceived as being relevant, solicited, valued or acted upon…. In a very real sense, then, contingent knowledge is embodied in the context itself." (1997: 390-1).

[50] Looking to embed action in knowledge Spender turns to Latour's (1996) concept of the actor network. "The actor network is not made up only of individuals. Social entities, people, firms, governments, and social institutions are also identifiable actors. Nor is the actor network purely social. There are human artifacts, pieces of research equipment, embodied knowledge, factories, infrastructure, physical laws and so forth, which constrain and shape activity… the overall dynamic complex is what Latour calls a quasi-object" (1996 p. 56).

[51] This emphasis on the importance of interaction with the non-human objects in determined situations and milieux, reflects Latour's concept of quasi-objects, upon which Spender draws as well, although no explicit reference is made.

In a practical sense, Fleck argues that "successful technology implementation and development requires the harnessing and exploitation of such knowledge. But because of the distributed, accidental and under-valued character of contingent knowledge, this is not always easy." In the context of technology transfer "such knowledge is not within the immediate power of the developer, but within the context of implementation. This is 'owned' by the user." This implies "a need for firms, especially technologically unsophisticated small firms, to realize the value of their contingent knowledge… There is an associated need for suppliers and implementers to realize explicitly the role of contingent knowledge and to devise systematic routines for harnessing it… The harnessing of contingent knowledge thus provides opportunities for learning during the implementation process… This constitutes a form of learning distinct from learning by doing or by training, and suggests other mechanisms for the learning organization" (1997: 393-4).

Fleck's conceptualization of learning and applying new combinations of diverse knowledge types as a dynamic process of negotiation and constructive activity is similar and directly complemented by Long's (2001: 71) conceptualization of knowledge as a socially constructed and contested phenomenon. I also quote his arguments at length due to their eloquence and particular relevance to case study analysis of similar "intervention situations."

> "Knowledge is a cognitive and social construction that results from and is constantly shaped by the experiences, encounters and discontinuities that emerge at the points of intersection between different actors' lifeworlds.... In intervention situations it assumes special significance since it entails the interplay or confrontation of "expert" versus "lay" forms of knowledge, beliefs and values, and struggles over their legitimation, segregation and communication.... The incorporation of new information and new discursive or cultural frames can only take place on the basis of already existing knowledge frames and evaluative modes, which are themselves re-shaped through the communicative process. Hence knowledge emerges as a product of interaction, dialogue, reflexivity and contests of meaning, and involves aspects of control, authority and power" (2001: 71).
>
> "Processes of knowledge dissemination/creation simultaneously imply, therefore, several interconnected elements: actor strategies and capacities for drawing upon existing knowledge repertoires and absorbing new information; validation processes whereby newly introduced information and its sources are judged acceptable and useful or contested; and various transactions involving the exchanges of actors involved in the production, dissemination and utilisation of knowledge" (2001: 175).

The arguments made by Morgan, Spender, Fleck and Long all suggest, in different but complementary ways, that the evolution of a firm's accumulated knowledge base, especially its tacit, collective and contingent dimensions and, most importantly, the conscious mobilization and application of this knowledge in innovative practice, is interdependently linked to the firm's organizational configuration and social interface dynamics.[52]

Sunbo (2003:101-02) provides a final complement to these arguments, emphasizing that knowledge is an "important raw material, but it is people who, in the social change process, create changes by using knowledge. The people decide which knowledge to select…. Innovation through strategic reflection is not just knowledge but action… The human will to act—even if it does not make sense in terms of existing knowledge—is the most important. This assumption also makes innovation into a social process where self-interest, firm policy and so forth play a role."[53]

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[52] In this sense it is interesting that Dosi (1988: 1127) defines a firm's knowledge base as integrating "information inputs, knowledge and capabilities," drawn on in looking for innovative solutions, which suggests the relevance of an active organizational component.

[53] Sunbo's concept of strategic reflexivity seems to complement Spender's proposal of four heuristics that managers could use in exercising "imaginative leadership and influence in the complex heterogeneous emotionally and politically charged knowledge systems" giving

Innovative learning dynamics

Bell and Albu (1999) argue that in discussing learning related to the innovativeness of technological capabilities, it is fundamental to distinguish between those mechanisms which are involved in "replicating and recirculating knowledge that is already established within the production system" and those "involved in acquiring, creating, processing and accumulating new knowledge, so that it can be brought into play in the system." They develop this distinction in the following way:

> The knowledge-using elements are involved, for example, in maintaining or expanding capacity using given modes of production; training workers in established operating procedures, or within a cluster context, the imitation of production techniques used by neighboring firms. The knowledge changing elements are involved, for example, in the management of innovation processes; in product design and development; or in the search for, selection, adaptation and assimilation of new product or process technology (from outside the cluster)…. The efforts of firms to learn from production, or from the repair, maintenance and reconditioning of equipment, may add to their deeper innovative capabilities. This may be extended into more systematic efforts to learn from observation, reverse engineering and practical experimentation in order to enhance capabilities for generating change (1724-25).

Johnson (1992: 32) also distinguishes between the active and passive routes to new knowledge generation in his general characterization of the learning processes by which firms build their knowledge bases within a system of innovation. These are:

- *"Learning by producing*, or simply learning, is the process of creating new knowledge through learning by doing, using or interacting by means of activities such as the purchase of inputs, production or trade carried out by the firm, and also through communication and normal interaction between firms which are not explicitly organized to generate new knowledge."
- *"Learning by seeking* is a systematic process characterized by activities which are explicitly organized to increase knowledge and thereby stimulate innovations. Learning by seeking can be subdivided into two closely related categories: organized search activities which are closely related to production and influenced by the economic logic of the trade sector, and other less income-oriented activities of basic research carried out by universities and other similar organizations. The latter may be called learning by exploring."

Different types of learning processes require different capabilities of the actors involved and in turn strengthen different types of capabilities relevant for innovative practice. Cooke (1999: 3-4) argues that searching and exploring are "more complex learning processes, including activities of problem definition and problem solution…." Searching is deliberately oriented towards "choosing and recombining existing knowledge to develop new products and processes." The region's firms must then be able to understand the potential importance of knowledge developed by others through exploratory processes and enlist support in translating this knowledge into forms applicable to their innovation needs. In the context of a regional innovation system, this is important as developing capability for learning by searching, "enables firms or organizations more quickly to exploit and evaluate the remaining possibilities of the specific paradigm in which they are, and may motivate them to search for new strategies and exploit a new paradigm."

Edquist (2004) argues that, in addition to these two types of learning, the systems of innovation approach must place greater attention on the relevance of knowledge accumulated through different types of human capital formation in the formal and informal educational system.

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meaningful directionality to knowledgeable practice (1996: 60). The recognition of "interpretive flexibility" among diverse actors within the firm, "boundary management" with respect to those areas of specialization conducted internally or accessed through network relations, identification of relevant external institutional and organizational influences for firm performance, and "the distinction between systemic and component features," i.e. what are the firm's key capabilities (1996: 60).

These mechanisms identified by Johnson, Cooke and Equist related to the systems of innovation approach, are strikingly similar to those identified by Bell and Albu (1999: 1724). They argue that the wide range of processes by which firms may add to their knowledge stock, identified by Romijn's (1998) review of studies describing the acquisition of capabilities in clusters of small scale industrial firms, can be synthesized in three general mechanisms:

- "First, they may be acquired through various *internal technological activities*. These may include the observation of routine production activities; the acquisition of knowledge from undertaking the repair, maintenance or reconditioning of equipment; more systematic reverse engineering or experimentation; or more formally organized technology development or even applied research."
- "Second, knowledge may be *acquired from external sources*, either relatively passively as a by-product from various kinds of interaction with the outside world or from a range of more deliberate and active search efforts…"
- "Finally, capabilities may be augmented through various kinds of *human capital formation* at the firm level - either via formal and informal training activities or simply by hiring people who already embody the knowledge being sought."

Finally, it is necessary to emphasize the importance of *reflexive learning* as a source of innovative knowledge. Learning through intentional processes of reflection on the firm's own productive, commercial, networking practice, especially related to the implementation of innovations, generates knowledge that is qualitatively different from that gained directly from these practices, passively without intentional reflection. Reflexive learning is thus especially important for innovation because it generates conscious understanding of evolving problems in these processes and past attempts at solving them. The knowledge generated, can then be applied to generating specifications to orient the internal and external search processes to develop innovative alternatives for the solution of the problems encountered. It can also be used to take greater advantage of currently underutilized potentiality of the firm's resources revealed through reflection. Constructing mechanisms to facilitate reflexive and proactive searches to identify endogenous problems and opportunities thus seem to be crucial importance for facilitating innovative practice.

Along these lines, Sunbo argues that strategic reflective practice implies organizational learning from experiences in the initial implementation of innovations and how these worked in practice, leading to strategic changes in the firm's future actions. Although real patterns of reflective practice within firms are considerably more chaotic, the process can be visualized as starting with reflections concerning market dynamics and the internal resources available to take advantage of market opportunities. These are interpreted by management and embodied in a more or less explicit strategy for firm development. The implementation of strategy can lead to innovation processes, and in turn learning from reflection on the innovation process "may lead to a change in the strategy or in the way of carrying out the innovation activities… When the final outcome of the innovation process … has worked for some time, further considerations may lead to the conclusion that a new market position or new internal resources are needed which are further processes of reflection" (2003: 110-11).

Creation of innovative options

This general discussion of differentiated learning mechanisms and the creation of innovative knowledge, leads us to the discussion of the interactive learning mechanisms through which firms develop innovative *options*.[54]

Loasby (2001, 2002, 2003) focuses our attention on the key question of how firms are able to take advantage of knowledge diversity, bridging cognitive distance between dissimilar knowledge bases built up through relative specialization on different productive or service tasks. Especially important are the capabilities associated with making connections and coordinating interactive learning between

[54] Loasby's arguments are cited at length due to their revelation of specific cognitive learning mechanisms glossed over in more general accounts of learning related to innovation.

people and organizations with dissimilar but potentially complementary knowledge bases to achieve novel outcomes. In this way people and the organizations they are part of are able to understand problems in new ways and generate innovative options for solving them.

> "Knowledge begins with uncertainty, and grows by trial and error in making connections, for knowledge is constituted not by elements but by the selective … connections between them; and these 'connecting principles'… are formed in the imagination. We are therefore using scientifically precise language when we talk of 'making sense' of phenomena or situations, for sense has to be made rather than revealed. We make sense by making patterns, and we stick to apparently successful patterns and seek to enlarge their scope, perhaps with modifications to a few connections at the periphery; sometimes we perceive apparently significant similarities with apparently successful patterns in another business or another discipline, and try to import them; and sometimes we create a link between two patterns and produce an innovation – remember Schumpeter's definition of innovation as 'new combinations'" (Loasby 2002: 8).

An actor's existing knowledge provides the basis for increasing its knowledge. Existing knowledge provides the starting point from which there is a limited diversity of feasible *options* for rearranging connections and introducing innovations within a system such as a firm, or a group of rural economic initiatives as in the GBL case. Loasy continues:

> "The options that are most likely to be perceived, and the easiest to exploit, are transitions to 'adjacent states' (Potts 2000), in other words those that involve marginal adjustments, or possibly moves to other systems that are similarly configured although they may bear different labels, ... If this is so, then the possibility of making new connections will be substantially influenced by the starting configuration, and since each new connection implies a new starting configuration, and thereby changes the set of adjacent states, the sequence of new connections is likely to be substantially path dependent – though not path-determined (2002: 8).

New knowledge relevant for innovation is created both through the absorption of external knowledge developed by others through "appropriate receptors" and/or generated endogenously through the "formation of linkages from some part of existing knowledge structures" (Loasby 2002: 9) In this sense, research activities are one source of options intentionally developed for future exploitation, but the "ordinary course of business, or of life, is also a common source of new options. The creation of real options, intended or unintended, is a source of variety for evolutionary selection" (2002: 5-6). Again, both endogenous knowledge creation and absorption of knowledge from external sources depend on the capability of making new connections and are therefore related to the connections that already exist (Loasby 2003:18). The connections that already exist thus define the firm's *knowledge base*.

Reflecting on the individualized cognitive dimension of this process, Loasby argues that it is asymmetries not only of information but especially "in interpretation and of perception, which leads some individuals and some organisations to take actions that others have dismissed, or never even thought of." Shackle's (1979: 26) "beautiful phrase of 'the imagined, deemed possible' invites us to consider the stimulus and sources of imagination and why some products of the imagination are deemed possible by particular individuals while others are not. Imagination and the assignment of possibility require the making of new connections, and often the discarding of old connections, a process that is easier to understand in retrospect than it is in prospect" (Loasby 2001: 11).

Loasby complements this argument by emphasizing the fundamental importance of diversity, but also complementarities between the knowledge bases of the actors involved in developing and implementing innovative alternatives. He states:

> "Though frameworks of thought may change progressively over time … there are substantial costs of major changes of framework, not least in the difficulty of forgetting, which requires the breaking of connections which have become automatic. Thus the options that are even conceivable for a single individual, or a single organisation are a minor subset of the options

that would be available to an unlimited intelligence. However, the options available to a community may be increased by orders of magnitude if the members of that community operate in diverse local spaces; the variety of contexts then generates a variety of problems which prompt the formation of somewhat different connections" (2002: 10).

Networking to learn and learning to network

From this emphasis on the specific cognitive mechanisms by which innovative options are developed, I now turn to the discussion of the importance of interaction and networking for learning and how actors in turn learn to network.

The importance of synergistic interactions between task-network actors (both between and within its member organizations) is reflected in Loasby's firm specific argument that, "what may be specific to a firm may be, not the component skills of its members, but the interconnections which allow them to be oriented towards a range of purposes, including the development of new products and new methods of production, in ways which no single member of that firm is able to specify – and which, therefore, may be difficult for any other firms to emulate (2002: 11).[55]

The importance of complementarities in networks is also reflected in Carlsson and Jacobsson's (1997: 270-271) argument that the generation and diffusion of new technologies depends on the existence of "reciprocal and positive external economies" between networked actors. This will reduce the costs of transactions between different actors of the same network. Also, the information flow and the construction of shared knowledge can result in the formation of a shared view of the future of the technological system and of the network. This shared future vision reduces the risk perceived in investments, orienting the organization and collective effort toward this future state and thus promote (consciously or not) the coordination of actions.

The capability to network is necessary for actors playing different roles related to the generation, diffusion, assimilation and application of knowledge in innovative processes. However, exactly how actors learn to interact within a firm, task-network or with their external network connections is less clear. Again, Loasby's work helps to shed greater light on this subject, citing Richardson (1972) and Smith (1976). One such contribution to understanding how firms learn to interact and network to innovate is the recognition that the integration of divergent but potentially complementary specializations is a specialized activity in and of itself.

> "Although the division of labour is usually associated with the separation of activities, Smith (1976b, p. 21) recognised not only the benefits of recombination but also that the selectivity of connections provides scope for those who 'are often capable of combining together the powers of the most distant and dissimilar objects'; thus integration, he observes, is itself a specialised activity. It is a particularly important exemplar of the advantages of the division of labour, because it encourages novel extensions of the results of more narrowly-focused specialisation through the development of new configurations. The skills of integration across domains are themselves domain-specific" (Loasby 2003: 20).

This suggests the need to explore the specific capabilities required of actors facilitating integration and how they acquire them. Again, Loasby argues that "handling cognitive transactions, which are neither those of internal organisation, both formal and informal, nor those of arm's-length market transactions, requires a distinctive kind of capability, which may be special to each relationship." He then carries

[55] Loasby states that "the identity of a firm is defined by its commitments to the continued development of particular skills and, even more, to the relationships between them – what is sometimes called its architecture. Because these relationships cannot be specified in any detail, and often cannot be adequately expressed even by the participants, they may be difficult to replicate by competitors, and sometimes even by the firm itself in a new location with new managers and a new workforce; they may also be hard to transform if they seem to be responsible for poor performance" (2002 p 12-13).

his argument further stating that, "The creation of such capabilities may involve substantial investment of time and skill, but it may create valuable options within the relationship." In addition, he states that, "The co-ordination, and above all the interactive development of divided knowledge, depends on willingness to rely on both the skills and goodwill of one's collaborators. Trust is a means to the creation of options, sometimes of great value, because it is a means to distinctive new combinations of capabilities" (2002:16, citing Richardson, 1972).[56]

While the question of how relational capabilities are formed, how actors learn to interact and network, remain unanswered, it is clear that the personal and organizational learning processes necessary to skillfully play this specialized coordination function take significant time and effort. The nature of this coordination function, also suggests that there is a high degree of tacit knowledge involved that is firm or network specific. In addition to being tacit some of this knowledge will also be collective, as it will be highly embedded integrated in the relationships existing between the actors who are interacting (as Spender argues). These features highlight the special value of this capability for the firm's innovative practice and thus business performance. Playing this integrating role requires the ability to build trusting relationships with relevant network partners, within and across organizational boundaries. I would thus argue that what can be understood as *networking capabilities* are learned mainly through participation in interactions sustained in relationships based on trust. Forming these types of relationships is a proactive process requiring specialized capabilities.

Applying the concepts

The framework developed is generally applied to analysis of the mechanisms which enable GBL's initiative task-networks to engage in innovative practice; specifically their interactive learning capabilities in Chapter 6 (6.5, 6.7).

3.5 Dynamic Assimilation of Exogenous Technological Components

The focus of the last section was on understanding innovative learning and networking capabilities that are key components of my overall understanding of innovative capabilities. However, the implementation of innovative technological alternatives requires additional capabilities that must not be overlooked. This section thus discusses the concept of technological capabilities and the dynamic assimilation of exogenous technological components, before proceeding to the concluding section dedicated to further delimiting the concept of task-network innovative capabilities.

Technological capabilities

As Bell and Albu (1999: 1724) state, "following Dahlman, Ross-Larson and Westphal (1987) it has been usual to place technological capabilities in functional categories related to the kind of activities which they facilitate, for instance: production capabilities, investment capabilities and linkage capabilities; but often with 'innovation capabilities' identified separately from these functional categories."

For example, Ngoc Ca's (1999: 11-12) develops the following taxonomy of technological capabilities based on Ernst et. al (1998), for application to his analysis of several case studies of technological upgrading in Vietnamese industries.

- Investment capability: the ability to undertake the functions of identification, preparation, design, setting up and commissioning of new industrial products, or the expansion and/or modernisation of existing ones. The capability can have two sub-elements: pre-investment and project implementation.

[56] Loasby finalizes this argument stating that "Relational proximity is often an important basis for ensuring that the cognitive distance which is large enough to sustain the development of differentiated knowledge is nevertheless small enough to support shared understanding (2002: 16). This relates directly to the arguments developed in Chapter 4 (4.3) concerning learning in agglomerated industrial firms.

- Production capability: the ability to operate plants, where shop floor experiences and learning by doing have an important role. This capability has elements like production management, production engineering, repair and maintenance of physical capital.
- Marketing capability: the ability to deal with demand patterns, market trends, user needs and skills so as to collect marketing intelligence.
- Linkage capability: the ability and organizational competence to transfer technologies at three levels: within a firm, among firms, and between firms and their scientific and technological infrastructure (network or system).
- Minor technical change capability: the ability to adapt engineering and organizational features, reverse engineering and analytical design, and system engineering.
- Major technical change capability: the ability to create technologies which are new in principle, design new features of products and processes (including new product ideas), and the ability to deploy scientific knowledge in developing patentable ideas.

However, following Lall (1992: 167), Bell and Albu propose that it is "conceptually helpful to locate capabilities not only horizontally in functional categories but also vertically according to the degree of innovativeness of those activities. Lall recognized that for most functions, capabilities may lie somewhere on a scale ranging from doing simple routine activities, through adaptive and duplicative activities, to more original innovative activities. In this sense 'innovativeness' is not a separate functional category of capability, but a quality or depth which may be achieved to different extents in all functional areas" (1999: 1724).

Van Dijk, Meine and Sandee, (2002: 1-2) argue that technological capabilities in small scale industries go beyond the capability of innovating through the adoption of exogenous technology to encompass "the ability to make independent technological choices, to adapt and improve upon chosen techniques and products and eventually to generate new technology, endogenously." They argue that, "without development of technological capabilities, innovation adoption by small producers may not contribute much to the long-term development of their firms." This is directly related to Knorringa's (2002) conceptualization of endogenous technological upgrading as the capability for small scale clustered manufacturing industries to implement and build on incremental innovations.

Dynamic technological assimilation

For small-scale manufacturing enterprises in the South, the acquisition and assimilation of exogenous technology components into their systems of production and commercialization is a crucial interactive learning process requiring significant networking capabilities. Bell defines *dynamic assimilation* of imported or transferred exogenous technology as its integration into a process of technical change and innovation within the importing firms and economies. A general classification of the types or degrees of technological assimilation includes: operational, replicative, adaptive and innovative, i.e. the capability for endogenous technological development (1997: 65, 69; see also Muller 2003).

In characterizing the advances towards dynamics assimilation in a given firm or group of firms, Bell also suggests that it is important to "move beyond a concentration on such things as improving process efficiency or the development of local (re) production of production equipment" but also the "production related dimension of increasingly creative technological assimilation" beyond the boundaries of the original product or product category. In addition, he stresses two additional dimensions. "The first relates to building up the capabilities needed to capture a greater share of the overall value added—for example, undertaking a greater proportion of design and marketing activities." The second, is the development of technological competencies in the area of the initially acquired technology, which permit diversification out of that area—both diversification upwards to more complex types of similar products, and diversification 'sideways' to different, but related, categories of product. In the longer run, this assimilation or learning process may create the basis for the capability to diversify over greater 'distances'—perhaps 'backwards' into the production of

machinery and instrumentation, 'forwards' into downstream products, or further 'sideways' into more distinctively new products and markets" (1997: 70).

In applying these concepts, Bell argues that it has become increasingly evident that "dynamic technological capabilities are cumulatively built 'upwards' from simpler to more complex design, engineering and managerial competences, not 'downwards' from R & D." This process of building the capabilities necessary for the dynamic assimilation of exogenous technology, "is not just a matter of mastering the use and development of product and process 'hardware.' The organizational dimensions of industrial technology are also critically important." Especially important is establishing a continuous process of organizational adaptation and development that then can play "a significant role in stimulating the search for, and facilitating the implementation of, continuing adaptations and improvements in product and process 'hardware'" (1997: 74-76).

Achieving this process of dynamic technological assimilation is also generally not the work of an individual firm but requires "the development of change-generating interactions between enterprises that are linked in 'supply chains', 'networks' and 'systems' as well as with various intermediary organizations and specialized technological institutions" (Bell 1997: 76-77). This requires the development of specific "associational capacities" by the firms in order to actively take advantage of the multiple exogenous resources available to them through networking (Helmsing 2001, citing Cooke and Morgan 1998).

A key concept related to dynamic technological assimilation is *absorptive capacity,* which makes a direct reference back to the earlier discussion of coordinating connections between diverse but complementary knowledge bases. Giuliani and Bell (2004: 5) build off of Cohen and Levinthal's concept of firm specific absorptive capacity to develop the meso-level concept of *cluster absorptive capability*.[57]

> "At micro level, absorptive capacity is considered a function of the firm's level of prior knowledge (Cohen, Levinthal, 1989, 1990). It is therefore influenced by the stock of knowledge accumulated within the firm, embodied by skilled human resources and accrued through in-house learning efforts. Following the argument of Cohen and Levinthal then, it is firms with higher absorptive capacities in a cluster that are more likely to establish linkages with external sources of knowledge. This is explained on the basis of cognitive distances between firms and extra-cluster knowledge, so that firms with higher absorptive capacities are considered more cognitively proximate to extra-cluster knowledge than firms with lower absorptive capacities."

For the application of the concept of cluster absorptive capacity it is important to note that it is focused on the dynamic assimilation of exogenous knowledge, based on accumulated endogenous knowledge bases and the existence of the relevant networking linkages. My broader conception of technology and technological transformation, suggests that the concept of absorptive capacity could be broadened to better deal with the dynamic assimilation of a diversity of exogenous technological components (financial resources, new machines and other techniques, novel organizational forms) as well as knowledge into existing systems. Thus the absorptive capabilities task-networks involved in economic initiatives not only depend on their combined endogenous knowledge base, but also on the configuration of the other components of their technological systems: the organization of the production, commercialization and functions, the techniques and production processes in place and the existing products and their characteristics as they are presented on the market.

In conclusion, I stress the importance of the intentionality, directionality and progressivity of actions to strengthen the capabilities necessary to achieve dynamic assimilation of exogenous technology. With reference to technology transfer, Van Dijk, Meine and Sandee (2002: 3) argue that the key is

[57] Although Giuliani and Bell discuss clustered firms, they place special emphasis on specific networks of inter-related firms within clusters and how external knowledge is absorbed and diffused into these networks. This is the way their concept of cluster absorptive capability is applied to the analysis of innovative capabilities of the task-networks involved in the GBL's economic initiatives.

setting in motion "learning processes that make small firms stronger and that make it increasingly likely that small entrepreneurs manage subsequent innovations on their own." Bell (1997: 77-78) furthers this argument stating:

> "… even from the earliest stages of reaching competitive operational efficiency, the assimilation of imported technology is not a matter of achieving any particular levels of performance. It is about setting in motion a process of technological and organizational change. Thereafter, assimilating initially acquired technology in ways that yield steadily rising real incomes requires progressively more complex forms of technological dynamism that are rooted in 'deepening' competences of individual firms, and in structures of change generating interaction among firm and other organizations."

Importance of boundary spanning roles in technological innovation

Building off the arguments already made in this section, the implementation of technological alternatives within economic initiatives requires, on the one hand, the establishment of dynamic connections between members of the task-networks and exogenous actors. On the other, it requires an increasingly dynamic process for the internalization of exogenous technological elements acquired through these connections and the progressive building of endogenous capabilities continue this transformation process. With reference to both dynamics, there are specific task-network actors (organizations and people) playing key *boundary spanning roles*; facilitating connections between task-network members and networking linkages with exogenous actors.

For example, a key determinant of the overall absorptive capacity of the cluster and thus its development dynamics, is the presence and capabilities of key firms and groups within these firms that act as *technological / knowledge gatekeepers*. These actors (organizations and key people within them) play a fundamental role in conducting the search for external knowledge and facilitating the process of internalization within these firms, as well as the subsequent selective diffusion within the cluster (Giuliani 2002, 2004; Giuliani and Bell 2004).[58] The concept of technological gatekeepers might also be broadened in scope to conceptualize the key roles of the same or different actors facilitating dynamic assimilation of other exogenous technological components.

Analyzing the contributions of these actors to innovative practice, necessarily leads us within the boundaries of the firm or task-network organizations, to focus on certain key individuals. In this sense, Ettlinger (2001) argues that it is important to recognize the potential importance of inter-personal diversity and the differences that arise from this within firms, for their competitiveness. The personalized nature of organizational interaction is, for example, reflected in the importance of people playing the specialized roles of technological gatekeepers, and coordinating interactive learning, as previously stressed by Loasby.

An additional contribution in this sense is made by Schot (1992: 40). He argues that understanding the vital linkages between the variation and selection processes, "between environmental requirements and technological opportunities and constraints," requires analyzing the roles of actors playing what he calls the *technological nexus* role. These actors are "responsible for translating certain environmental requirements into criteria and specifications used in developing the technology…. The nexus role implies considering both the selection and variation process as a resource and an option: that is, activities which can and must be molded and harmonized through active efforts." This role may be played by a specific organization, group of people or a person within an organization.

The process of bringing these together, can be understood as making connections between the relatively specialized knowledge bases implied, and creating innovative options based on this integral

[58] For further discussion of these concepts see Allen (1977), Allen et al. (1979), Rogers (1983) and Gambardella (1993) cited by Giuliani and Bell.

understanding (Loasby 2001, 2002). It is also closely related to the conceptualization of strategic reflexive practice that Sunbo (2004) outlines, stressing the interplay of management understanding of market opportunities and internal resources.

As Long suggests, people who occupy boundary spanning roles, who carry out negotiations at the interface between organizations within the task-network or with external actors, can frequently assume positions of significant power. He argues that, "Their position is inevitably ambivalent since they must respond to the demands of their own groups as well as the expectations of those with whom they must negotiate. This is of course the dilemma of … anyone occupying an intercalary position between different social domains or hierarchical levels. Those who become skilled in managing such ambivalent positions are able to deploy them to their personal or political advantage, and sometimes they act as intermediaries or brokers" (2001: 69-70).

Applying the concepts

The conceptualization of technological capabilities and dynamic technological assimilation is used in Chapter 6 (6.7) to characterize these capabilities and processes as they are evolving in the GBL's economic initiatives. Throughout the analysis in Chapter 6, I also analyze the contributions of boundary spanning actors to making innovative connections through building and facilitating a diversity of networking relationships. Where possible, the analysis of the innovative processes within the GBL initiatives goes beyond the reified idea of organizational interaction, to the more precise conceptualization of interaction between people with specific competencies embedded within organizational contexts and other contexts.

3.6 Innovative Capabilities of Task-network Actors

This concluding section develops my conception of task-network *innovative technological capabilities* as a proposal for the conceptual synthesis and integration of key aspects of such capabilities discussed in the preceding sections. It thus provides the specific framework that is applied in characterizing the capabilities of the GBL's initiative task-networks as they are expressed in their innovative practice, as well as how and why these capabilities emerge and are strengthened.

My conceptualization is similar to and can be seen as building off of the conceptualization of firm level innovative capacities proposed by Yoguel and Boscherini (2000: 8-9):

> "Different types of knowledge and capacities existing in the different areas of the firm converge in the "innovative capacity" aimed at attaining quasi-profits or maintaining the position of enterprises in the market. The possibility of profiting from such knowledge and capacities will depend –especially in the case of SMEs- on the organizational culture of the firm. The intra-firm production and development of that knowledge is a dynamic, continuous and cumulative process, which modifies and reproduces static organizational and technological competencies. Thus, learning -both individual and collective- plays a central role and causes competencies to be dynamic resources which can be modeled according to the firm's strategic vision. Over time, the interaction of this set of factors generates a patrimony of competencies, in many cases intangible and firm-specific (Prahalad and Hamel, 1990) which determine and condition their innovative capacity."
>
> "Therefore, going further into the analysis, the innovative capacity of agents may be conceptualized as their potentiality to transform general knowledge into specific knowledge based on formal and informal learning processes which allow them to increase their competencies and competitive advantages. This process is represented in the capacity attained by the SME to develop and enhance products and processes, implement organizational changes and develop new forms of relationship with the market. In that sense, such potentiality

> implies much more than differential efforts performed in formal R&D laboratories. It involves incremental activities developed throughout the organization, constituting the so-called spread innovative activities (Lassini, 1992)."

There is a fundamental level of convergence between our conceptualizations in the sense that I also argue that the specific configurations of task-network innovative capabilities is a specific "patrimony" of this group of actors that differentiates them and their economic activities and products from others. I also agree that the organizational culture, but also the configuration of the firm, or in my case, the task-network is of crucial importance for the potential of actors to transform knowledge and other "capacities" or components of the technological system, through innovative practice. I, however, place greater focus on networking, as well as learning capabilities as fundamental deeper aspects reflected in a specific set of functional innovative capabilities that are expressed in innovative practice and reflected in the initiative's approximation towards sustainable performance. I thus go further in developing this concept.

Along these lines, the innovative capabilities of task-network actors can be defined as the ability they possess to mobilize and creatively apply a diversity of endogenous and exogenous resources to innovative practice; i.e. the generation of different kinds of technological innovations, while embedded within a diversity of enabling and constraining contexts. Innovative capabilities are reflected in innovative practice, or put another way; innovative practice emerges from the mobilization and creative combination of complementary resources by capable actors. Transformative practice can emerge from within the technological system through the endogenous generation of novelty or through the creative integration of exogenous elements, or most often, a skillful combination of both types of processes.

As innovation is generally an interactive process within organizations or across organizational boundaries, it is important to conceptualize collective innovative capabilities that are embedded in specific organizational or network contexts or structures. Innovative capabilities can be said to be collective when interaction between the actors involved is a necessary characteristic of innovative practice; i.e. the actors are mutually dependent in the context of a specific innovative effort. Their collective innovative capabilities are in part embedded in their relationship and as such are not individual, personal or organizational characteristics. As such, innovative capabilities are often not "possessed" by discreet organizational actors or individuals within organizations, but emerge within relationships characterized by mutual dependence and complementarity between actors involved in specific instances of coordinated innovative practice.

The concept of innovative relationships or connections, known as *innovative linkages,* is developed by Andersen and Lundvall (1997: 248) to explain how organizations collectively create innovative results. A key point they make is that frequently these results cannot be individually exploited given that "the division of labor between organizations participating in this relationship has been developed to the point that they have to interact to produce feasible innovations." Innovations emerging from this type of relationship are not unique events, but rather they are part of a co-evolutionary process.

Accumulated complementary knowledge bases are fundamental components of innovative capabilities. Especially important is knowledge related to understanding complex problems and potentially innovative solutions, fundamental to developing specifications for search processes and critically evaluating alternative options. Also important, is understanding why, how and from whom to mobilize the diversity of endogenous and exogenous resources necessary for the implementation of a series of related technological innovations over time. In this sense, Cooke (1999) argues that there is a key distinction to be made between learning how to conduct a specific task (acquiring a competence) and acquiring knowledge that reflects an "understanding of the mechanisms underlying the solution of the problem involved in the task" which he relates to the concept of *capability*.

However, the capability of creatively integrating knowledge and other diverse resources and applying them to innovative practice is not just a mental exercise. The exercise of innovative capabilities involves concrete organizational linkages and ordered processes to bridge the gap from innovative conceptualization and design, into innovative practice. The organizational conduits are the key relationships between people in task-network organizations and between these organizations through which relevant resources flow. The innovative outcomes of collective practice by a determined group of knowledgeable actors, organized in a certain way, also depend on the way in which these actors bring the diverse resources they have mobilized to bear in the ordered problem solving process. This suggests the importance of work or process methodology for innovative practice as well as their motivations, future visions and power relations.

More concretely, to this point I identify two related *types* of innovative capabilities:
- Learning from reflective internal processes and interactive situations with external actors.
- Organizing and networking to build and maintain innovation relevant relationships internal to the task-network and with external actors.

These *types* of innovative capabilities are applied to different functions or actor roles within the innovative process. In this sense, I argue that for local economic initiatives to be innovative and achieve substantial improvements in the livelihoods of the rural families involved, the task-network actors involved must be motivated and capable of coordinating their activities to:
- Reflect systematically on their business practice to identify challenges in terms of problems to be overcome, opportunities to be taken advantage, or exogenous threats that demand action;
- Conceive and progressively refine design specifications for innovative technological alternatives to address the problems and opportunities analyzed, articulating needs for mobilizing internal and exogenous resources;
- Motivate task-network members to take risk-able innovative steps, applying their individual abilities in complementary ways;
- Network with relevant exogenous actors to enroll their cooperation in necessary knowledge, financial, human and technical resources;
- Develop innovative technological alternatives through dynamic assimilation of exogenous elements and/or endogenous efforts and implement them in transforming the initiative's localized technological systems;
- Reflect critically on the different phases of their innovative practice in order to learn from their advances and difficulties to be able to consolidate their current innovative endeavors and continue with their innovative practice in the future.

In conclusion, innovative practice is the expression of the innovative capabilities of the task-network of actors involved in a given problem solving exercise; knowledgeable actors, organized in a certain way, creatively integrating endogenous and exogenous resources through a determined process. The relationship with the dynamic conceptualization of technology and technological transformation applied here is of course not accidental. Innovative capabilities are the underlying capabilities expressed in diverse functional areas which enable the task-networks to creatively manage the progressive transformation of their technological systems.

Finally, the innovative capabilities of task-network actors can be applied to essentially two different types of problems: (i) the generation of technological innovations within a given societal room for maneuver (a given institutional context, given access to necessary resources, markets, etc.), but also (ii) increasing room for maneuver to enable future innovative practice. These two potential applications of the task-network's innovative capabilities are qualitatively different in that they refer to the creative mobilization of different types of resources, different time frames, interactions with different types of exogenous actors within the context of differential power relations, etc.

Increasing contextual room for maneuver, implies contributing to the transformation of specific societal structures—different aspects of the predominating institutional and organizational set-up on a regional,

national and international level. This is especially crucial where the societal structures constraining innovative practice are most restrictive. This is paradoxically also the situation in which the power of the task-network to contribute to these changes may be severely limited as well. This is an essential reason why strong relations between the task-network and relevant exogenous actors and the enrollment of the latter in support of the innovative initiatives are so crucial to enabling localized innovative practice. It is also why the embedding of these initiatives in regional innovation systems and local development processes is essential, as they can carve out, if you will, a localized context conducive to innovative practice.

Regional contexts enable innovative initiatives to be consolidated in some cases, where the same efforts made in divergent territorial contexts would have met with failure or at least ended up on a different path. I thus employ an actor centered approach to the analysis of technological innovation, focused on their capabilities for agency, expressed through transformative practice. The development of the framework to analyze the room for maneuver provided by the structural enabling and/or constraining conditions of the multiple contexts in which these initiatives are embedded is the subject of Chapter 4.

Applying the concepts

As suggested, this section provides the framework of conceptual integration and synthesis that will be applied to the analyzing the innovative capabilities of the GBL's task-network actors in Chapter 6. In the concluding section to Chapter 6 I then return to further develop the integral conceptualization of innovative capabilities presented here. The list of functional capabilities essential for innovative practice is used to frame the initial characterization of the innovative capabilities of these task-networks in the concluding section to Chapter 5 (5.3).

A fundamental question to explore with respect to the innovation capabilities in general, is to what extent are the actors from the regional, national and international systems of innovation motivated and able to support the strengthening of the emerging innovative capabilities of the GBL's task-networks? Or, does the development of these capabilities depend essentially on reflexive learning, networking, proactive resource mobilization, etc. from below by these task-networks themselves? This will be explored in the analysis presented in Chapter 7 and then in more general way in the conclusions presented in Chapter 8.

CHAPTER 4

Regional Innovation Systems and Innovative Practice

The innovation capabilities of the task-networks of actors integrated in local economic initiatives (discussed in Chapter 3) are enabled and constrained by structural forces at work in the regional, national and international contexts in which their initiatives are embedded. This has been stressed through the preceding discussion of external networking capabilities as central to the task-network's efforts to transform their technological systems, improve the performance of their business initiatives and improve the livelihoods of the rural families involved. In this chapter, I develop the overall conceptual framework for the analysis of the external structures enabling and constraining innovative practice, with special emphasis on the characteristics of regional innovation systems.

The expression of the capabilities of task-networks' through innovative practice in the GBL's diverse economic initiatives, is also conceptualized as an integral part of the local economic development process in Tecolua's regional context. This chapter provides the framework for understanding the dynamics of this local economic development process. This conceptualization emphasizes the directionality of the outcomes of the innovation system's performance in terms of the economic, social and ecological sustainability of economic activities and the generalized improvement of the quality of life for local citizens. Coordinated local economic development practice, it is argued, should facilitate building a collective economic development vision among local actors, which frames their subsequent efforts to design and implement technological transformations in specific economic initiatives.

The regional innovation system is seen as the immediate organizational and institutional structural context enabling or constraining technological transformation in economic initiatives designed to improve the sustainability of their performance outcomes. The regional system of innovation concept focuses attention on the functional mechanisms related to building innovative capabilities and achieving innovative outcomes: the relations between agglomerations of economic agents, the complementary capabilities of the enterprise support network and the configuration and functioning of associational territorial governance mechanisms. The importance of the localized institutional set-up is also analyzed as a key structural component of the regional innovation system.

Both concepts highlight the importance of coherent, concerted, coordinated action by localized actors in generating technological transformations necessary for transforming the competitiveness and the social and ecological sustainability of the territorial economy.

This chapter is divided into eight sections. Section 4.1 discusses the economic dynamics of sustainable territorial development and characterizes the principal local economic development actors. Section 4.2 develops the concept of regional systems of innovation, their basic conceptualization, importance and delimitation, as well as the applicability of this concept to less favoured regions in the North and South. Section 4.3 then enters into greater specifics as to the dynamics of the territorial production system, the emergence and development of industrial clusters and mechanisms facilitating inter-firm learning and cooperative action in agglomerated firms. Section 4.4 discusses the relevance of linkages between firms and regional enterprise support network for innovative practice. Section 4.5 conceptualizes the territorial governance system's relevance for enabling localized innovative efforts, specifically the local government's potential role as system coordinator and the engagement of business initiatives in associative governance.

Section 4.6 presents the framework for understanding the organizational and institutional configuration of RIS, focusing on networks and networking, the key aspects of the regionalized institutional set-up and mechanisms facilitating interactive learning in the regional context. Section 4.7 examines the relevance of external linkages for learning within the RIS, the importance of external linkages within the extended commodity network and the regional mediation of exogenous forces. Section 4.8 concludes this chapter introducing and developing the complementary concepts of regional social capital and regional innovative capacity.

4.1 Regional / Local Economic Development

Sustainable local development

Local development,[59] in rural El Salvador implies a complex transformation process localized in a given territorial context that covers multiple dimensions—economic, social, cultural, political, environmental, etc. The main objective of this process is to increase the quality of life for each family, man and woman, living within the territorial boundaries, as well as for future generations. Under the adverse circumstances that currently prevail in rural areas and small towns in countries like El Salvador, local development is a search for the improvement of livelihoods. Some times this search is reduced to livelihood maintenance or just survival, but the longer term perspective is to build alternatives that make livelihood improvements possible.[60]

Local development processes and specific initiatives look to generate economic growth, accumulating wealth in the territory but also facilitating a more equal distribution of employment opportunities and income generated. Local development also implies generating conditions of greater gender and age equality, as well as the sustainable use of the territory's natural resources.

Concertación[61] to construct collective development visions and strategies and the coordination of concrete efforts between the diverse actors that integrate local territories are needed in order to achieve the significant transformations implied by local development in El Salvador. The social construction and flexible implementation of integral territorial development strategies requires the permanent, creative and responsible participation of all segments of the territorial population, their community base-organizations, the diversity of local economic actors and their associations, the NGDOs working in the territory, entities representative of the national government, as well as the motivational and innovative leadership of the local governments.[62] In this sense, local development is a process that looks to form a collective of actors that are increasingly capable of managing risk and opportunities to improve the livelihood conditions for all local families.

Furthermore, although the primordial objective of local development initiatives is to transform and integrate each territory as a coherent whole, local development processes also contribute to the country's integral development and search to establish a synergistic and competitive insertion of the territory into the country and the globalizing world. From a national perspective, an important outcome of local development processes is the reduction in the territorial disequilibria, between urban and rural areas, poor marginalized territories and the areas of the country that centralize the majority of economic activity. Local development processes lead to an increase in the degree of social integration and territorial governance.

In essence, local development implies a localized conceptualization of sustainable human development proposed by the UNDP (2001, 2003), in terms of objectives and process. However, it is crucial to emphasize the contextual specificity of local development dynamics as a result of the historical co-evolution of endogenous as well as exogenous factors. The definition of sustainability, and especially how to achieve it, will also be contextually specific.

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[59] This section represents my conceptual synthesis and contribution to works of: the Red para el Desarollo Local (1998) the FIS-DL Consultative Group (1999) expressed in the National Local Development Strategy, Cummings and Silva (2001), Enríquez (2003) and Gallicchio (2003).

[60] Families that can't at least survive locally or perceive that some of their members have better chances else where, send them to the cities or directly to the North. The hope is that the migrants will encounter jobs that enable them to sustain their remaining family members and eventually support further migrants.

[61] This concept can be roughly translated as consensus building, bringing together actors with divergent interests and power positions and facilitating mutually beneficial agreements, where possible.

[62] There are no regional or intermediary level governments in El Salvador, besides the departmental councils of mayors.

The economic dynamics of territorial development

Within the context of local development practice in rural El Salvador and more specifically, Tecoluca's regional context, there is an emerging necessity to focus greater attention on the economic dimensions of the process. As suggested in the Introduction, there are urgent problems that demand solutions in order to generate dignified options for rural employment and income through family based economic activities; upgrading competitiveness and sustainability of agricultural and animal production, agro-industrial and manufacturing enterprises located in rural areas, dynamizing markets for commercial activities, etc.

Local economic development (LED) is an integral component of local development practice and, as such, cannot be conceptualized or practiced in a way that is not embedded in the territories' wider human development process. Adopting an economic lens for the analysis of local development dynamics implies an explicit focus on how the territory's economic activities are enabled or constrained by its social, environmental, cultural and political dynamics and in turn how economic activities affect these dynamics.

The complementary definitions proposed by Barquero (2000), Helmsing (2001) and Schejtman and Berdegué (2003) (see Box 3) emphasize that LED is a multidimensional process of transformation in the territory's economic structures and dynamics, but also in other structural aspects of the territorial system of economic relevance.

Box 3
Local Economic Development Defined

Barquero synthesizes his conceptualization of local economic development as "… a process of growth and structural change in the economy of a city, municipality or region, in which at least three dimensions can be identified (Coffey y Poles, 1985; Stöhr, 1985): an economic one, characterized by a productive system that permits local businessmen to efficiently use the productive factors, generate economies of scale and increase productivity to levels that increase their competitiveness in markets; another social, in which the system of economic and social relations, the local institutions and values serve as a base for the development process; and the other being political and administrative, in which the local initiatives create a local context favorable for production and the promotion of sustainable development" (2000: 6, my translation).

Helmsing defines LED as "the process in which partnerships between local governments and civic groups and the private sector are established to manage existing resources to create jobs and stimulate the economy of well defined areas. It emphasizes local control, using the potentials of human, institutional and physical and area natural resources. LED initiatives mobilize actors, organisations and resources; develop new institutions and local systems through dialogue and strategic actions" (2003: 69).

Schejtman y Berdegué develop a complementary conceptualization of Rural Territorial Development as a "process of productive and institutional transformation in a determined rural area with the purpose of reducing rural poverty. The purpose of the productive transformation is to competitively and sustainably articulate the territory's economy with dynamic markets. The purpose of institutional development is to stimulate and facilitate the interaction and concertación between local actors and between them and relevant external agents. It is also to increase the opportunities so that the poor population can participate in the process and its benefits" (2003: 32-33, my translation).

The expected results of local economic development practice are the vitalization of existing economic activities and the creation of new ones leading to endogenous economic growth. LED processes look to create and expand employment and income generating opportunities in the local context that can effectively be taken advantage of by local families to construct more productive and dignifying livelihoods (Gallicchio 2003).

Local economic development strategies and specific initiatives aim to integrate aspects related to social equality with the strengthening of the economic competitiveness of local businesses. "The income and wealth distribution and economic growth are not two processes that emerge and take their form in a parallel fashion. Instead they acquire a common dynamic given that local public and private actors make investment decisions oriented towards resolving local problems that affect the business and the local economy as a whole" (Barquero 2000: 6, author's translation).

The current performance outcomes and dynamics of the local economic system are mediated by localized structural factors such as: the historically configured distribution of ownership of the means of production, historical technological trajectories and those present in current production processes, the accumulated production and marketing capabilities of local producers, the dynamics of market systems to which localized producers are linked, the evolution of the territorial eco-systems in relation to economic activities, etc. Other key structural factors that influence local economic development dynamics are the linkages between economic actors within the territory, their inter-connectedness with external value chains and final consumer markets, and the formal and informal institutional set-up that influences these types of relationships, enabling or constraining the emergence and strengthening of local economic initiatives

There is thus a definite tendency towards path dependence in LED dynamics due to the mediation of these socially constructed structural conditions that enable or constrain the opportunities for different actors to access different types of "capital" inputs and to "invest" them locally in new or existing economic initiatives. Put in another way, the accumulated results of the local development process are reflected in the capabilities of different families and organizational actors to take advantage of existing or new opportunities to improve or at least maintain their livelihoods, as well as mitigate risks that threaten their viability.

As reflected in the above definitions, local economic development is fundamentally a process that progressively transforms the territory's economic dynamics, and its linkages to external markets and sources of resources for local investments, in order that they become more competitive and sustainable. While local economic development processes have a tendency to "stick" to certain trajectories, they are also highly dynamic and non-linear, contingent process influenced by multidimensional transformational forces over time.

Technological innovation is implicit in this conceptualization of local economic development. Innovation is, for example, necessary for families to adjust their economic strategies to improve or at least maintain their livelihoods and for businesses to improve the competitiveness and sustainability performance. This is due to changing local and external structural conditions that constantly create new risks and opportunities for them.

The profitability, competitiveness and sustainability of a territory's economic activities are primarily determined by the capabilities of the actors involved to increase productivity, the local value-added content and quality of products and services and progressively improve the positioning of its goods and services in demanding markets. This is largely based on the innovative capabilities of the task-networks of actors involved in local economic initiatives; the learning capabilities of their human resources, flexibility and efficiency of their organizational configurations, their connectedness to other relevant actors, etc.

Increasing the generation of dignified employment, income opportunities and the overall sustainability of local economic development process is based on an accumulation of vital factors such as: the

formation of new businesses and associations between firms, the local productive reinvestment of profits to expand existing operations or start new ones, the progressive development and adoption of new technologies and presentation of new products, the increase in labor productivity and the development of a dynamic local labor market, stimulating the dynamics of the internal market and connections to external demanding markets. The productive activities of a business initiative will not be sustainable if they depend on aspects such as the over exploitation of human or natural resources in order to achieve a spuriously competitive position (Gitli and Vargas 1996; Rodriguez 1999; Cummings 2001).

Barquero (2000: 5) argues that a central characteristic of a local economic development process is the joint capability of local actors to mobilize the development potential of the territory's "collective of resources (economic, human, institutional and cultural) and the unexploited economies of scale." In order to achieve this, the collective of local actors must strengthen their capabilities to: mobilize and take advantage of the diversity of endogenous territorial resources, and negotiate complementary resources from external sources, manage the creative application of these internally and externally generated resources to innovative practice in initiatives, related to the overall orientation of the territorial development strategies, as well as, promote a diversity of mechanisms to facilitate interactive learning and coordinated action.

In general, increasing the sustainability of local economic development practice requires a systematic process of institutional and organizational transformations in: the local market structure and connections to external markets, provision of specialized financial and other business support services (technical assistance, training, etc), knowledge of and access to exogenous innovative technological alternatives, local organization for production and commercialization, mechanisms for knowledge generation, acquisition and diffusion, etc.

In analyzing the situation of peripheral regions in the European Union, Morgan (1997: 496) identifies a series of problems that these regions must overcome if they are to emerge from their marginal status. Underlying the symptoms like lower per capital incomes and higher unemployment visible in these regions is what Morgan calls their "poor development capacity." This is related, to inadequacies with physical infrastructure, human capital formation, research and technological development activities, etc. His key argument, however, is that:

> … less favoured regions (LFRs) seem to have *little or no social capital* on which they can draw, a point which turns the spotlight on factors such as the institutional capacity of the region, the calibre of the political establishment, the disposition to seek joint solutions to common problems. These factors—the invisible factors in economic development—are just as important as physical capital (Doeringer and Terkia, 1990; OECD, 1993)."

A final argument, emphasized by several authors, is that sustainable local economic development is not possible without consensus building and coordination between local actors. It requires the participation and progressive articulation of public and private actors from economic, social and political sectors of local society—in a process of concertación, negotiating their diverse interests. The objective is to arrive at basic agreements concerning actions that can be coordinated to the benefit of the collective of local actors (López and Blandón de Grajeda 2002). The achievement of agreed upon local economic development goals requires coordinated action between public and private sector actors within the local context but also between them and other actors from the regional, national and international contexts. This suggests that "the local actors must develop cooperation strategies and new alliances with extra-local actors" (Gallicchio 2003: 1005, my translation). LED is, thus, an integrating process, articulated by the local actors, but linked to the actions of external agents that manage resources complementary to those available internally.

The construction and implementation of a common territorial development strategy is a complex political project. It requires significant time and effort to integrate the political will and capabilities necessary for co-implementation of such a project. This process is necessarily one of successive approximations involving enrollment of an ever greater diversity of local and extra-local actors. The actors driving the enrollment process, their aims and capabilities to do so, are important to determining the outcomes that are achieved. In this sense, LED is as much a socio-political process as one occurring strictly within the sphere of economic transactions.

Local economic development actors

Local economic development actors are understood to be organizational entities involved directly or indirectly in the creation and strengthening of the innovative local economic initiatives involving the territory's families and established businesses. I identify essentially six types of actors involved in LED practice in El Salvador, located in the realms of the State, the market and civil society:[63]

- The legally constituted businesses and "informal" family based or associative economic initiatives, involved in local activities related to production and commercialization of diverse goods and services.
- Institutionalized networks, legalized or not, that are integrated by business initiatives, linked horizontally as associations, consortia, etc. or vertically as providers, processors and/or marketers.
- Local governments or national public state agencies, whose actions within the bounds of a given territory facilitate or constrain the development of localized business activities.
- Private, for profit or non-profit, organizations that provide support services for localized business initiatives, including national and international NGDOs and business consultancy firms.
- Organizational entities that represent different territorial development programs, often being jointly implemented between international agencies (international state development agencies, bilateral financial agencies, United Nations agencies, etc.) and the Salvadoran State's national line ministries or local governments.
- Social base organizations that are representative of local urban and or rural communities within a given territory or specific social groups such as women, youth, ex-combatants, etc.

The specific roles played by different types of actors in any determined territory and with respect to specific LED initiatives are contingent on a multiplicity of localized factors. However, there are some general distinctions that can be made between the roles that different types of actors play or could be expected to play in the future dynamics of LED in El Salvador. Distinctions relevant for analysis of the GBL's economic initiatives and the functioning of Tecoluca's regional innovation system are discussed in the subsequent sections of this chapter highlighting the capabilities necessary for them to play their respective roles in the regional innovation system.

Applying the concepts

This conceptualization of local economic development provides a general framework against which to compare and contrast the process being developed in the municipality of Tecoluca and its surrounding context. The general aspects from this framework are integrated into the analysis of the functioning of Tecoluca's emerging regional innovation system in Chapter 7 (7.1-7.4).

4.2 Regional Systems of Innovation

The conception of local or regional economic development as a multidimensional process of transformation in the territorial economy suggests the need for a more in-depth understanding of

[63] For analytical, I do not refer specifically to people or individual families outside the context of the organizations or economic initiatives in which they are embedded.This is not, however, to deny their capabilities to make changes in the territory's economic dynamics.

the systemic mechanisms which support these transformative processes. This section introduces and delimits the concept of regional systems of innovation as the initial basis for such an understanding. This complements the discussion of innovative capabilities of task-networks of local actors in Chapter 3 which establishes the basis for understanding the contribution of specific economic initiatives to the LED process.

The systems of innovation approach

A *system of technological innovation* is constituted by three elements: (i) a diversity of public and private, firm and non-firm actors directly or indirectly involved in the creation, diffusion and use of technological innovations, (ii) the nature of the linkages existing between these actors and (iii) the formal and informal institutional fabric of the economy in which they are embedded. The networked practices of the actors integrated into the system's dynamics are enabled and/or constrained by the interplay of their action capabilities and the structural factors that also constitute the system—the system's organizational configuration and its institutional set-up.[64]

Cooke and Morgan (2000) argue that the *"associational capacity of the system,"* measured by the extent to which firms forge dynamic linkages with other actors from the local, regional, national and international milieu in which they are immersed is a key system characteristic. The organic networking linkages between actors that characterize the innovation system can emerge between firms through horizontal and vertical linkages involving some degree of cooperation or through more "arms-length" market based transactions. They can also develop between firms and non-firm providers of knowledge, financing, etc., with public authorities, with citizen organizations of different types, etc.

Orozco (2003) stresses that the *quality of interaction* within these interface situations is of the utmost relevance for innovative performance of firms and the system as a whole. The quality of relationships between actors participating in routine activities of production, distribution and consumption, for example, is a key characteristic of the regional structure of production. These relationships are the source of much of the learning which is so important for innovations, especially ubiquitous diverse processes of incremental innovations within systems of innovation (Johnson 1992). Power relations are a key aspect defining the quality of relationships within systems of innovation as is stressed by Long (2001, as cited in Chapter 3) and several authors in the following discussion of the dynamics of regional innovation systems.

The organizational set-up of a national system of innovation is characterized by certain fundamental constellations of actors that play key functions in relation to the systems overall innovative performance. Morgan (2004) identifies the following as especially important:

- The R&D system, particularly its sectoral composition and division of labour between publicly funded and business funded R&D spending
- The education and training system, particularly the division between academic and vocational skills
- The financial system, particularly the interface with industry and its capacity to provide 'patient capital'
- The network of user-producer relationships and the norms of interaction …

Another key sub-system would certainly be the territorial governance structures that are controlled by national government agencies and local governments, but characterized by an increasingly important participation of internationally funded territorial development programs and NGDOs of different types in El Salvador.

The formal and informal institutional set-up of the system of innovation influence the way in which learning and other key interactive practices related to innovation take place, both within and across

[64] Complementary definitions of systems of innovation are presented by Orozco (2004), Segura (2000), Edquist (2001), Gregersen and Johnson (1998) and Freeman (1987).

organizational boundaries. Edquist and Johnson (1997: 46) define institutions as, "sets of common habits, routines, established practices, rules or laws that regulate the relations and interactions between individuals and groups." The basic functions of institutions within a system of innovation are "to reduce uncertainty by providing information; to manage conflicts and cooperation; [and] to provide incentives."

The institutional set-up relevant for innovative practice includes "informal" aspects like the cultural norms or conventions related to learning, cooperation, taking investment risks involved with innovation, etc, as well as more formalized aspects like rules regulating market transactions, the legal framework concerning business registration, sanitation and product quality standards, environmental and land use regulation of industry, labor regulations, tax codes, import-export regimes, etc. [65]

The institutional and organizational dynamics of an innovation system can be mutually reinforcing, promoting learning processes and the mobilization of other complementary resources to generate innovative practice. Or, on the contrary, they can combine to form constellations blocking innovative processes. Cumulative causation and virtuous and/or vicious circles are thus basic characteristics of innovation systems and subsystems (Lundvall, 1992). As Segura (2000) stresses, a key virtuous or vicious relationship is that formed between the economic and ecological dynamics related to the generation, diffusion and use of technological innovations. Thus, as in the case of specific technological systems, understanding an innovation system's dynamics, the virtuous or vicious relations within and between its sub-systems of actors over time, is crucial for the analysis of its current functioning and performance outcomes, producing technological innovations along more or less sustainable development paths.[66]

A final point to be made here is that there are general distinctions to be made between national, sectorial and regional/local systems of innovation, although the boundaries of different types of systems of innovation are both conceptually and empirically difficult to establish and overlap in many ways. These approaches are complementary and as Orozco (2003) argues, placing greater emphasis on one or the other depends on the research effort.

Analysis of *national systems of innovation* (NSI) brings into focus national differences with respect to the role and functioning of innovation systems, especially with regard to key aspects like the national production structure, patterns of economic specialization and demand, the organization of the state and innovation relevant government policy and the evolution of their formal and informal institutional set-ups over time (Lundvall 1992; Johnson 1992; Gregersen and Johnson 1998). As Morgan (2004: 14) states, "although the NSI does not in any sense determine corporate behaviour, it certainly renders some courses of action easier than others."

Differences in the coherence, configuration and functioning of an NSI contribute to the differentiation of innovative performance of firms across national boundaries and, thus, the significant and persistent differences in the overall development dynamics of national economies in the North and especially between the North and the South (Sutz and Arocena 2002, 2004b). An example directly relevant for our discussion here, is provided by Mario Cimoli. He argues that the progressive disruption of the local production chains and networks, "expressed in the breaking of domestic links, particularly for the production of intermediate commodities and capital goods" is a fundamental characteristic defining the recent evolution of Latin American economies. *"This structural divergence could be viewed as a different capability from Latin America and the developed world, of creating local positive externalities, of diffusing increasing returns mechanisms and spillovers between firms and institutions that create knowledge. At the end, this micro and meso divergence established the differences in all [the] mechanisms that explained a sustainable pattern of development."* (2002: 31, *my emphasis*)

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[65] Collective actors with formal structures created consciously to reach explicit objectives (municipal governments, firms, cooperatives, NGDO business support service providers, etc.) are also frequently referred to as *institutions*. In this text, however, they will be called *organizations*, also as proposed by Edquist and Johnson (1997), to differentiate them from institutions in the specific sense used here.

[66] This idea is reflected in Segura's (2000) conceptualization of *sustainable systems of innovation*.

The analysis of *regional / local systems of innovation* adopts a similar territorial perspective. Analysis is focused on innovation dynamics within sub-national, although sometimes across national, geographical boundaries. Within the context of an NSI, the analysis of the configuration and functioning of regional innovation systems (RIS) can provide insight into why firms, localities and regions have divergent development dynamics.

An analysis of *sectoral of innovation* emphasizes the dynamics of particular technological systems, the groups of related interacting and competing firms and supporting organizational and institutional set-ups that characterize different economic "sectors," on a local, national or frequently global scale. Breschi and Malerba (1997: 131) argue that, "By focusing on the sources of knowledge and on the role played by geographical space in the processes of knowledge transmission, the boundaries of the sectoral systems of innovation are endogenous: they emerge from the specific conditions of each sector."

Within this general framework provided by the systems of innovation approach to analyzing the dynamics of technological innovation, the remainder of this section will further development the concept of regional innovation systems.

Conceptualization and importance of regional innovation systems

The concept of regional innovation systems (RIS) seems to have emerged from a cross fertilization between the national systems of innovation approach, research on industrial dynamics in regional clusters, industrial districts and *milieux*, as well as strands of regional economic geography.

Asheim cites Lundvall and Borrás (1997: 39) in arguing that "the region is increasingly the level at which innovation is produced through regional networks of innovators, local clusters and the cross-fertilising effects of research institutions." Regions represent a meso-level of economic governance and interaction between the macro national and international contexts and the micro cluster or firm level. Many of the factors that are known to influence innovative capacity at the national level have strong regional dimensions (Oughton et al. 2002). For example, national production structures are frequently characterized by strong regional tendencies towards agglomeration. In some cases, there is also a clear linkage between the localization of key knowledge providers, research universities for example, and the regional agglomeration of related knowledge intensive firms. The importance of regional and local innovation systems, within the context of national innovation systems is recognized in the South as well as the North.

Regional and national innovation systems share similar constitutive elements, and RIS can be considered constitutive elements of a NSI. At times actors that play an important role in the NSI, can play important roles in the territories where they are physically located. Public policy and other important institutions within NSI also influence economic activities at the regional level. However, RIS are not just territorially localized NSI. The regional context is qualitatively different from the national context in several important conceptual and practical ways, especially due to the spatial proximity and greater degree of interrelatedness of the actors involved (Morgan 2004).

Various authors argue that at the heart of a well functioning regional innovation system there are two basic constellations or sub-systems of actors:

- The regional production structure or knowledge exploitation subsystem which consists mainly of firms, especially where these display clustering tendencies.
- The regional supportive infrastructure or knowledge generation subsystem which consists of public and private research laboratories, universities and colleges, technology transfer agencies, vocational training organisations, etc. (Asheim and Coenen 2004, citing Cooke et al. 1998; see also Asheim and Isaksen (1997), Asheim (2002a) and Cooke (2002).

Cooke 2002 also mentions "local governance bodies responsible for innovation support practices and policies" as an integral part of the second sub-system. However, it seems to me that the sub-system

of actors providing knowledge production and specific business support services play a qualitatively different role from the territory's governance bodies and associational governance structures.

I thus argue that that the emergence and consolidation of a regional innovation system depends on the interrelationships between three critical territorial dynamics:

- The development of the localized production structure and especially the emergence of a critical mass of agglomerated and innovative business enterprises,
- The emergence of a complementary configuration of actors specialized in diverse tasks that directly support local enterprise development such as, universities, technological institutes, etc. focused on knowledge production and diffusion, but also other actors like NGDOs, territorial development programs, financial intermediaries providing specific business support services,
- The relevant actions of local public authorities and the functioning of diverse associational governance mechanisms, where relevant actors can negotiate and coordinate actions in favor of innovative economic initiatives and LED more generally.

Delimitation of regional innovation systems

As with NSI, regional innovation systems are territorially bounded, however these boundaries are considerably more amorphous.

As Cooke argues, the conceptualization of these territorial boundaries is heavily mediated by the criteria employed to define them. He identifies four basic types of delimitation criteria: "(1) it has a determinate size, (2) it is homogeneous in terms of specific criteria, (3) it is distinguishable from bordering areas by a particular kind of association of related features, and (4) it possesses some kind of internal cohesion. It is also important to mention that the boundaries of regions are not fixed; regions can change, new regions can emerge, and old ones can perish. Therefore, to analyze a region, criteria must be found that define a functioning unit within a specific time" (1999: 2). In relation to Cooke's fourth criteria, Edquist (2001) suggests delimiting the spatial boundaries of regional systems of innovation to areas that have a high degree of inward orientation or coherence in regards to innovation processes, principally in terms of network relationships and knowledge spill-overs.

In the delimitation of regional innovation systems, Morgan argues that a distinction should be made "between genuine innovation processes that have assumed a territorial form and the more common situation whereby localities and regions have created an enterprise support system for the express purpose of promoting innovation…. (Braczyk et al., 1998; Cooke et al., 1998)." He cites micro-level studies of RIS, from the firm outward, in arguing that "localized patterns of communication, search, learning, knowledge-sharing, and innovation" must be present if we are to categorize what exists as a RIS. Empirical evidence from the EU suggests that many localities and indeed entire regions "lack these concentration and localization benefits because of low density, peripherality, lack of dynamic, innovative firms and institutions and simply being knowledge and information poor" (2004: 17, citing Howells 1997).

Although my understanding of "genuine innovation processes" may be broader than Morgan's (as discussed in Chapter 3), there is a useful distinction to be made between a system supporting the strengthening of existing endogenously dynamic innovation processes and a system of actors looking to create these types of processes where they do not as yet exist or are just emerging. Regional innovation systems *can* thus be defined in terms that presuppose consolidated cluster dynamics and collaborations between localized actors leading to innovation. However, it seems to me that regional innovation dynamics emerge through cumulative processes and can be strengthened through intentional cooperative efforts by localized and external actors in what I will refer to as *emerging regional innovation systems*.

In general, as technological innovation is a cumulative, interactive process, ubiquitously distributed within firms in the economy (Lundvall 1992), one could also assume certain territorial distribution

of innovative activities as well. I assume that all regional configurations where innovative activity takes place must have some sort of regional innovation system in place. For example, Bertelsen and Muller (2001) identify localized innovation systems supporting innovative practice over time by artisan village black-smiths and boat builders in East Africa. Cummings (2003) and Ekhoff *et al*. (2001) identify system dynamics in processes of technological transformation over time in the analysis of the three most important agglomerations of artisan firms involved in diverse types of handicraft production in three regions in El Salvador.

Much hinges on the definition of innovation and especially the related definition of the knowledge inputs to innovation and, thus, the characterization of localized knowledge providers. However, even utilizing our flexible definition of technological innovation, it is possible to assume that reasonably coherent regional innovation systems do not emerge in all geographically delimited areas or "regions," i.e. there may be no systematic localized innovation processes and/or no system of actors and institutional set-up that supports these innovative economic initiatives.

In dealing with the problems of identification and delimitation of regional innovation systems, Cooke makes a useful distinction between "operational" and "conceptual" systems. He argues that the analytical conceptualization of a regional system of innovation implies a methodological approach that focuses on the system's "constituent elements and their specific characteristics, the relationships between these elements, the boundaries of this system, and the interaction with its environment. Defining the system concept as an analytical tool, we do not need to assume innovation systems always consist of tightly linked actors and that they have clear-cut boundaries. We also do not need to expect that all innovation systems consist of the same actors performing the same function. On the contrary, such an understanding of a systems approach is open for flexible interpretation." (1999: 5).

Applicability of RIS concepts to less favoured regions in the North? South?

Morgan (1997) raises a key question which is directly relevant for our study. He asks "to what extent, if at all, can peripheral regions innovative?" In other words, do the majority of the arguments concerning innovation dynamics in regional innovation systems developed through the analysis of dynamic, core regions in the North apply to its more peripheral regions? Do they also apply to peripheral rural regions in the South, such as Tecoluca?

In relation to these questions, Morgan (2004: 18) argues,

> "Geography matters …, but uneven development is a sobering reminder that it matters for different reasons in different regions. At the dynamic end of the spatial development spectrum clustering may be one of the forms through which localized learning and innovation take place, a process that tends to be organic and self-activating. It is at the less dynamic end of the spectrum, in the context of less favoured regions, where we encounter one of the biggest questions in political economy today, that is whether localized learning and innovation can be consciously induced through judicious public intervention and new forms of collective action. The evidence from Europe's less favoured regions may be less than inspiring, but at least it suggests that, even here, the development process is not set in aspic….
>
> If less favoured regions are to become something other than they are today, especially if they are to develop a more robust endogenous capacity for innovation and development, they will need to adopt a twin track approach. They'll need to recognize that local circumstances are the only meaningful point of departure for a genuinely attuned regional strategy and they'll also need to recognize that local resources are a necessary but not a sufficient condition for progress."

Morgan suggests that there is indeed some basis for cautious optimism as to the possibilities to combine endogenous and exogenous resources, working from what exists to establish break the vicious circles and establish positive innovation related dynamics, at least in Europe's less favoured regions.

From a Southern country perspective Vargas et al. (2000) argues that the importance of the local/regional dynamics on innovation processes must be considered in relation to extra-local factors such as the great instability that underlines the macroeconomic environment and the fragmented characteristics of the institutional frameworks supporting the innovative activities in developing countries. As Arocena and Sutz (1999) argue, there is a marked disintegration among the organizational agents that play crucial roles in systems of innovation in the North. This argument mirrors Oughton et al.'s arguments concerning the fragmentation of Europe's less favored regions.

In terms of the applicability of the systems of innovation approach to studying localized innovation dynamics, this work is preceded by others that have suggested its worth. This type of approach was applied in a significant research effort to characterize and compare selected local productive arrangements in Brazil and Uruguay, aiming at investigating local bases of productive and innovative capacity in order to design S&T policy propositions at national and regional level. Partial results from these studies are reported in Cassiolato and Lastres (1999, 2002), Vargas (2000) and Villaschi and Ramos Campos (2001). The systemic nature of technological innovation is also reflected in the more extended literature on industrial clusters in the South, including articles from a special issue of World Development (1999, Vol. 27, No. 9) and those included as chapters in Parrilli, et al. eds. (2002). In this sense, it is also useful to remember Cooke's earlier cited distinction between strict operational delimitations and more flexible analytical applications of RIS concepts.

Applying the concepts

Taking the conceptual delimitation of regional innovation systems presented here as the framework for analysis, I adopt the flexible conceptual perspective proposed by Cooke to characterize Tecoluca's emerging regional innovation system in Chapter 7. The general discussion of the importance of networking and networking practice within RIS is applied to the analysis of how and why the system's configuration and functioning provides, enables and constrains innovative practice in the GBL's initiatives. The more specific conceptual framework for this analysis is provided in the following sections.

Also, as suggested earlier, one of the conceptual challenges for this thesis is to further reflect on the question of the applicability of concepts such as these to the case study in rural Tecoluca. In Chapter 9 I do so and indicate future avenues for empirical research related to the relevance of emerging regional innovation systems in the rural South for the development innovation capabilities in task-networks of actors.

4.3 Territorial Production System

The regional production system, and especially agglomerations of interconnected firms, can be understood as the core of the regional innovation system. It is largely in relation to the innovative practice of the region's economic initiatives that the other tangible and intangible elements of the RIS gain their specific relevance.

The production structure within the context of a regional innovation system may be characterized by an increasing degree of convergence around a central agglomeration of related, competing and complementary, business enterprises or there may be greater diversity in economic activities, i.e. sectoral specialization or diversity (Asheim and Coenen 2004: 7). As Loasby argues, industrial dynamics, or in this case the dynamics of the regional production system, depend on the differentiation between and within economic sectors of the economy (localized or not). "… it is the effects of these differences on behaviour, continually modifying and occasionally disrupting the environment in which firms are operating, requiring new interpretations and sometimes prompting new perceptions, that provide the dynamics" (2001: 11).

Barquero (2000) argues that the "systemic organization" of the diversity of territorial economic initiatives is essential for local economic development, as this can generate economies of scale, the

reduction of transaction costs, the creation of increasing returns and the increase in the competitiveness of local firms in national and international markets. Rodriguez (1999) also argues that the integration between large, medium, small and micro enterprises as well as inter-sectoral complementarity and vertical integration between economic activities are key characteristics of a dynamic local economic development process, as a diversified and flexibly integrated business community has greater potential for growth in rapidly changing realities and resilience to external shocks.

Schmitz and Navdi (1999: 1505-06) state that clustering can facilitate regional economic development, although this is not necessarily the outcome.

> "For poor regions seeking to industrialize from below two things need to occur: the mobilization of unused local resources (financial and human), and the effective use of these resources…. Clustering facilitates the mobilization of financial and human resources, in that it breaks down investment into small riskable steps, that the enterprise of one creates a foothold for the other, that ladders are constructed which enable small enterprise to climb up and grow. It is a process in which enterprises create for each other – often unwillingly, sometimes intentionally – possibilities for accumulating capital and skill."

Emergence and development of industrial clusters

The literature reviewed on industrial clusters in the North and the South focus on cases where firms engaged in similar or directly complementary economic activities have become co-localized in geographical agglomerations. The analysis of innovation within these agglomerations focuses on the learning dynamics related to direct observation, competition and cooperation between firms, but also increasingly between firms and non-firm actors in the regional, national and international contexts.[67]

Maskell argues that "the reason for the existence of the cluster can be found in the enhanced knowledge creation that takes place along its horizontal and vertical dimensions." Initial cluster formation is based on "enhanced knowledge creation stemming from the variation developed along the horizontal dimension of the cluster, supported by the reduced costs of co-ordinating dispersed knowledge, of overcoming problems of asymmetrical information and aligning incentives, as well as of easing the actual transactions taking place along the vertical dimension." A diversity of knowledge flows develop within the cluster develops through the intelligent observation made by firms of their co-localized competitors' actions (production organization and techniques, product characteristics, providers, etc.), as well as intentionally coordinated interactive learning processes (2001: 924, 937).[68]

Giuliani (2002) and Giuliani and Bell (2004) argue that firms within geographically bounded clusters develop heterogeneous knowledge bases due to the diversity of their specific historical development paths. The overall creation of innovative knowledge in the cluster is dependent on the selective combination of these specific knowledge bases embedded within the individual firms. They argue that the most important collective learning processes are not characterized by random diffusion of knowledge through the air, so to speak, but through selective channels of specific relationships between firms.

With the development of the cluster there is also a tendency for firms to differentiate themselves through specialization and thus develop potentially complementary knowledge bases and vertically integratible roles within the cluster. The realization of coordinated action and the creative combination of their complementary knowledge bases are facilitated by their physical proximity. "When creating

[67] The innovation relevant dynamics of linkages between firms and other relevant non-firm actors are discussed in greater length in Sections 4.5 and 4.6.

[68] In other words, "the cluster exists because of locational economies that are independent of the internal degree of interaction at least in principle. The sole requirement is that many firms undertaking similar activities are placed in circumstances by co-locating where they can monitor each other constantly, closely and almost without effort or cost." (Maskell 2001: 930).

an appropriate vertical differentiation, new economic activities become possible, knowledge creation is advanced, and the resulting extension of the internal market helps make the process self-reinforcing (Young, 1928)" (Maskell 2001: 932).

Maskell continues his argument concerning cluster development stating that there is a close "interdependence or fit between the specific economic activity of a cluster and the particular institutional endowment developed" in its immediate regional context over time. "… while the cluster's particular set of activities affects what is learnt, it is the institutions in the cluster that define how things are done and consequently how learning takes place (Lundvall and Maskell, 2000)" This particular synergistic relationship between the cluster's particular pattern of specialization, the supporting non-firm organizations and regional institutional set-up, facilitates the establishment and development of certain types of similar or complementary economic activities in the area and discourages others which do not fit or are not supported (934-5, 937).

Michael Best (1999) complements these arguments, taking a combination of Penrose's arguments concerning capability development in firms and Smith's principle of increasing specialization, as the basis for developing a "capabilities perspective" of regional cluster growth dynamics. The model he develops is based on the synergistic relationship between the internal dynamics of entrepreneurial firms, technological diversification through the creation of new firms, the development of inter-firm horizontal networks and the evolving specialization and diversity of industrial firms within these networks.

Best argues that entrepreneurial firms look to develop "unique capabilities, often of a technological form, but the process of developing such capabilities creates new productive opportunities in terms of a refined match between product or service performance and customer demand … In the process of redefining the product, the market, too, is re-characterized. These new 'market' opportunities feed back to motivate changes in productive capabilities setting in motion a new dynamic."[69] The path dependent nature of this process of technological development within firms constrains the development of all initially conceived alternative options.[70] However, this dynamic may provide an opportunity for the creation of new firms or new divisions within firms to exploit these opportunities or for the creation of new inter-firm relationships to exploit complementary capabilities (Best 1999: 113-14). The process of knowledge transfer related to these potential opportunities could occur through the mechanisms of intelligent observation and/or through more specific channels as discussed above.

Regional specialization patterns are formed through the path dependent and rather unique "combinations and patterns of intra- and inter-firm dynamic... The capability-creating process of the entrepreneurial firm is the source of internal dynamics, but the firm exists within a larger system of inter-firm relations and dynamics which condition its opportunities. Thus a firm's opportunities to specialize and develop its unique capabilities are shaped externally by the constellation of enterprises and capabilities with which it can partner" (Best 1999:116).

Thus, the development of synergistic horizontal and vertical linkages between co-localized firms, and between them and other actors is crucial for the development of innovative options through creative connections between diverse knowledge bases as argued by Loasby (2001, 2002).

Mechanisms facilitating inter-firm learning and cooperative action in clusters

Within cluster analysis, both in the North and South, significant emphasis is placed on the importance of purposeful inter-firm co-operation in order to take advantage of emerging opportunities and respond to

[69] Best's conceptualization of the close linkage between the internal generation product novelty and the re-characterization of the external market, can be related to Schot's (1991) arguments as to the co-evolution of the generation of novelty and the selection environment and thus the importance of the technological nexus role.

[70] See Muller (2003: 57) for a more detailed explanation of the paths not taken, i.e. the alternatives not developed in the process of technological innovation.

crisis that effect the viability of current economic activities. Schmitz (1995, 1999) argues that proactive cooperative action between co-localized firms, as well as with local non-firm actors, is crucial to fully realizing the potentials for "collective efficiency" facilitated by spatial proximity. Schmitz and Nadvi argue that connections to sizable distant markets through effective trade networks and trust sustaining inter-firm relations are two key factors facilitating cooperation between co-localized firms to realize these potentials (1999: 1507).

Cooke (1999: 7) argues that, "Agglomeration facilitates inter-firm learning, especially with respect to tacit as well as codified knowledge. Where such interactions are more strongly trust-based, transaction costs will be reduced.... 'Conventions' develop where actors are recognized as reliable, and over time a regional 'micro-constitution' of shared rules, norms and habits becomes institutionalized in the agglomeration. Thus a collective social order emerges."

Helmsing in turn focuses on "the emergence of basic shared knowledge and procedures" as the basis for collective learning between co-localized firms. This implies the development of "a common language for talking about technological and organizational problems; shared or partially overlapping technological/engineering knowledge; and shared organizational knowledge of how to manage and divide responsibilities and modalities of collective decision-making. Preconditions for collective learning are common, regional, culturally-based rules of behavior, a language of engagement and collaboration, and accepted but tacit codes of conduct between firms, which enable the development of trust, itself essential for innovative collaboration" (2001: 289, citing Lawson 1999).

Although horizontal cooperation between producers/firms plays a central role in local economic development, this process is problematic and frequently requires support by actors playing the role of catalyst; establishing the pre-conditions to enable cooperation and mediating between the conflicting interests that emerge (Schmitz 1999; Schmitz and Nadvi 1999; Helmsing 2001, 2003). In El Salvador, the process of forming these types of associations is frequently facilitated by NGDOs and territorial development programs promoting the formation of different types of associative economic initiatives. Local governments have generally had only a limited role in facilitating such efforts.

Applying the concepts

The conceptual framework developed in this section deals primarily with the emergence and development of agglomeration of industrial firms and the relevance of proximity and linkages within the cluster for their innovative practice. This framework is applied in the characterization and analysis of the Grupo Bajo Lempa Consortium as an emerging agglomeration of linked economic initiatives in Chapter 6 (6.3). It is also applied to analyzing the territorial production system in Tecoluca's emerging RIS in Chapter 7 (7.1).

4.4 Linkages between Firms and Regional Enterprise Support Networks

While the main focus of cluster analysis is on the behaviour of agglomerated firms and inter-firm relationships, there is increasing attention being placed on interaction between these firms and regional networks of business support organizations. These local actors include public and private universities and other knowledge providers, as well as NGDOs and other specialized business support service providers.

Knowledge sharing in relationships between firms and organizations specialized in research and in the distribution of knowledge with complementary specialties, play an important role in innovation processes (Andersen and Lundvall 1997). As such, interactive learning between firms and a diversity of other knowledgeable actors is a key characteristic of a well functioning regional innovation system. Cooke (2002: 136) argues that, "Where there is a rich innovation infrastructure, ranging from specialist research institutes, to universities, colleges and technology transfer agencies, and institutional learning is routine, firms have considerable opportunities to access or test knowledge, whether internally or externally generated to the region."

The support of specialized networks of business support service providers is important for the upgrading of firms interested in competing in more demanding and higher paying markets, especially specialized export markets. They require "specialist producer services to enable them to acquire knowledge about these markets (demand characteristics such as consumer tastes and product attributes, marketing channels and trading practices). They also need these services in order to prepare their own manufacturing operations financially, technologically and organizationally for internationally competitive production" (Helmsing 2001: 296).

There is considerable diversity in the modalities of business support service provision, including the following: "(i) public provision, where public agencies provide services such as export marketing, vocational training and technology centres; (ii) public-private partnerships where government, for example, co-finances service centres but leaves it to the private sector to run them (trade representation, sector specific innovation centres); (iii) intermediary forms of non-profit (non-membership) enterprise promotion agencies delivering enterprise development services … ; (iv) business associations… (v) consortia (more or less formalized agreements between a limited number of firms to pool efforts or resources for a common purpose); usually these are not sector wide but composed of self-selected groups of firms… ; (vi) formation of groups of firms, often restricted to small groups, and often involving flexible arrangements…." (Helmsing 2001: 296-7).

The capability of localized business initiatives to form different institutionalized network constellations is especially important as these associations can provide directly or facilitate the access of localized firms to specialized business support services (related to financing, technical assistance, marketing, etc.) that enhance their individual and collective innovative capabilities. These associations can also serve as platforms for joint action to influence the investment priorities of local governments, relevant national public policy, leverage diverse types of support from national and international agencies to further collective business objectives, etc.

In addressing the development problems of the EU's "less favoured regions" (LFRs), Oughton et al. (2002: 98) focus on potential solutions to what they call the regional innovation paradox. By this they refer to "the apparent contradiction between the comparatively greater need to spend on innovation in lagging regions and the relatively lower capacity to absorb public funds earmarked for the promotion of innovation and to invest in innovation related activities, compared to mare advanced regions."

This paradox can be explained principally in relation to the characteristics of the emerging, often fragmented and incomplete, regional innovation systems. In particular they focus on the inability of many localized firms, especially SMEs, to articulate their needs for innovation and specific demands for diverse business support services necessary in order to innovate. Equally, local governments, business support organizations, universities, etc. are frequently unable to design and provide services that are relevant for solving specific problems constraining the innovative development of localized firms. This situation is related to a generalized lack of local experience with inter-firm cooperation and cooperation between localized firms and other potentially key actors in the emerging RIS.

> "In short, the regional innovation system is fragmented… and lacks either the necessary interfaces and co-operation mechanisms for the supply of innovation inputs to match firms' demand, or the appropriate conditions for the exploitation of synergies and co-operation among regional innovation actors which could eventually fill gaps and avoid duplication in service provision" (Oughton et al. 2002: 102).

Morgan (1997: 496) focuses on the key issue of how to link supply side initiatives, like those to promote regional technology development in the EU, with the effective demand of local economic actors. He argues that,

> "In many ways this problem of receptivity on the demand-side is more difficult to resolve because it involves modifying internal routines within the firm so as to promote at least three

types of competences. First technological competence, the ability of an enterprise to master particular technologies that are relevant to its needs; second entrepreneurial competence, the ability to integrate relevant technologies with the wider corporate strategy of the firm; and third, learning ability, which partly involves structuring a firm's organizational and management routines such that they can absorb information on changing markets, new technologies and innovative organizational structures."

Based on a critical review of experiences fostering industrial clusters and networks in the South, Humphrey and Schmitz propose that to be effective such interventions should be: "(a) customer oriented: enabling firms to learn about, and from, the needs of their customers helps them tackle problems of competitiveness; (b) collective: directing support at groups of enterprises not only has lower transaction costs than assistance to individual firms, but also encourages co-operation and mutual learning; (c) cumulative: generating the capacity to continuously upgrade and improve makes further public support unnecessary" (1996, cited by Schmitz and Nadvi 1999: 1509).

In addition, it is crucial that enterprise support services be differentiated and specifically oriented towards the demands of agglomerations of firms at different moments in their development; possibly focusing on stimulating and mediating networking practices at the earliest "survival" phases of such clusters and progressively placing more focus on motivating and facilitating capability upgrading in areas of technological learning and innovation as the clusters develop (Schmitz and Nadvi 1999: 1509).[71]

Sustained interaction and spatial proximity are factors that enable improved relations and the co-evolution of the demands of agglomerated firms and enterprise service providers. This is especially true in complex processes of technology transfer that involve high degrees of tacit knowledge and higher degrees of divergence in terms of the knowledge bases and cultural perspective of those actors involved. In these cases Morgan (2004: 8) argues that, "what is needed above all is mutual understanding, and this requires a common code through which information can be understood (Lundvall, 1998; Gertler, 1995). …. Projects with a high tacit component require nothing less than 'intimate personal contact to succeed' (Teece, 1981)."

Applying the concepts

The conceptual discussion from this section is applied to the analysis of the emerging relations between the GBL's economic initiatives and the developing regional enterprise support network in Chapter 7 (7.2). Special attention is given to assessing the role of CORDES Bajo Lempa in supporting the emergence of the GBL's emerging economic initiatives as compared to the actions of other actors comprising this network.

4.5 Territorial Governance Mechanisms and Innovative Practice

The territorial governance structure is the third key sub-system constituting the regional innovation system. Faced with the rapidly increasing pace and complexity of economic dynamics in both northern and southern economies, firms look to other firms and non-firm actors in their search for innovative knowledge and as providers of specialized services to enable their development and implementation of innovative alternatives. The increasing interdependence of firms and other actors has multiplied problems of coordination while uncertainties about the outcomes of innovative efforts have increased. Within this context, associational territorial governance has become increasingly important.

Helmsing argues that "… the viability or strength of a regional production system depends as much on the firms as on the local regulatory, coordinating and supporting institutions and the way in which they interact. Systems that are better able to handle these problems have a greater capacity

[71] See Altenberg and Meyer Stamer (1999) for an in depth review of experiences with the promotion of clusters in Latin America.

for timely adaptation and this allows them to maintain a growth trajectory. *New forms of governance are required both between firms as well as between firms and territorial or public agencies*" (2001: 295, my emphasis).

Cooke (2002: 135) uses the concept of *associative governance* to refer to a "networking propensity whereby key regional governance mechanisms, notably the regional administrative bodies, are interactive and inclusive with respect to other bodies of consequence to regional innovation." Along this same line Morgan (2004) argues, regional governance roles are frequently played by both private representative organizations such as branches of industry associations and chambers of commerce, and public organisations such as universities, polytechnics and regional ministries with devolved powers concerning enterprise and innovation support, particularly for SMEs.

Associational governance mechanisms can thus be characterized by the quantity and diversity of the actors (from the public, business and civil society sectors) that are engaged them, the roles they assume in associative governance practice and their capabilities to play them. These structures are also characterized by the connections established with exogenous sources of knowledge and other resources necessary for localized innovative practice. The linkages to key policy making and development organizations from the national and international contexts are the conduits that enable the creation of opportunities and more effective mitigation of external threats to LED dynamics and specific innovative initiatives.

While recognizing the authority and political legitimacy of elected local/regional governments, associational governance is a negotiated, interactive process that also recognizes the legitimate participation and complementary capabilities of other territorial actors. A central goal of associational governance practice is the development of a general territorial development vision and strategy for local economic development. However, in adopting this perspective of associational governance it is important not to gloss over conflicting interests between different groups of actors that attempt to give directionality to the local economic development process.

The basic nature of the regional governance structures and their relevance for LED vary across countries, due to divergent national legislation as to the ways in which the State is organized on a sub-national level, as well as the responsibilities and resources that it possesses. State legislation and its implementation with respect to centralization versus decentralization of decision-making power and resources applicable to promoting local economic development and innovative economic initiatives are especially important in this sense. There are also significant differences across regions due to their formal, but especially informal, institutional set-ups. These mediate the way sub-national public organizations involve private enterprise and civil society actors in regional governance roles relevant for the functioning of the regional innovation system, for example.

The associational governance process, specifically related to enabling localized innovative practice along specific technological trajectories, demands the configuration of a diversity of *specialized functional mechanisms*. The main function of these mechanisms is to facilitate interactive practice in relation to key dynamics such as: territorial development planning, endogenous interactive learning, acquiring and internalizing external knowledge, mobilizing internal and capturing external resources, coordinating existing efforts and designing future joint initiatives, etc.

Local government's role facilitating interactive innovative practice

Municipal governments are being forced to assume an increasingly relevant role in the promotion of local economic development in El Salvador and much of the South, even though they generally do not possess adequate capabilities to do so. Within the literature on regional innovation systems, diverse authors argue that local governments have an important role to play in the establishment and strengthening of territorial associational governance mechanisms.

Cooke (2002: 135), for example, places the regional government at the heart of associative governance practice arguing that an organizational setting could emerge in which "the regional administration animates or facilitates associativeness among representative bodies inside or outside public governance, but does not seek to dominate a process of consensus formation with respect to, say a readjustment of regional economic strategy." Instead the government agency may share or delegate this function to "legitimate private governance bodies such as chambers of commerce or business associations."

With reference to Europe's less developed regions, Oughton et al. argue that regional governments also have a potentially important role to play as catalysts for "articulating and dynamising a regional innovation system." Especially important aspects of this catalyst role are "articulating ways of linking regional actors (firms, technology centres, universities, business service providers) and matching firms' innovation needs with knowledge supply, in search of synergies and complementarities among the different actors, policies and sub-systems" Playing this role would be facilitated by their political legitimacy and access to a diversity of national and EU regional development funds (2002: 104).

In general, an important aspect of the municipality's role in LED is its capacity to convene collective processes, provide motivating leadership and mediate between the conflicting interests that are frequently revealed. The municipality can play a key role in enrolling and promoting convergence and co-operation between the territory's diversity of firm and non-firm actors; providing coherence and directionality to the collective LED effort, as well as motivation to obtain concrete short term results.

Engagement of business initiatives in associative governance

The territory's diverse business initiatives should be the principal drivers of local economic development dynamics. They are the ones involved in routine productive and commercial operations and risking investments in the diverse types of innovative initiatives necessary to make LED dynamic. Frequently, however, local economic actors do not participate in local economic development processes in an organized way. Economic actors do not engage the municipality or other support service providers, nor do they participate in development planning exercises or other associational governance mechanisms designed to deal with LED issues.

In part this may be because they perceive that there will not be an adequate return on their investment of time and other resources. In this sense, Meyer Stamer (2003: 15-16) argues that it is necessary to "run LED like a business, and not like a politico-bureaucratic activity: flexibly, looking for opportunities, seeking a quick return on investment. This is, in fact, one prerequisite to raise the private sector's interest in LED. Private businesses will not be particularly interested in an LED initiative which appears to consist mostly of meetings and does not render visible results."

Associational governance capabilities

The main goal of associational governance practice is the articulation of the aspirations and capabilities of regional actors and the complementary enrollment of external actors in solving problems that limit the realization of the territory's development potentials.

The specific ways in which the diversity of actors are integrated into associational governance mechanisms, the quality of their interaction and the complementarity between their diverse capabilities, as well as the configuration and the progressive institutionalization of the functioning of these mechanisms, represent an important source of regional differentiation. These factors can enable or constrain innovative practice in regional economic initiatives, influence the overall performance outcomes of the regional innovation system in terms of sustainable development goals, establishing positive or negative future perspectives for rural family livelihoods.

It is also clear that, effective engagement in associational governance practice to facilitate the emergence of innovative economic initiatives demands certain, but as yet unspecified, capabilities of the actors involved.

In this sense, Oughton et al. (2002: 104) identify three crucial steps for improving a region's systemic capability to absorb investment in innovation activities, thus breaking out of the negative spiral of cumulative causalities reflected in the *regional innovation paradox*, present in Europe's LFRs:

- "… the facilitation of cooperation and coherence between different agents and policies… which are integral parts of the regional innovation system.
- … identifying and helping express innovation demand and needs, be it latent or otherwise, from regional organisations, most notably business, especially small and medium sized enterprises (SMEs).
- …the coordination of the firms' demand for innovation inputs (their desire and capacity to use knowledge) and regional supply (the availability of R&D knowledge, knowledge centres, technological expertise, investment funds) and eventually to open gates to external innovation sources and partners capable of addressing the innovation needs of the regional economy."

Cooke (1999: 7) identifies an additional need for the regional governance structure to proactively avoid excessive rigidity in internal and exogenous network linkages and perspectives, in order to avoid lock-in to non-functional, non-competitive "practices and ways of thinking." He continues stating,

> "This clearly involves a monitoring, outpost, or observatory function in which information of consequence to system actors is relayed and transmitted rapidly and responsively. Anticipated changes in skills needs of importance to the firm and organizational needs in the regional system would be a case in point…. Feedback loops, in which advanced regional organizations monitor, engage in reflexive behaviour, learn, and implement adjustments through associational policy networks are a central process feature here. Learning is the selection mechanism by which innovation leads to a shift in trajectory from one path dependence to another… These are fundamental, evolutionary development processes that support intervention for economies on yesterday's trajectory to be shifted towards those of tomorrow. *In a world of increasing externalization and specialization, more of this support falls on the combination of public and private networks that may operate more or less judiciously in regional agglomerations" (Cooke 1999: 7-8, my emphasis)*.

Furthermore, Morgan, reflecting on the experience of Regional Technology Planning initiatives in Europe's LFRs and the specific case of the Welsh Development Agency's actions as animateur of localized business development efforts, comes to several conclusions that are directly relevant for analyzing the relevance of Tecoluca's associative governance mechanisms for strengthening innovative economic initiatives (1997: 497-501). These are presented in Box 4:

Box 4
Associational Governance and Technological Innovation in the EU's LFRs

- "The [Regional Technology Policy] initiatives are aimed at what he sees as the right targets, changing the institutionalized negative inertia of LFRs, consciously aiming "to build 'capacities for action', where this is understood to mean 'mutually coherent sets of expectations, built into conventions, which underlie technological spaces, permitting actors involved to develop and coordinate necessary resources' (Storper, 1995)"
- "Innovating in the periphery means; working with what exists, however inauspicious, in an effort to break the traditional institutional inertia in the public and private sectors, fostering inter-firm networks which engage in interactive learning, nurturing trust and voice-based mechanisms which help to lubricate these networks and promoting a cultural disposition which sets a premium on finding joint solutions to common problems."
- In order to be able to implement what is learned or projected in collective planning processes it is necessary to empower regional governance structures to "design and deliver policies which are attuned to the nuances of their regional economies," which implies "devolved institutional capacity" at this level.
- It is however, also necessary to combine a bottom-up approach to developing new routines—with respect to reciprocity, trust, formal interaction and informal know-how trading, etc." with complementary top-down initiatives designed to create a "more supportive macro-environment—with respect to investment, skills formation, technology transfer and regional governance structures."
- "A supportive central state is also necessary to compensate those LFRs which do not have the capacity to experiment with their own institutional resources (Amin and Thrift, 1995)."

Based on the work of these authors and my experience promoting local economic development activities in El Salvador, some key capabilities necessary to engage in effective associational governance practice are:

- Methodological facilitation and contribution to the substance of territorial development planning or strategizing, especially as it relates to promoting LED and innovative practice,
- Facilitation and proactive engagement in interactive learning spaces, internal and external to the territory, in order to acquire knowledge to be applied to improving the functioning of associational governance mechanisms as well as directly to innovative economic practice,
- Capabilities to facilitate and engage in the building of collective agreements (*concertación*) and the coordination of actions related to LED initiatives between diverse actors,
- External resource mobilization through the presentation and negotiation of initiatives with and enrollment of exogenous actors in support of LED efforts,
- Establishment of effective mechanisms to ensure transparency and accountability in public investment decisions, service provision, etc., related to LED, by public authorities and citizen advocacy groups.[72]

An additional aspect of associational governance practice is the generation and transformation of the regional institutional set-up to facilitate the emergence and consolidation of innovative economic initiatives. This implies specific capabilities associated with elaborating territorial development plans, as well as municipal regulations on urbanization, the relationship between natural capital resources and economic activities, and taxation of local enterprises and property. Even more complex capabilities associated with intentional efforts to establish local cultural conventions that are conducive to coordination and interactive learning in relation to the development and implementation of innovative technological alternatives in local economic initiatives.

[72] See Amin (1999) for an articulation of policy proposals to strengthen regional governance capabilities.

With respect to these types of capabilities, there seems to be a key distinction between the capabilities required of actors playing the role of *system integrators* (Helmsing 2001) responsible for designing and dynamizing the functioning of associational governance mechanisms and the capabilities required of actors enrolled in these mechanisms to contribute to development planning exercises and/or the coordinated implementation of efforts to implement these plans. Other key actors are those with specialized capabilities related to the acquisition and internalization of external knowledge and other resources.[73]

Greater precision concerning *associational governance capabilities* required at any time, certainly depends on the system dynamics, the functional mechanisms in place, the characteristics of the business enterprises and innovative activities being promoted/supported, etc. These capabilities will, thus, be quite specific to the localities where they are developed and applied to solve certain problems and are dynamic over time.

As with innovative capabilities, there are also certain associational governance capabilities which are best understood as collective, being exercisable only through joint action. An important collective aspect of these associational governance capabilities is the degree of complementarity between the capabilities of individual actors, applicable to solving regionally specific problems. A diversity of actor perspectives on territorial governance problems, and their related knowledge bases, can be considered beneficial for the generation of innovative solutions; that is, if the appropriate connections can be made between them as they are creatively applied to this end.

Applying the concepts

This conceptual framework is developed in order to understand the nature and functioning of the associational governance structures and to analyze the associational governance capabilities of actors embedded in Tecoluca's regional innovation system in Chapter 7 (7.3). The key question is how and why their associational governance practice enables or constrains the innovative practice of the GBL's economic initiatives.

4.6 The Organizational and Institutional Configuration of RIS

Up to this point, the chapter has focused on the conceptualization of and the relations between local economic development and regional systems of innovation, as well as the most important characteristics of their three constitutive sub-systems: the production system, the localized business support system and the territorial governance system.

Two crucial structural system components, emphasized in the general innovation systems approach but not mentioned explicitly in the above definitions of RIS, are the interwoven formal and informal localized institutional set-ups and the organic linkages between actors. These structural aspects bond the regional innovation system together and greatly influence its dynamics, enabling or constraining the functioning of the three regional sub-systems and the interactions between their constituent actors.

This section further develops the framework for understanding the mechanisms that explain how and why the combined dynamics of the RIS's three sub-systems constrain or enable the innovative practice of territorially embedded firms. The argument is made that these mechanisms constitute regionally specific sources of competitive advantage for local firms, and also define to a large extent the social and ecological sustainabiliy of the local economic development process.

[73] The conceptualization of associational governance capabilities is further developed through application to case study analysis in Chapter 7 and in the conclusions presented in Chapter 8.

Networks and networking within the RIS

Analysis of local economic development dynamics demands an understanding of the actors involved and their interrelations in what can be understood as emerging regional systems of innovation. This implies analysis of the complementarity of their accumulated capabilities, as well as the density of the network linkages and the specific nature of the relationships between these system actors. It also demands analysis of their linkages with actors external to the regional system, embedded in national and international innovation systems.

The formal and informal networks between individuals and organizational actors within and between each of a RIS's three constitutive sub-systems are fundamental structural elements of a regional system of innovation. In Chapter 3, the focus was on the specific task-networks involved in economic initiatives. Here this focus is widened to include the diversity of networks and inter-connections that are the organizational basis for the functioning of regional innovation systems.

In this context, networks may be conceptualized as any repeated and reasonably stable pattern of interactions between a particular set of actors. Two important characteristics of networks are their stability in time and efficiency in satisfying the objectives defined for their creation and maintenance. A well functioning network generates synergy or self-catalization dynamics based on compatibility between products and services (knowledge, etc.) which the different actors have to offer to the collective effort (Saviotti, 1997). *Networking practice* is then the intentional participation of regional actors in networks, the formation of new networks and dissolution of old ones (Van Geenhuizen and Nijkamp, 1999: F).

The nature of the networks to which an organization has access defines to a great extent the knowledge and other resources to which it also has access. In this sense, authors such as Carlsson and Jacobsson (1997) and Van Geenhuizen and Nijkamp (1999) focus on networking as a means to acquire innovative knowledge and resources to support innovative learning. For case study analysis this emphasis on knowledge acquisition and interactive learning, however, is broadened to include networking practice related to the acquisition and creative internalization of the diversity of exogenous resources that are necessary for innovative practice. This is necessary in order not to gloss over the multi-functionality of networking capabilities for innovative practice.

For analysis of networks and networking related to innovative practice, Van Geenhuizen and Nijkamp propose making distinctions between "simple and complex, symmetrical and asymmetrical, horizontal and vertical relationships." Furthermore, they argue that the analysis of interaction within networks must elucidate how different power positions between actors are expressed in access to resources, asymmetric exchanges and dependence (1999: F).[74]

Cooke (1999: 10-11) argues that, networks and network relationships within a RIS should be "*heterarchical* not hierarchical" and thus involve "exchange among partners of consequence… based on the following key social and psychological features:

- *trust* in the integrity of partners who are interdependent,
- belief in the *reputation* of partners to display integrity,
- customary *conventions* or rules of the game,
- reciprocal relations of *exchange* among partners,
- expectation of the *reliability* of partners,
- understanding of the need for *openness* and willingness to learn a social disposition that is *inclusive* not exclusive,

[74] This recognition of the importance of power relations in networks echoes the similar recognition by Bjiker (1987) of the importance of power relations between actors involved in the social construction of technology as well as Long's (2001) emphasis on power relations between actors in social interface situations, as discussed in Chapter 3.

- a political disposition that is *empowering* not elitist."

These arguments echo and complement Orozco's (2004) general emphasis on the *quality of interaction* between actors within and between networks as determinants of innovative performance of economic initiatives within systems of innovation.

Regionalized institutional set-up

The localized formal and informal institutional set-up is a critical constitutive element of a regional innovation system, and as such, a qualitative distinction needs to be made between the relevance of formal institutions generated on the national and progressively international level, which directly influence innovative practice in the regional context and those that emerge directly from interactive processes on a regional level. As mentioned earlier, examples of locally created formal institutions are local government legislation and formalized territorial development plans. Informal institutions, relevant for innovative practice include the cultural conventions or norms that regulate relations between producers and NGOs, communities and the municipality, etc., as well as those related to taking the risks involved in making investments to innovate.

With respect to their institutional set-up, regional innovation systems can be characterized in relation to:

- how relevant "exogenously" created institutions are mediated by regional actors as structural phenomenon that provide opportunities or constrain their innovative practice;
- how regional actor coalitions interact with others to advocate for changes in formal national and even international institutional set-ups in order to facilitate their local economic development strategies and innovative practice;
- the nature of locally created institutional set-up, relevant for the emergence and strengthening of innovative regional economic initiatives as well as the interactive dynamics through which the structures of the RIS itself is being transformed.

Facilitating innovation in local milieux and learning regions

Interactive learning among firms and with other relevant local actors such as local authorities and supporting organisations, as well as greater regional integration in terms of networking linkages, convergence between firm's demands and the delivery of support service programs, etc, provide opportunities for firms to strengthen their innovative capabilities. Put another way, the particular regional configuration of the organic linkages between system actors, as well as the complementaries and dynamics of their relationships can be said to be the immediate context from which the innovative capabilities of task-networks emerge. Different aspects of the regionalized formal and informal institutional set-up are in turn crucial determinants of the way different actors interact, enabling some forms of interactive behavior and constraining others.

Oughton et al. (2002: 101), note that *innovation capacity* of the regional firms and the *learning ability* of the region as a whole are "directly related to the density and quality of networking within the regional productive system. Inter-firm and public-private cooperation… and the institutional framework within which these relationships take place are key sources of regional innovation." They quote Asheim's (1998) definition of a *learning region* as "representing the territorial and institutional embeddedness of learning organisations and interactive learning." Asheim (1995: 17) argues that the key characteristic of learning regions is that these territorially embedded learning organizations and the networks between them also be dynamically, functionally, connected to external knowledge sources, so as to "avoid a 'lock-in' of development, caused by localised path-dependency."[75]

[75] Asheim argues that excessive focus on internal regional dynamics is a central problem of the innovative milieux approach, "which misses the central point of the 'productive' balance of the functional and territorial modes of integration, which has been the key to the industrial and economic success of the industrial districts" (1998: 15). This argument, concerning the importance of a RIS's external connections is further developed in Section 4.7.

Lawson and Lorenz argue that of particular importance for regional competitive advantages is the regional specificity of capabilities that cannot be purchased and moved elsewhere or copied due to the tacitness of much of the key knowledge base that underlies these capabilities. The emphasize that "While the capabilities of an individual employee can be transferred to another phase of the innovation process in which tacit or geographic regions, a regional capability, rooted in particular patterns of inter-firm networking and in inter-personal connections, cannot" (1999: 310, citing Foss 1996, Malmberg and Maskell 1999).

Asheim and Coenen argue that, "close proximity between actors and organisations strongly facilitates the creation, acquisition, accumulation and utilisation of knowledge rooted in inter-firm networking, inter-personal relationships, local learning processes and 'sticky' knowledge grounded in social interaction (Asheim and Isaksen, 2002)" (2004: 15, see also Asheim 2002). The specific processes of interactive learning embedded within the particular organizational set-up of the learning region, provide localized firms with their most immediate access to the knowledge and other resources they need to identify and take advantage of business opportunities through enhancing their innovative capabilities (Helmsing 2001, Van Geenhuizen and Nijkamp, 1999).[76]

In addition, Oughton *et al*. (2002: 102) stress that the regional system as a whole must be the subject of an intensive learning process in order to become an efficient "learning region." This is because "The nature of the regional governance system and the wider *institutiona*l framework shapes the effectiveness and efficiency of regional knowledge building/transfer among the different integrating parts of the system...."

From the context of their works, it seems that Oughton and Asheim are using the word *institutiona*l to talk about what I would call organizational frameworks and organizational embeddedness. However, as stated above, the formal and informal regional institutional set-up must also be taken into account in discussing the regional learning dynamics.

In synthesis, the particular nature of institutional set-up, existing linkages between actors and the particular characteristics of interaction within these relationships can facilitate regional knowledge flows and form the organizational basis for the accumulation of sticky innovation relevant knowledge in learning regions. Equally they may severely limit these crucial learning dynamics.

A complementary concept to that of the *learning region*, is that of the *innovative milieu* as proposed by Maillat (1995, 1998). Helmsing follows Maillat (1995) arguing that a milieu implies a "collection of players consisting of firms, research and training institutes, and local authorities, which must have … relative autonomy in making strategic choices" (2001: 289). He continues this argument stating:

> "A milieu becomes innovative when local actors begin to exploit advantages of collective learning and to adjust their own actions to that end—in other words, when 'interactions amongst economic agents develop as they learn about multilateral transactions that generate innovation specific externalities, and as the learning processes converge towards increasingly efficient forms of joint management of resources' (Maillat, 1995: 161)" (2001 p. 290).
>
> [This requires] "involving local players and the development of localized synergies leading to new endowments or (non-physical) territorial assets. Synergies may compensate for a lack of economies of scale, cut transaction costs and develop specific and collective territorial resources (in the form of know-how, specific technologies, products and processes). The initial focus may be on particular concentrations of products and industries (clusters), but what matters in the end are 'deeper' local regional competencies. These include new firm formation (start-ups) and upgrading, the associative capacity of firms, labor mobility and the

[76] This echoes the earlier discussion in this section concerning the importance of networks as conduits for resources applied to innovative practice in economic initiatives.

development of local human resources, synergy between economic activities, the 'thickness' of local institutions and of support systems, and the convergence in their programmes" (Helmsing 2001: 304, citing Maillat 1998).

Along these lines, it can be argued that the emergence of innovation capabilities within economic initiatives is directly related to the development of a regionally specific web of *traded interdependencies* such as the user-producer network relations essential for learning and incremental innovation, but especially *non-traded interdependencies* between firms and other local actors. Key non-traded interdependencies which support innovative practice and the upgrading of technological innovation capabilities are: dynamic regional labor markets, the configuration of different types of local private, public and semi-public business support organizations, relevant conventions, norms, values and codes of conduct arraigned through public and private interest governance, as well as, the development of trust and social embeddedness in networks (Helmsing 2001: 303; Morgan 1997: 495, citing Storper, 1992, 1994, 1995).

Lawson, (1999: 159) provides a complementary explanatory focus for the importance of embeddedness in innovative milieux. Citing Camagni (1991), he argues that the "ability of the local milieu to foster or facilitate innovation," is not only related to mechanisms which facilitate collective learning but also reduce "dynamic uncertainty." From collective learning emerges a shared knowledge base which facilitates "coordinated action and the resolution of problems." Membership in a milieu also reduces uncertainty, especially that faced by small firms, related to: "the complexity of information (requiring a search function); the problem of inspecting, ex ante, qualitative features of inputs, equipment, etc. (requiring screening); the problem of processing available information (transcoding); and assessing the outcomes of ones own action and the actions of others."[77]

In relation to the reduction of uncertainty related to innovation, it is also important to remember that this is a main function of the institutional set-up within systems of innovation (Edquist and Johnson, 1997). In this sense, it could be argued that it is in fact the institutionalized regularity of behavior of the inter-connected members of this regional community that helps to reduce uncertainty, as actors are able to rely on access to the complementary capabilities of other milieu members.

Crucial to the conceptualization of learning regions and innovative milieux is the argument that their organizational dynamics and the evolution of the institutional set-up generate regionally specific conditions and interdependencies that enable innovative practice in regionally embedded firms and are thus a potential collective source of competitive advantage for localized firms over time.

Regional conditions necessary for interactive learning

Applicable to analysis of the dynamics of a regional learning system, Dalum, Johnson and Lundvall (1995: 302-7) discuss six aspects that they argue should be guaranteed through direct or indirect, state action. Using their concepts, it could be argued that an important function of regional associational governance mechanisms is to ensure that the regional actors have access to: (i) the means to learn to innovate (ii) incentives to learn, (iii) opportunities to strengthen their learning capabilities, (iv) access to innovation relevant knowledge, (v) the capacity to use the knowledge to which they have access to create innovation, (vi) the capabilities necessary for remembering relevant knowledge and forgetting obsolete skills and activities. Without getting into an extended discussion of these conditions, the following comments are relevant for analyzing the systemic support for innovative learning within Tecoluca's emerging RIS. More specific discussion of the capabilities to learn and apply knowledge to innovative processes is provided in Chapter 3.

[77] Helmsing (2001 p. 287-288) also argues that, "A firm embedded in a geographical cluster of similar firms benefits from reduced uncertainty related to the gathering and interpretation of information for the development and assessment of alternative courses of action."

The means to learn

Dalum *et al*. (1995:) emphasize the need to strengthen the quality of the educational experience provided by the formal education system, especially its capability to teach how to learn, as well as the access which different sectors of the population have to the system. In addition, they argue that at times it is necessary to strengthen some of the under-valued components of this system, such as education and training for adults, especially with regard to the processes of creatively forgetting, to facilitate forward movement. Building linkages between the educational curriculum and the overall regional development strategy as well as specific economic activities related to this strategy would also be important.

Incentives to learn

As interactive learning and cooperative efforts related to innovation are based on shared values and basic standards concerning trust, cooperation, solidarity, open and honest communication, etc., it is necessary to design institutionalized incentives to strengthen this rationale, especially during the formative stages of people's lives inside and outside of the formal education system. This suggests, for example, the need to strengthen the incentives of the formal education and training system which are more related to the contributions of individuals to their work groups than to their individual achievements, for example (Dalum *et al*. 1995).

Access to relevant knowledge

Foray (1997: 64) argues that the rapid distribution of knowledge through an innovation system is vital for the learning capacity of the system as a whole, sub-systems and individual actors. A regional system of innovation is thus characterized both by its capacity to support and improve the processes of distribution and access to knowledge within the economy, as well as its capacity to generate new knowledge. This is fundamental as it would "increase the social value of the knowledge produced by processes of learning based on experience or organized research, and also of knowledge which is acquired and assimilated from external sources."

In order to facilitate knowledge diffusion and interactive learning in a regional innovation system it is necessary to establish conventions or ways of lining up individual expectations for behavior toward the institutionalization of openness with respect to knowledge sharing. This is not a spontaneous process. It requires continuous efforts to form coalitions, groups or networks of actors that develop and defend these conventions which can be degraded rapidly by acts of non-cooperation which are diffused spontaneously in the system (Foray, 1997).

As has been stressed above, a firm's access to organizations such as universities and technical institutes is a potentially an important source of innovative knowledge. It is thus problematic that the relationship and the communications between these organizations and businesses generally provide unequal access for firms of different sizes, specialties and locations. This makes it necessary to have specialized actors serving as bridges between those who produce knowledge and those who apply it in innovative practice (Dalum, *et al*. 1995). Such *bridging organizations* are especially necessary if the source of knowledge is located in another region or country making it difficult or impossible for its potential local users to access due to distance, language, etc. or if the different organizations are too isolated or distrusting of one another to realize the possible benefits of a cooperative relationship.[78] The existence of such entities in knowledge poor regions, like Tecoluca, is crucial to provide knowledge access for the most isolated families and economic initiatives and promote innovative linkages between localized firms and other organizations which have had little contact with each other but which are doing potentially complementary things in practice (Carlsson and Jacobsson, 1997).

[78] See Carlsson and Jacobsson (1997) for further discussion of their concept of *bridging institution*.

Remembering and forgetting creatively

Dalum et al. argue that although a system of innovation must have an adequate capacity to preserve knowledge obtained through learning for future access, "in a broad sense the capacity to forget is also important." For individuals, forgetting means abandoning obsolete knowledge and capabilities related to their economic activities. Within firms, it means terminating activities, projects and products which are also obsolete. For the system of innovation, forgetting means having mechanisms to help select and support firms with a future, as opposed to those without an adequate innovation capability (1995: 305).

The costs of changes, especially radical ones such as the transformations under way in El Salvador's fragile economy, are often very high and distributed unequally among regions, groups and individuals. The processes of change will be much easier if some sort of redistribution system which supports victims of change is in place, making it easier for them to move ahead toward more promising activities (Dalum, *et al*. 1995). Locally this would suggest the need for mechanisms specifically designed to meet the transitional needs of groups especially affected by changes, such as increased foreign competition under free trade agreements, to enable them to transform their current to activities to become more sustainable or to be involved themselves in other more dynamic economic areas.[79]

Applying the concepts

The complementary conceptualizations of learning regions, innovative milieux and regional learning systems are applied to the integral characterization and analysis of the strengths and weaknesses of the learning mechanisms in Tecoluca's emerging RIS in Chapter 7 (7.5). This analysis also makes reference to the conditions necessary for facilitating learning in innovation systems outlined by Dalum et al. (1995).

4.7 Relevance of a Regional Innovation System's External Linkages

A point that has been made by several of the authors cited above, but which must be emphasized here, is that a regional innovation system cannot be conceived of as a closed system. Exogenous forces influence local conditions, providing opportunities for local businesses to improve their performance or families to improve their livelihoods. External forces may also threaten the viability of local production and consumption activities and thus jeopardize the sustainability of local livelihoods, business performance and economic development dynamics.

External forces of particular concern here are those embodied within national and international innovation systems. The main mechanisms through which these exogenous forces influence the innovative practice of task-networks involved in regional economic initiatives are:

- local actors interacting with endogenous actors with given domains and under the institutional set-ups that characterize these national and international systems,
- the intervention of external actors in the local context, directly or indirectly, through providing resources necessary for the actions of others,
- the influence exerted by the exogenous institutional set-up on the actions of local actors, defining what actions make sense in relation to their innovative efforts and what actions they consider as not viable under their local circumstances.

Relevance of external linkages for learning within the RIS

As discussed in Chapter 3, the generation of technological innovations by economic initiatives frequently involve new combinations of endogenous knowledge and other resources with assimilated

[79] Nationally, this typically involves different types of arrangements for social security, including unemployment insurance, retraining programs, etc. High rates of out-migration from rural areas are a telling sign that such national and local mechanisms are generally not in place in El Salvador.

external resources. The same can be said for the transformations made by other regional actors like local authorities and localized business service providers, related to the products or services they offer, their internal organizational forms, the ways in which they relate to each other, etc. "The milieux must therefore develop the higher order competence to open up to the rest of the world and mobilize external resources" (Helmsing 2001: 290).

Bell and Albu (1999: 1726) also note the fundamental importance of exogenous knowledge sources as major contributors to technological change and dynamism in "traditional" sector industrial clusters in the South. They argue that "… key features of knowledge systems of clusters include not just their internal mechanisms for circulating knowledge already available and for acquiring new knowledge from experience of various kinds of 'doing.' Possibly more important is their openness to knowledge flows from outside."

Both Bell and Albu (1999) and Schmitz and Nadvi (1999) suggest the need for greater emphasis on the organizational basis for the openness of cluster knowledge system and the internalization of externally acquired knowledge. This refers us back to the arguments of Giuliani 2002, 2004) and Giuliani and Bell (2004), presented in Chapter 3, with respect to *cluster absorptive capability* and the key role of technological gatekeepers within geographical agglomerations of industrial firms.

External openness has an institutional as well as organizational, networking, dimension. In addition to institutions that support localized cooperation, Cooke (2002: 135) stresses the importance of norms that support the openness of "firms and enterprise support organizations… in a globalizing economy, characterised by turbulence and uncertainty, to learning good practice from others…. This applies equally to organizations that interact with firms, including governance agencies that must 'learn-by-monitoring' (Sabel, 1995) in respect to the performance of the wider economy, their own goals-achievement and that of competitor agencies. It goes without saying that such learning is global as well as local."

Morgan (2004: 16) agues that "Generally speaking the smaller the spatial scale of the 'system' the more open and porous it will be, with the result that local firms will have many non-local interactions (Howells, 1999)." This would certainly be true for innovative local firms that would most likely demand knowledge and other inputs un-available locally and thus seek greater external linkages and would probably be more active in external markets that would pay for the innovative nature of their products. This is, however, not the case with respect to localized clusters of subsistence agriculture or small scale "traditional" agro-industries where inputs are purchased as close to home as possible and, frequently, what products are commercialized are sold at the farm gate to intermediaries that control their market access. Although the need for exogenous knowledge and complementary resource inputs is clear, if meaningful transformations are desired in these cases, the capabilities to mobilize these resources are frequently not in place.

Thus the openness of a regional innovation system to outside influences and the organizational linkages that facilitate monitoring of exogenous innovation system dynamics and also the acquisition of exogenous knowledge and other resources are key characteristics of the system as a whole.[80]

Likewise, Asheim and Coenen (2004: 7) argue that "the regional level is neither always nor even normally sufficient for firms to stay innovative and competitive (Isaksen, 1999). The learning process becomes increasingly inserted into various forms of networks and innovation systems (at regional, national and international levels)." What is crucial, however, is for regional actors to be able to combine synergistic local and extra local linkages in order to stay innovative and competitive. This is reflected in the key conclusions drawn by Asheim and Isaksen from three recent case studies of localized industries in Nordic countries are presented in Box 4.

[80] This complements Edquist's (2001) delimitation and characterization of RIS based on the inward orientation and degree of interaction within the system, internal flows of people, knowledge and other resources leading to innovative outcomes.

Box: 5
Combining Synergistic Local and Extra-Local Linkages in Nordic Clusters

"An important conclusion from the three case studies is, thus, the significance of a multilevel approach to innovation systems and technology transfer as firms in regional clusters exploit both place-specific local resources as well as external, world-class knowledge respectively to strengthen their competitiveness…. it is the specific situation of each firm and cluster that define which geographical level will be most important for the innovation activity, knowledge creation and learning (Maskell *et al.*, 1998)."

"The use of external competence networks in all the three clusters demonstrates the importance of national innovation systems, the existence of world leading national research groups and collaboration with global actors, also for innovation processes in regional clusters…."

[However,] "The three case studies also stress the importance of localised knowledge, including formal knowledge. … The informal knowledge includes both 'know-how'—knowledge and skills in the specific technologies the firms possess—as well as 'know-who'—information about persons in R&D institutes and other organisations with special knowledge. The combination of these different kinds of knowledge is bound to individuals and cannot be moved without persons also moving. The knowledge is 'sticky' as the knowledge is partly embedded in local patterns of interaction, and in the fact that the local area holds persons with first-hand experience of the knowledge and on how to put it into use. … The place-specific knowledge, and the interactive way in which this knowledge is acquired, is also an important explanation of the tendencies of successful path dependency to be observed in several regional clusters, and could be said to represent important context conditions with respect to the competitiveness of the firms" (Asheim and Isaksen 2002: 84-86).

External linkages within the extended commodity network

Analysis of innovative practice and technological upgrading in clustered firms suggests that vertical linkages between co-localized firms, but especially with external firms within their commodity chain, can (but do not always) provide important opportunities for learning and stimulate technological effort to innovate. This is a theme that emerges both in the literature on the more "developed" clusters in the North and on the emergence of industrial clusters in the South.

The differential product prices, etc. inherent in the diverse market channels in which clustered firms are embedded, are an important mechanism explaining divergent potentials for technological upgrading between firms, and, thus, their performance. The motivation and pressures involved in the connection of localized firms to dynamic exogenous markets is thus emphasized by Schmitz and Nadvi (1999) as one of the crucial conditions from which proactive collective efficiency can emerge in Southern contexts.

Raynolds (2004) argues that firms embedded in global value "chains', which she more adequately names *global commodity networks*, are strongly influenced by the institutional set-up that has been established to govern commodity transactions within these chains. The focus of her analysis on the global organic agro-food networks, and the importance of organic certification regimes as governance mechanisms, is especially relevant in the case of the local production and processing and international marketing of certified organic cashews by the SAMO initiative. This stresses the importance of understanding the quality of interaction that is established between local actors and those whose function is to enforce certification regimes established as governance structures within the organic and fair-trade commodity networks.

Regional mediation of exogenous forces

It is clear that external forces can severely constrain or provide important opportunities for improving the innovative practice of regional economic initiatives. However, it is important to recognize that the way in which aspects of the national institutional set-up and national actors actually come to exert influence over the actions of local actors are, at least to some degree, contingent on local conditions. Vulnerable families and weak local economic initiatives are likely to migrate or disappear when faced with strong external forces that further limit the viability of their livelihoods or economic strategies. Families and task-networks involved in regional economic initiatives with more consolidated economic strategies will more likely react through adaptation or proactive advocacy with exogenous actors to mitigate external threats. The situation will be similar in relation to exogenous opportunities which some will be able to take advantage of and others will not, maybe not even being conscious they exist.

As is the case within specific-task networks, there is a dynamic inter-dependence between linkages to external actors and the internal systems dynamics. Factors like the nature of the region's technological systems, the development of inter-firm relations, the capabilities of its business support system and governance structures, in other words the complexity and evolution of the regional innovation system, directly influences the external linkages that will exist and their relevance for enhancing endogenous innovative performance. Especially relevant for the overall functioning of regional innovation systems are those capabilities that enable local actors to proactively learn about and deal with exogenous threats and opportunities relevant for localized innovative practice.

Applying the concepts

The framework developed in this section highlights the fundamental importance of external linkages especially those establishing dynamic synergies between the internal and external dynamics of regional innovation systems. This framework is used to characterize the openness of Tecoluca's emerging regional innovation system, discuss the relevance of key external forces for the innovative performance of the GBL's economic initiatives and analyze the emergence of their capabilities to proactively mediate exogenous forces in Chapter 7 (7.4).

4.8 Regional Social Capital and Innovative Capacity

By way of a conceptual conclusion to this chapter, this section introduces the complementary concepts of regional social capital and regional innovative capacity. Both concepts refer to a plurality of dynamics within regional innovation systems that emerge from social interaction and, in an integral way, to the complex interplay of regional organizational dynamics within a RIS's three main sub-systems, the evolution of the localized institutional set-ups and the exogenous linkages of system actors.

These concepts are intimately linked. The regional accumulation of social capital can be seen as the structural regional room for maneuver in which task-networks interact with others in the exercise their innovative practice. Regional innovation capacity on the other hand, reflects proactive capabilities of regional actors to intentionally create additional room for maneuver for innovative practice, transforming the existing organizational and institutional structure of the regional innovation system.

Regional social capital

Morgan (1997: 293) uses the concept of social capital to integrate the way different types of cultural conventions and production related routines are built up through repeated social interactions and "help to regulate economic life" in a given regional context. He uses Putnam's (1995) definition of social capital.

> "By analogy with notions of physical and human capital—tools and training that enhance individual productivity—social capital refers to features of social organisation, such as networks,

> norms and trust, that facilitate coordination and cooperation for mutual benefit. Social capital enhances the benefits of investment in physical and human capital and is coming to be seen as a vital ingredient in economic development around the world."

Put more simply, social capital refers to "the norms and networks that enable people to act collectively" (Woolcock and Narayan 2000: 226).

Cooke (1999: 9-10) argues that "Social capital must involve *embeddedness* such that a region may have expectations of collective rather than individual action to achieve its economic goals. Among these expectations are shared values, reciprocity, solidarity, and meaningful trust. Additional manifestations of regional social capital important for the functioning of regional innovation system identified by Cooke are:

- symbolic diversity, translated as 'openness' and 'transparency.'
- resource mobilization, meaning collective, local will to invest...
- quality of networks, i.e. diverse, horizontal and vertical in dimension.

Furthermore, the concept of *social capital* is crucial to understanding not only the internal relationships and resource flows between actors, but also the territorial capacity to dynamically assimilate / internalize exogenous knowledge and other resources to implement their collective development vision. In this sense, Cooke (1999: 10) argues:

> "where such [regional] settings are flexible, somewhat transparent, or open to knowledge flowing around larger-scale or even global networks, learning can be extremely rapid even though it does not take the measurable forms of human capital in terms of qualification and certification. Social capital can be a more powerful learning milieu because of its cooperative, trustful, reciprocal, and cognitively complementary norms and values. But the learning region must not become atrophied and its networks introverted so that mainly localized learning goes on. Localized learning strength needs augmenting by global competencies."

Simply put, territories that have developed this diversity of institutional and organizational characteristics, synthesized through the concept of regional social capital have much greater innovation capacity and development potential than those that have not (Cooke, 1999: 9).

Following the works of Moran (1997) and Cooke (1999), I propose the concept of *regional social capital* as a means to synthesize and integrate the key conceptualizations of the formal and informal institutional characteristics, un-traded interdependencies and the enabling dynamics of organic connectedness between actors in a regional innovation system that facilitate cooperation to strengthen innovative practice in regional economic initiatives.

Regional social capital is the integral expression of the regional configuration of organic linkages between actors with complementary capabilities and the formal and informal institutions that provide the structural regional room for maneuver in which task-networks interact with others in the exercise of their innovative practice. Following this definition, the historical formation of a regionally specialized labor force with complementary knowledge and personal relations, the intricate webs of cooperative inter-relationships between local firms, enterprise service providers and local authorities, territorial development plans that articulate shared visions for the future trajectory of local economic development and conventions concerning reciprocity, co-responsibility, transparency, etc. that enable local actors to effectively rely on and cooperate with other members of the regional community, would all be expressions of accumulated regional social capital. All of these different types of organic linkages between regional actors and institutions are argued by the author's cited in this chapter to be directly conducive to cooperation in interactive innovative practice in the context of RIS. Negotiation and consensus building, as well as synergistic linkages in concrete cooperative efforts between actors from the diverse domains of the regional innovation system are facilitated by the region's accumulation of social capital.

Regionally specific configurations of actors enable specific types of learning processes, accumulations of locally sticky knowledge, and the opening of channels for the dynamic assimilation of external resources, etc. that are extremely hard to duplicate. The localized constellation of capabilities and (flexibly) institutionalized relations between actors can also become part of a positive territorial image, providing local businesses and other local actors additional leverage in their dealings with external actors: in market dealings, in negotiations with external financial organizations, in negotiations over public policy, etc.[81] These arguments reflect the importance of accumulated regional social capital for the sustainable performance of regional innovative economic initiatives.

A region's social capital accumulation is also reflected in the directionality and the sustainability of local development processes, primarily due to the importance placed on openness, inclusiveness and the development of horizontal relations between actors in defining development goals and the ways of implementing them. This is especially important as social justice is not only a fundamental goal of local human development, but it is one of the most important pre-requisites for the establishment of a strong innovative capacity in a regional society. The establishment of relationships based on trust and interactive learning is facilitated if there is a feeling of belonging among the members of a society characterized by equal rights and livelihood opportunities for all, an adequate distribution of wealth, etc. (Dalum *et al*., 1995). These are conditions that do not characterize much of rural El Salvador, but, as I will discuss in Chapter 7, they are part of the integral development vision being promoted by actors in Tecoluca, and to a lesser extent in its regional context.

Regional innovation capacity

Lawson (1999) argues that the concepts used in the competence based theory of the firm[82] can be usefully applied to the analysis of *regional productive systems*, complementing an increasing focus on learning and inter-firm linkages in explaining territorial industrial dynamics. He explores the "emergent powers" related to competencies within the firm seen as a social system. He then translates these arguments to the analysis of regional competencies: "… the region, as a productive system, may be differentiated as an ensemble of competencies that 'stretches' both through space and across organizations, and contains a degree of coherence in virtue of the nature of (localized) interaction constitutive of it" (1999: 157).

Lawson's focus is on explaining the emergence and development of the innovative relationships observed between firms and also other types of organizational actors, which "underlie or constitute the region's competences or capabilities… They are real factors which emerge from, and are reproduced through the interaction of agents where some systems of interaction are better, more competent, at facilitating some kinds of outcomes than are others." In this sense, there is a need for analysis which "combines firm and regional competences" as explanatory factors related to innovation within a given territorial context (1999: 160-61).

Some particular characteristics of regional competences cited by Lawson are that they: "not only span products but firms themselves at any point in time... may not only be more stable and evolve more slowly than products, but may be more stable and evolve more slowly than firms themselves…. are not only gained or enhanced by work but by trade and other inter-firm interaction… the relative performance of regions as well as the relative performance of firms is merely the superficial expression of a deeper competition over competences." (1999: 160-61).

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[81] Equally true would be that a non-functional arrangement of this type, one characterized by exploitative relations or an institutional set-up that fosters non-cooperative, cut throat competition, would be a structural problem hindering collective innovative practice, also hard to resolve.

[82] From this perspective, the firm is characterized as a "repository of productive knowledge" and as such learning is a crucial process as are "the relationships (of trust, etc.) which surround and facilitate different types of learning and the dynamic process of change which follow." The focus is on the abilities possessed by the firm which enables it to "do certain things—to learn, produce, occupy certain market positions, etc." (Lawson 1999, citing Foss, 1996).

Building off of Lawson's arguments, I introduce the concept of *regional innovative capacity* as a complement to the concept of accumulated social capital. This capacity can be understood as the sum of the inter-dependent capabilities of the region's initiative task-networks, the enterprise support networks and the actors participating in associational governance mechanisms to proactively create an enabling context for the emergence and strengthening of localized innovative economic initiatives.[83]

An especially relevant aspect of regional innovation capacity is the collective capabilities for transforming the existing organizational and institutional structure of the regional innovation system to enhance its innovation enabling performance. It is an integral concept that tries to take into account the synergies created (intentionally or unintentionally) through coordinated actions of the system's integrants to create room for maneuver for projected innovative practice within the regional context.

Diverse expressions of the system's overall capacity to support innovative practice create structural *opportunities* that can be taken advantage of (or not) by initiative task-networks to engage in innovative practice. Some of the opportunities created will be enterprise support services than can be accessed by economic actors to strengthen their capabilities to implement technological transformations. Other types of opportunities created through interaction over time are expressed as the current configuration of the regional institutional set-up and the quality of the networking connections that are here conceived of as regional social capital, especially those enabling collaborative efforts.

The initiative task-networks or firms, are the actors that directly implement innovative alternatives. Their innovative practice can be enabled by the supporting actions of other actors within the regional system of innovation, as well as the quality of the system's organic network configuration and institutional set-up. Equally, innovative practice can be constrained by the actions of other regional players or the non-actions of absent players, the way the system's networks are configured or linkages are missing, and the negative qualities of the localized institutional set-up. Thus, the concepts of regional innovation capacity and social capital accumulation, express both the strengths and weaknesses of the system, enabling some innovative practices and constraining others. Regional innovation capacity is also related to the system's internal dynamics as well as its external connectedness. The key is the creation of synergy between the endogenous innovation processes and absorption or dynamic assimilation of exogenous elements.

In conclusion, regional innovation capacity and social capital are emergent properties of the RIS. They both emerge from the interactive learning and networking practice between localized actors and between them and external ones over time, just as the innovation capabilities of task-networks do. Regional innovation capacity is expressed in the construction of networks and institutions that facilitate interaction can be considered as future accumulations of regional social capital. Actual expressions of accumulated social capital enable coordinated practice by actors expressing regional innovative capacity in creating room for maneuver for innovative local economic initiatives.

I return to these two concepts and further develop them in the concluding section of Chapter 7.

[83] This concept is also related to Muller's more general concept of the technological dynamism of society defined as "The aptitude of a society to reciprocally match its changing social structure to the changing technological capability of its social carriers of technology…. It represents "an expression of the social ability to effect technological change in response to changing circumstances of all kinds" (2003: 66).

PART III

Case Study Presentation and Analysis

CHAPTER 5

The Innovative Nature of the Grupo Bajo Lempa's Economic Initiatives

This chapter presents the heart of the empirical case study material concerning the principal economic initiatives integrated into the *Grupo Bajo Lempa* consortium. Section 5.1 provides an introductory description of the historical process through which the consortium has emerged, its novel characteristics within the Salvadoran context, and the integral development vision which forms a central part of its collective identity. The role that the NGDO CORDES Bajo Lempa has played in this process and more specifically in the emergence and initial consolidation of the GBL's innovative economic initiatives is discussed in Section 5.2.

Section 5.3 presents a characterization of each of the most important economic initiatives: their patterns of technological specialization, the task-networks of actors involved and their principal external networking partners, as well as the innovative nature and the implementation of technological transformations in these initiatives. Section 5.4 provides an initial characterization of the functional innovative capabilities of the task-networks involved in these economic initiatives. The chapter is concluded in Section 5.5 with a holistic synthesis of the innovative nature of the GBL's economic initiatives and the innovative capabilities they have demonstrated.

5.1 The Emergence and Nature of the Grupo Bajo Lempa[84]

The Grupo Bajo Lempa is a consortium of diverse social and economic organizations that have emerged from the local development process in a group of what are now 50 communities (estimated 2.500 families and 12.500 people) located in the municipalities of Tecoluca and Zacatecoluca on the western side of the Lempa River (CORDES Bajo Lempa 2002). These organizations include:

- three micro-regional organizations of communities with elected directive councils,
- other social base organizations of various kinds, including a rural women's association, a young people's association, and the association of teachers from the local schools,
- a diverse group of associative business ventures, combining activities related to small-scale agricultural and cattle production, agro-industrial processing, organized commercialization and the provision of financing and other services like agricultural inputs, machinery, etc.,
- CRIPDES San Vicente, a regional social-base organization formed by elected representatives from the communities integrated in the GBL that provides social services to community organizations in areas such as literacy, gender awareness and leadership trainings, and that is active in political advocacy efforts,
- the NGDOs that are directly involved in supporting these organizations: CORDES Bajo Lempa, CIDEP (specialized in education) and FUNDE (specialized in development research).[85]

The formation of the GBL consortium in 2002 was the culmination of a participatory process discussing how best to integrate the diversity of social and economic initiatives that have emerged in this area with the support of the local development work that CORDES Bajo Lempa, CRIPDES and others had been carrying out for more than a decade in this area. A crucial preliminary step in this integration process was the agglutination of the Bajo Lempa Initiative to advocate for adequate public and private, national and international support for the reconstruction and development of the region after the devastation caused by the tropical storm MITCH in 1998.

One of the key mechanisms that contributed to the initial consolidation of the GBL was the participatory process of strategic planning finalized in 2003. There was also a visit made by key people elected to the main governance body of the Grupo (*el Directorio*) to learn about the experience of the cooperative network of businesses integrated within the *Mondragón* Corporation of the Basque region of Spain.

[84] The works cited in this chapter are originally in Spanish. The translations of quoted sections are mine. All abbreviations are based on the Spanish names.

[85] A complete list of the GBL's organizational members is provided in Annex 1, along with a synthesis of the most important changes in local socio-economic conditions from 1992-2002.

The GBL's distinctive nature and development strategy[86]

In its Strategic Plan (GBL 2003) the GBL defines itself as "the maximum expression of integral unity of the Western Bajo Lempa region, that struggles to achieve sustainable rural development and quality of life for the families and rural communities; constructing an alternative, participative, human, just and equitable development model."

The formation of the GBL represents an attempt to integrate the efforts being made by its local social and economic member organizations in the struggle to "construct improved opportunities for sustainable rural development and advocate for the structural changes necessary, in coordination with other relevant actors, in order that the rural families and communities can achieve … a dignified quality of life." Through the "synergy of solidarity and organization" the members of the GBL are dedicated to the "integral development of the region," specifically the local communities where they work (Escobar and Zepeda: 282-3).

The GBL is a relatively novel local development experience in El Salvador and the Central American region. The Salvadoran NGDO PRISMA, for example, states that the articulation of the Grupo Bajo Lempa represents a "qualitative jump of great relevance" in terms of local organizational capabilities for the management of territorial development, which is unique in El Salvador. The organizations that are members of the Grupo Bajo Lempa have built "a strong identity based on the accumulation of social capital that has guaranteed the access and control of their territory, the provision of basic services and collective actions to make their productive diversification strategies viable" (2003: 30, 48).

The collective identity of the actors involved in the GBL has been forged through their joint actions facing the challenges of securing control over land and other vital local resources, the resettlement process and subsequent community development efforts. "The capabilities of the local organizations and their ability to secure resources has made possible the accumulation of other capital resources such as access to alternative markets, improved education, and the provision of services, among others. It has also permitted a rapid reaction in the face of disaster … [and] to advance towards disaster risk management" (PRISMA in UNDP 2003: 191).

Likewise, Escobar (2005: 1204) characterizes the Grupo Bajo Lempa as "a new and unique experience." She goes farther to argue that it represents "an alternative form of development and livelihood that is still evolving, being constructed by its own *subjects*, based on trial and error. This gives them *autonomy*. It is, also, an integral experience, where livelihood reproduction takes into account economic, social, political, educational aspects, etc. Through their organization the member organizations have achieved a great deal. In addition to achieving a near 100% coverage of basic services—potable water, electrical energy, housing, health, education, etc.—they have created a context where they are capable and are motivated to participate in and influence the decisions that affect them."[87]

This relatively rapid process of transforming the local territory made by the members of the GBL in coordination with the municipal government has been largely financed through the mobilization of resources from international sources. International support has been fundamental for improving access to social infrastructure for the families integrated in the GBL and in financing the emergence of the Group's economic initiatives. International actors have also been important in opening access to international organic and fair trade markets for some of the GBL's products. In general, the actions of organizations of international solidarity have "facilitated human, material and financial resources over these years [from 1992], modifying the emphasis of their support and their styles of accompaniment in accordance with the diverse phases in this process." They argue that these are positive aspects of

[86] This section describes the GBL as it presents itself and from the perspective of other relevant national actors. More critical reflections on my part are reserved for the analysis presented in Chapter 6 and the conclusions and lessons learned in Chapter 9.

[87] Exactly how near to 100% coverage is unclear however, estimates made by CORDES in 2002 are not quite so favorable. See Annex 1.

"trans-nationalism and globalization," (in UNDP 2003: 192). These are in contrast to the negative impacts on the livelihoods of the rural families integrated in the GBL of the structural economic reforms being implemented in El Salvador, under pressure form international organizations (as discussed in Chapter 1). [88]

From the perspective of CORDES' regional manager, the "articulation of the entire social and economic network of actors" was in response to the need to consolidate the collective identity and capabilities of the individual initiatives. Greater internal cohesion and collective effort were needed in order to effectively confront the challenges of improving rural family livelihoods in an adverse economic, social and political context. The challenges identified include those implied by El Salvador's insertion in processes of globalization, free trade agreements with Mexico and the United States of America (Escobar and Zepeda 2003: 287, 289, citing interview with Espin).

The strategy of integrating these diverse local actors in the GBL is also intended to create greater collective advocacy capabilities to contribute to the structural changes necessary to facilitate this process. One major demand from the State is support in generating massive employment opportunities to meet the increasing demand, especially from young people in the Bajo Lempa Region. This is needed to complement the important but limited contribution of the GBL's economic initiatives in providing income generating and employment opportunities for local families.

The key question is what kind of employment is needed. Espin argues that in contrast to the short term option of the *maquila* garment assembly industry, the region demands "employment that trains the workforce, which pays a dignified salary, treats the workers humanely, does not destroy the environment…" What is needed is a commitment to develop national industries, agro-industries, specialized business services, etc. in rural areas. Businesses are needed that not only provide opportunities for local people but also motivate young university trained professionals to return to rural areas, to put their expertise at the service of rural development efforts (Interview with Espin in 2003 cited in Escobar and Zepeda 2003: 291).

An important part of this process has been the formation of the *Poligono de Solidaridad* complex in Tecoluca. It is conceptualized as a new type of agglomeration of economic activities (agro-industrial, industrial and commercial SMEs) and a diversity of production support service providers (NGDOs and service firms in financing, biological agricultural inputs, etc.). Co-localized with the physical space of the *Poligono* are also offices of the diverse social base organizations integrated into the Grupo Bajo Lempa. The *Poligono* also provides collective spaces for the meeting of GBL actors involved in the consortium's associative governance mechanisms at different levels and provides an attractive space for interaction between GBL actors and different exogenous ones as they are enrolled in one way or another in its diverse initiatives or just there to learn. The complex is named in a way that intentionally differentiates the cooperative nature of the activities and the socio-economic focus of the organizations integrated there, from the neo-liberal focus on competition for individual gain and wealth concentration. It is named in direct opposition to the brutality of the neo-liberal development model and the egoism and individualism that characterize it and to provide a symbol of solidarity (Interview, Emilio Espin 2004; Escobar and Zepeda 2003).

In conclusion, as Espin puts it, these actors are "constructing a type of development model that is critical of and represents an alternative to the neo-liberal model." This model looks to generate what Espin calls a "new rurality;" providing opportunities that rural families take advantage of to construct a dignifying rural livelihood, so that it is not necessary to "destroy families through immigration" (interview cited by Escobar and Zepeda 2003: 291).

[88] For example, "the elevation of the costs of public services, especially due to the privatization of the distribution of electrical energy, severely impacts family expenditures, restricting the possibilities of community development." Also, "the agricultural crisis continues to stimulate the search for non-agricultural employment in the maquilas," especially by women (PRISMA in UNDP 2003: 192).

The most important collective functions or roles of the Grupo Bajo Lempa consortium identified in their strategic plan are:

- Coordinate regional development efforts,
- Represent its members in relations with external actors, motivate and facilitate external support for member organizations,
- Provide technical assistance services for its members,
- Monitoring and evaluation of the Group's development efforts.

5.2 The role of CORDES in the GBL and its economic initiatives

As a prelude to the discussion of the GBL's economic initiatives and their innovative capabilities, it is necessary to further clarify the role played by the CORDES Foundation as a central actor in this dynamic story.

CORDES Bajo Lempa's role in the GBL

As stated earlier, a central agent in the historical process leading up the formation and in the current consolidation of the Grupo Bajo Lempa is the regional office of the Salvadoran NGO, the CORDES Foundation.[89] In response to the complicated conditions of resettlement, CORDES, in collaboration with the local government and other local actors in Tecoluca, has accompanied a group of families resettling in rural communities in Tecoluca and the adjoining municipality of Zacatecoluca in a collective effort to improve their livelihoods.

In 1994 CORDES Bajo Lemp established a regional office in the southern coastal plain of the municipality of Tecoluca. In this territory it supported the formation of first the SES and later the other two micro regional organizations as it expanded the geographical scope of its work into the central part of the municipality and then into the adjoining coastal region of Zacatecoluca. In accordance with this process of regional expansion, CORDES moved its regional offices to a more centrally located community (El Playón) where it has mobilized resources to develop the *Poligono de Solidaridad*.

CORDES Bajo Lempa accompanied the emergence of the GBL facilitating the preliminary discussions and then the strategic planning process, as well as the visit of key members to learn about the Mondragón experience. It also mobilized financing for a campaign publicizing the innovative nature of the GBL and its members through a series of announcements made on prominent television stations and local radios during 2003. This campaign was intended to raise public awareness of the member initiatives, provide a basis for the market positioning of their products and strengthen the public image of the consortium as a whole.

From the inception of local work, CORDES Bajo Lempa has been active in coordinating diverse development efforts with other actors in the municipality of Tecoluca and within the surrounding region. Their work has been closely coordinated with the FMLN municipal government in Tecoluca which won the first peacetime municipal elections in 1994 and has held office since, winning by increasingly significant margins in the elections of 1997, 2000 and 2003.

In the process of constructing this alternative model, CORDES, other member organizations and now, progressively, the GBL leadership are actively involved in networking to enroll the support of external public and private, national and international actors. Many of these actors do not share the same principles and values or political perspectives that orient the GBL's actions, especially the public entities representing the national ARENA government. In this sense, the key has been the capability of

[89] CORDES, founded in 1988, is dedicated to promoting sustainable rural development in El Salvador. For more information in Spanish see: http://www.geocities.com/lia_hernandez/Perfil.html.

the local organizations to "negotiate and demand respect for their principles, values and autonomy" (Interview with Espin in 2003 cited in Escobar and Zepeda 2003: 289).

CORDES' role in the GBL's economic initiatives

CORDES has played a key role throughout the emergence and initial consolidation of the different economic initiatives integrated into the GBL. The role that CORDES Bajo Lempa has played has been driven by the fundamental aspects of its economic development vision expressed by its regional manager, Emilio Espin Amprino.

One key aspect of this vision is the constant search and development of innovative alternatives for the solution of priority economic problems faced by the rural families, synthesized in the need for dignified employment and income generating opportunities. The economic development strategy being implemented is oriented towards the diversification of primary production activities and the consolidation of small scale agro-industries and related services enterprises, many of which are cooperatively owned. Their productive focus is towards the adoption of cleaner and eventually organic and fair trade certifiable production techniques, incorporating greater focus on social, gender and age, equity. These aspects are actively transformed into marketable aspects of products, as well as the creation of a positive, progressive image associated with the Grupo Bajo Lempa's initiatives in general (Interview with Emilio Espin 2004; PRISMA 2003; Escobar y Zepeda 2003).

In this sense, Espin states that "the market for us is not a god; the market for us is a means for constructing development that is necessary to know, dominate, understand and be able to change." The motivation to create economic profitability must be maintained in equilibrium with concerns for "social profitability" or the welfare of the people involved. A key mechanism that reflects this is the participation of local people in the generation of added value within the value chain and the equitable distribution of this wealth; not just the generation of profits but the generation of dignified employment for local people (interview cited by Escobar and Zepeda 2003: 291).

Another key aspect is the creation of synergistic systems of territorially agglomerated economic activities. This implies the integration of production, processing, and commercialization operations in determined agro-industrial systems (currently cashews, dairy products, fruits and vegetables and sugar cane). It also implies the generation and integration of a diversity of complementary business service activities into this production system as well as the diversification into non-agricultural service sectors, specifically tourism (Interview with Emilio Espin 2004).

CORDES' initiates project planning through a participatory process of identifying and prioritizing the interests and "needs" of the producers in the communities integrated in each of the GBL's micro-regions. This participatory contribution to the design of CORDES Bajo Lempa's social, economic and environmental development initiatives permits an "improved identification of the most vital and felt needs to be resolved in the short and long term" (Escobar and Zepeda 2003: 315).

In relation to the economic initiatives, CORDES then evaluates the technical and economic viability of the priority alternatives. These initial "feasibility studies" have become progressively more rigorous with time in response to the problems caused by weak feasibility analysis and project planning.

However, as the internal capabilities of CORDES are limited, the quality of market analysis, for example, depends on external networking to mobilize the necessary resources towards this task. For example, the deepening of relationships between CORDES Bajo Lempa and national public and private universities has allowed them to rely increasingly on students to carry out initial feasibility studies, but also more in-depth works based on students' thesis. More in-depth market and technical studies have been financed by external sources such as territorial development programs or a government competitive fund for technical assistance to SME's which covers up to 80% of such consultancies. Increasingly these types of consultancies are now contracted by the initiatives themselves to support further product development or to strengthen their marketing efforts.

Based on this information, CORDES then elaborates a project to present the alternative being developed for consideration by an external source of financing. The role of project elaboration has become more specialized with time as the proposed economic alternatives have become more complex and the external funding agencies have become more demanding.

Throughout this project development process it is important to value the diversity of knowledge that CORDES has accumulated concerning the reality of the local communities through different diagnostic studies but principally through the experience of more than 10 years of work in the region. This has been applied to the design and implementation of programs and coordinated actions oriented towards eradicating the structural causes that generate the necessities felt by the population in different areas: improving basic infrastructure, education and health services as well as generating opportunities for income generation and rural salaried employment.

CORDES' role in project implementation is carried out principally through its agricultural and business support programs which provide technical assistance, training and general organizational support to the producers and business ventures involved. Progressively, the project resources available to provide quality technical and business support have been diminishing, especially those needed to support the economic initiatives after their initial projects have terminated, but before they become sustainable businesses. To compensate, CORDES has moved to enroll other actors to supplement their deficiencies in these areas.

As the projects that have supported the initial emergence of GBL's economic initiatives come to a close, the actors directly involved are forced to make the transition to functioning as relatively autonomous businesses and CORDES' role changes as well. For example, in the case of the SAMO organic cashew initiative, CORDES has now transferred their initial ownership of the processing plant to the legalized producer association APRAINORES. In addition to this process of transition in plant ownership, CORDES has ceased to directly subsidize the SAMO's business operations through payment of key administrative staff, so the management is also financially independent. There are some restrictions on this independence, but they are minimal in terms of their influence on management decisions (Escobar and Zepeda 2003).

The SAMO management and the directive council elected by the owners are now "responsible for the good and bad decisions that they make," especially since they have now secured financing based on mortgaging their patrimony. They thus "must make good decisions and if they make a mistake they will have to pay the consequences." CORDES continues to support SAMO providing some direct technical assistance to producers, enrolling other actors to support marketing studies and other specific business needs, as well as promoting their products through different channels (Escobar and Zepeda 2003: 309, citing interview with Espin).

5.3 The GBL's Innovative Economic Initiatives

Initially most of the economic projects promoted by CORDES Bajo Lempa and other NGDOs working in this area were focused on the basic subsistence needs of the repopulated families (1992-1995, more or less). However, over time the actors now involved in the GBL, lead by CORDES have been able to mobilize local and external capital and knowledge resources to create a diversity of innovative economic initiatives.[90]

As indicated in Chapter 2, most of the GBL's economic initiatives have not yet achieved profitability and those that have are only marginally profitable, the SAMO for example. However, as Escobar argues, "they have produced various human benefits, which have improved the lives of the people

[90] Unfortunately no comprehensive figures are available for the total investments made by CORDES and others in the GBL's economic initiatives. CORDES estimates that it has been able to mobilize an average of one million USD per year (Espin personal communication 2005). This figure, besides being imprecise, includes significant investments in social infrastructure, especially housing.

that participate in them." These include regular paid employment for approximately 356 people, as well as income generated by local producers providing inputs (milk, cashews, vegetables, etc.) to these initiatives. Additional economic benefits are generated for those producers that receive financial services from El Roble, free technical support from CORDES, lower cost, quality agricultural inputs from BIOTEC and the *Agroservicio* San Carlos Lempa, transport and agricultural machinery services from the Maquilishuat cooperative, etc. (2005: 1205).

The most important of the economic initiatives integrated into the GBL are:

- SAMO: an association of small-scale organic cashew producers that own an industrial processing plan, exporting to the "green" and "fair trade" markets in Europe and the United States;
- BIOLAC: a cooperative association of small-scale milk producers that are the owners of a processing plant making gourmet European style chesses with European technology for national niche markets;
- SAAO: a small-scale processing plant, using sugar cane from small-scale producers to make granulated *panela,* a type of non-industrialized, unbleached, natural sugar.
- AGROLEMPA: an association of irrigated vegetable producers organized around a legalized commercialization business that is competing for public contracts, selling to supermarkets and competing with Central American producers in the national wholesale market;
- LEMPAMAR: an association formed mainly of employees or ex-employees of CORDES, running a small scale hostel and restaurant near the Montecristo Island in the Lempa River delta, and coordinating the municipal efforts to promote eco-tourism;
- EL ROBLE: a local savings and loan cooperative managing a diversity of credit lines for small-scale family oriented economic ventures, with a perspective of managing investment and working capital funds for the larger scale GBL business initiatives;
- BIOTEC: El Salvador's only biotech laboratory capable of producing (limited) commercial quantities of biological pesticides.

The following presentations of each of these initiatives are composed of three sections. The first discusses the historical emergence of each initiative and its evolving specialization pattern. The second characterizes the task-network of actors involved in each initiative and the most important external networking relations relevant for their innovative practice. The final section analyzes the relative innovative nature of each initiative in the local, national and international contexts, as well as the most important technological transformations being implemented in each one. In the more detailed descriptions of the BIOLACT and SAMO initiatives, this last section is broken down into several related sub-sections. The exact content of these sections varies between initiatives depending on my appreciation of what is most relevant for the subsequent case study analysis as well as the available information.

BIOTEC—Biological Pesticides

Emergence and specialization

This small-scale bio-technological firm specializes in the development, reproduction and commercialization of products containing entomopathogenic organisms[91] for the biological control of pests and plant diseases. Through the promotion of their innovative "green" products, BIOTEC aims to develop a commercially exploitable niche in the national, and eventually, Central American market for these types of agricultural inputs. This initiative aims to contribute to more sustainable and productive agricultural practices, especially in the development of organic agriculture, through providing high quality bio-pesticides at an accessible price, complemented by the necessary educational activities. Achieving their goal of becoming the leading Central American commercial bio-pesticide firm will

[91] Entomopathogens are microscopic organisms like bacteria, fungus, virus that cause disease in the insects they infest.

imply a continual research and development process to improve existing products and elaborate additional innovative ones, as well as the development of dynamic marketing capabilities (BIOTEC, information brochure 2004).

BIOTEC has developed one marketable product (*Bio Tric*) based on a specific naturally occurring local strain of fungus which acts to protect the developing plants from other pathogenic funguses. This fungus also grows in a synergistic relationship with the plant, attaching itself to the plant's root structure and enabling the plant to capture an increasing amount of vital nutrients and water from the surrounding soil.

As an active member of the GBL, one of BIOTEC's priorities is the development of biological pest control solutions for the producers from this region; although not in a way that is detrimental to its wider business ambitions to serve producers in the national and Central American markets. The development of their initial product was based, in part, on a participatory investigation of the local producers' problems, which suggested that controlling plant diseases caused by funguses were a first priority (Escobar and Zepeda 2003).

Task network and external networking relations

BIOTEC is a legalized business in which the CORDES Foundation is the controlling shareholder, with the APRAINORES producer association as minority partners. The principal business decisions are taken between the staff and representatives of CORDES central office, as well as the regional manager. The business operations are run by a biologist as manager who is also involved in the research and development activities, with the support of another biologist. The marketing operations are now being run by a third employee. None of the three is from the GBL's communities, given the educational and professional requirements of their positions.

The initial project was developed and financed by OXFAM America, based on a detailed technical and market feasibility study. OXFAM selected CORDES and specifically CORDES Bajo Lempa as partners due to the regional emphasis on the development of commercial organic agricultural initiatives.[92] The initial project financing lasted for two years ending in 2003, from which point the initiative has had to survive on the working capital stock left by the project and the returns from their initial commercial operations.

The knowledge base on which the business is being developed was initially consolidated through the participation of the BIOTEC staff in two interchanges (over a period of 40 days) with Cuban scientists working in this field.[93] In El Salvador BIOTEC staff has also developed cooperation with scientists involved in biological pest management. This collaboration has implied work with, scientists from the Faculty of Agronomic Sciences of the national University of El Salvador, with whom they have collaborated on identifying the pathogenic agents for the validation tests in the BIOTEC laboratory. They have also work with an agricultural engineer from MAG-CENTA, who supported them in the phase of field evaluation of their experimental products. He also was influential within CENTA to achieve the donation of three examples of entopathogenic funguses that had passed the initial phase of evaluations in CENTA's laboratories. BIOTEC also obtained the collaboration of another CENTA engineer in the implementation of hygienic techniques and the elaboration of bio-security manuals. In addition they have received support from an expert (PhD) biologist from the autonomous semi-public institute PROCAFE, in order to improve their laboratory techniques for the isolation of fungus samples, in general.

[92] OXFAM also selected another national NGO to participate in the development of another laboratory facility but did not continue with this process for unspecified reasons (Escobar and Zepeda 2003).

[93] They worked with representatives of the National Association of Small Producers in Cuba involved in the reproduction of entomopathogenic funguses and bacteria in their regional Reproduction Centers and then with scientists from the Research Center for Vegetative Hygiene on identifying and characterizing 2 species of entomopathogenic funguses and a bacterium.

For the promotion of their products BIOTEC has focused on establishing networking alliances with the organizations that provide technical assistance and financing to groups of producers involved in the production of irrigated vegetables and other crops for which Bio Tric provides a viable alternative. The relationship with these organizations and the producers they support are built up through an educational process concerning the nature and benefits of this type of product as compared to chemical alternatives. This is followed by the establishment of plots that demonstrate these comparative benefits in the practice as a final step in establishing their interest as buyers.

Within the GBL this has implied the establishment of close working relations with CORDES' agricultural program, as well as with AGROLEMPA that also provides technical assistance to its producers. However, on a local level, vegetable production has decreased drastically. Many producers are changing their production activities and many lack access to credit. This is due in part to the agro-ecological difficulties of producing vegetables in this area of the Bajo Lempa, but also to weak production knowledge and management skills. For this reason, many of BIOTEC's clients are located in other regions of the country where the conditions for producing this type of crop are more favorable; both agro-ecological conditions and financial and technical support from some public or private development program (Thomas 2004, personal communication).

Innovative nature and technological transformations

This type of laboratory is unique in El Salvador, due to its ability to develop and produce commercializable quantities of biological pest control products. On the Central American level there is at least one other laboratory in Honduras which is producing a product similar to Bio Tric which is also sold in El Salvador, but at a significantly higher price. This gives BIOTEC a potential competitive advantage in the regional market, given the similar quality and presentation of their products.

Bio Tric is the first product of this type elaborated in El Salvador, although it must compete with other similar imported products. It offers a natural alternative to chemical fungicides which are an important source of intoxications among farmers. A fundamental difference between Bio Tric and chemical fungicides is that the former is designed to prevent, not cure, this type of plant diseases. It also has the advantage of not creating resistance in pests; on the contrary it has demonstrated its effectiveness against the types of resistant pests present in the Bajo Lempa region. It can be applied in a diversity of crops and in conjunction with other biological or synthetic chemical agricultural inputs, with the exception of chemical fungicides which eliminate its active micro-organisms (Escobar, Diario Co-latino, 2003; Escocar and Zepeda 2003).

In the globalized context, the scientific competences and the production capabilities of BIOTEC are also not common in the South.[94] For example, there are several organizations from India which are significantly more advanced in terms of diversity of their biological pest control products and production capabilities. The SANINET web site supported by the IICA office in Ecuador reveals a list of six firms where this type of product can be purchased over the web. However, it is also interesting to see that a group at the National Agricultural Institute (INA) in Costa Rica, where organic agriculture is significantly more advanced, is developing a trichoderma product and other related ones, but did not have them available commercially (at the time of this search in 2004).

In other words, this small scale NGDO venture is well positioned in Central America in terms of its technological and commercial capability and is involved in an emerging field of technological innovation in the South, principally related to the emergence of organic agriculture, but also as a complement to agrochemical pest control and fertilization methods. The recent organic certification of BIOTEC's productive process adds an additional commercial benefit.

[94] This paragraph is based on an exploratory search of relevant web listings through Google.

The product development process has three basic phases: (i) field and laboratory research to identify and characterize a locally occurring micro-organism that is attacking a given type or types of prioritized pests, (ii) the controlled reproduction of this organism to achieve commercializable quantities, (iii) and the development of specifications for product use, commercial presentation, etc. The development of their initial product took 9 months in the identification phase, facilitated through collaboration with the National University of El Salvador and CENTA, and another four in the development phases before the first bag was ready for sale. Before commercialization the product is submitted to a quality control regime, consisting of counting the fungus spores and then successive tests in the laboratory, a green house environment and then in the field, using standardized indicators for this type of product (Escobar and Zepeda 2003). The nature of the research and development process suggests the inherent uncertainty and risk in this field of economic activity.[95]

BIOTEC is marketing Bio Tric locally and nationally and currently exploring the regional market. In order to focus on production and development of new product lines, the firm is in the process of negotiations with national and regional distributors. As an initial step in its regional projections, the BIOTEC team participated in a major regional trade fair (AGRITRADE) in Guatemala in 2004. This experience reinforced the need to continuously improve the quality of their products, as well as their packaging and commercial presentations in order to compete in the formal regional market. This will imply a considerable investment to pay specialists in product image and packaging design, although they have already made initial improvements in packaging and the quality of the technical materials for product promotion.

A major challenge facing the introduction of BIOTEC's products is the education of producers that have assimilated the use of diverse agrochemicals as part of their "traditional" agricultural practices. For example, a representative of a national agricultural input store recognized the quality of Bio Tric but suggested that its diffusion "must be accompanied by an educational program in the use of the product, given that producers have been abusing agrochemicals." Along these lines, Manuel Ávila, manager of AGROLEMPA said "Those of us that are involved in vegetable production see this as a real alternative, the results are [improvements] in crop productivity and quality." Avila also stressed the importance of educational efforts but especially diffusing the positive results that some producers, including members of AGROLEMPA, have achieved using this product, as they can "give faithful testimony" to its quality (Escobar, 2004).

Thomas argues that, "Producers are not accustomed to utilizing inputs of a preventative nature, only curative. In other words, they do not invest in prevention, but prefer to wait and see what happens. There are also cultural aspects … like that which suggests if a product to control pests or sicknesses does not smell bad, it doesn't work." However, he says that the agricultural producers that have used their product for the first time continue using it. They recognize the valuable properties and effectiveness of the product. They provide producers with up to 11 *manzanas*[96] of sweet peppers and others with a diversity of vegetables, yucca and sweet potatoes, etc. that have tried and continue using Bio Tric (Thomas 2004, personal communication).

In addition to those mentioned, another innovative characteristic of the BIOTEC initiative that should be highlighted is the intention of CORDES to develop it into a business venture that could produce profits to support other areas of the NGDO's work. The initial level of business development does not allow any predictions as to the eventual success of this strategy for CORDES. The strategy of using this business venture to directly complement the central development strategy of conversion to organic production technologies to differentiate the products of GBL initiatives in niche markets is what I find most innovative.

[95] The laboratory's current production capability is 420 Kg./month, limited by the capability of a machine that sterilizes organic material base (rice husks or pieces of dried sugar cane stalks) upon which the micro-organisms are grown and transported (Escobar and Zepeda 2003: 437). There are plans to overcome this limitation, purchasing an additional machine of this type to meet increasing market demands.

[96] 1 manzana = 0.74 hectares

In conclusion, BIOTEC's manager Carlos Thomas argues that, "It is necessary that the Bajo Lempa businesses stop thinking of ourselves as *changarritos comunales,* [i.e. community based initiatives] with more of a social than a business character, and learn to project ourselves in the national and international business context." One important step in achieving this type of business recognition is making the necessary investments, taking increased advantage of the "enormous quantity of local financial resources" that are available if they apply for them and meet the requirements (Thomas 2004, personal communication).

El ROBLE—Savings and Loan Cooperative

Emergence and specialization

El Roble is a local savings and loan cooperative that emerged in 1999, from CORDES' financial program that had provided subsidized credit to local producers.

In 1992 CORDES established its Sectoral Financial System to manage the financial components of its programs to provide small loans to cover the needs of the families for subsistence production in the newly settled communities. Later in the process, larger loans were given for market oriented economic products managed by cooperatives and less formal associative production groups of between 20 and 40 producers (UdPs).

However, the experience over several years of supporting economic projects managed by these associative groups suggested the need to change strategy. The UdPs were "not achieving the expected results when they were given credit. Simply put, the returns were too low for any financial organization to make them sustainable." These groups suffered from serious technical problems with their production activities, as well as organizational and managerial weakness. Both problems were reflected in a general lack of appropriation and responsibility for the economic projects on behalf of their members, especially when the encountered problems they could not immediately solve. "The levels of recuperation [of credits] from the UdPs were between 15 and 17%, and as the financial system was not legal … there was no formal commitment within the system of the UdP" (Escobar and Zepeda 2003: 404, citing interview with El Roble's manager). CORDES' credit program was perceived as managing donated funds destined for the local producers which weakened their sense of responsibility for repayment.

These critical problems with the sustainability of CORDES' financial program came to a head when the area was flooded in 1998 during the tropical storm MITCH. This caused an almost total loss of crops and livestock for families and the UdP producer groups. Faced with this situation the General Assembly of the SES (micro-regional organization member of the GBL) decided to propose to CORDES the cancellation of more than 1 million dollars in accumulated debts to producers that had lost their productive capital during the floods.[97]

At this time the decision was made to form the cooperative El Roble. The initial result of the strategy to focus on supporting smaller associative groups based on extended family ties and individualize credit responsibilities under more rigorous conditions of credit analysis and guarantees was positive. In 1999 the Roble had achieved a 93% recovery of their initial loans, even though it was not legalized until the end of this year (Escobar and Zepeda 2003: 405-6).

The cooperative was founded by an initial group of 45 members and currently has 300 full members and an additional 400 in the process in the process of becoming members and thus eligible for initial loans. Of the total members approximately 37% are women. The bulk of the cooperative's original capital was transferred from the NGDO, under an agreement conditioning the transfer process

[97] A technical study made by CORDES suggested that given their past performance of the UdPs and their losses, these debts were not repayable under any reasonable circumstances. There was also an understandable reluctance to re-finance many of these unstable producer associations which would have been a component of any repayment scheme.

on the indicators of the consolidation of the cooperative's financial situation and functioning of its governance structures.

The cooperative's main credit lines are cattle, agriculture and commercial/personal loans. El Roble's interest rates are competitive with other micro-finance organizations serving the rural population. Although they are slightly higher than the commercial banks, there are major difference in terms of the additional fees charged to secure loans, as well as in the fundamental issues of access and the types of guarantees needed. Access to financing through El Roble depends to a large degree on establishing a good credit history. Although any credit above $3,000 must have a mortgage as a guarantee, below this amount they can be more flexible accepting other types of guarantees.

In 2003 El Roble was managing a portfolio of approximately $2.2 million in capital assets and also administering significant additional funds for the San Vicente Productivo program. One such program is a micro-credit fund destined to improve the food security of families, given especially to women for small productive or commercial activities. This line of credit for women complements one originally capitalized by the SHARE Foundation through a donation of approximately $23,000 (Escobar and Zepeda 2003). Details concerning El Roble's specific work with women are provided in Box 6.

Box 6
El Roble's Work with Women

"A mixed gender cooperative that serves the municipality of Tecoluca, El Roble has a line of credit for women supported by SHARE. In this third year of the program 57 women (15 more than last year) received credit for a total of $34,456. Most of the women have small businesses or work with livestock (e.g. chicken farming, stores, etc). A low 1.18% of the loans are in arrears. The Roble Cooperative credits this to the SHARE supported promoter who makes house visits and works with credit recipients to ensure success in their ventures. In addition, El Roble works with another SHARE partner, ASMUR, a women's group, to identify and train potential beneficiaries. The success of the credit program can also be measured through the credit applications for second loans in which the financial status of the applicants receiving a second loan is significantly better than first time borrowers. Another success for El Roble is the increased membership of women, 37% this year, and the election of a woman to Vice President of the Administrative Council, the highest level of leadership for the coop."

Source: SHARE Foundation, Local Development Program, Annual Report 2003.

El Roble also provides direct support (low interest loans) to innovative productive initiatives proposed by producers related to the GBL´s micro-regional community base. For this purpose the El Roble is administering a second special fund from the San Vicente Productivo program (for 561 thousand Euros) (Escobar and Zepeda 2003).

Although El Roble's clients are involved in risk prone rural economic activities, especially those involved in agricultural activities, it has been able to achieve a respectable 93% rate of repayment. The credit line of mostly small loans oriented towards women, has an even higher repayment rate of 98.8%.

However, the cooperative is still in a process of business consolidation. There is still a need to offset operating deficits through a continuing subsidy by CORDES for the salaries of the manager and other professionals working at El Roble. In 2003, with these subsidies, El Roble was able to generate a modest "profit" of $1,635 USD. The cooperative identifies its key major challenge as reaching its break even point and becoming truly profitable through a continued increase in its membership and capital stocks needed to increase its loan portfolio (Escobar and Zepeda 2003).

Task network and external networking relations

CORDES has been a central actor accompanying the historical emergence of the El Roble cooperative. Key people from CORDES have been the regional manager and people involved in the previous financial program, as well as technical personnel from the national office. There is a working group within the national CORDES network dedicated to strengthening the different regional savings and loan cooperatives.

CORDES Bajo Lempa supports El Roble capitalizing its operations through the transfer of project funds to be lent to the types of producers and economic activities specified in these projects. Recovered funds and interest payments then form part of El Roble's capital base. CORDES also supports El Roble's efforts to mobilize additional exogenous resources for further capital injections, as well as for training, business planning and other specific technical assistance. In this sense, CORDES is an important strategic partner and mediator with exogenous actors, although it no longer has any direct formal decision-making power within the cooperative.

It is important to stress the autonomous nature of El Roble within the context of its relationship to CORDES and the GBL Consortium. Currently, the decisions concerning the cooperative's functioning as well as its future are being taken within its associative governance structures. Specific people, such as the manager and cooperative president, are of strategic importance for its development.

The decision to form El Roble followed earlier processes in CORDES' other regions where a similar cooperatives were formed in late 1990s. Subsequent decisions concerning organizational and functional matters in El Roble have also benefited from learning from the experiences of the other cooperatives. In El Salvador, the development of the cooperative movement of the 1970s and 1980s, included the formation of a significant number of savings and loans cooperatives and their union in cooperative federations. This history, although not an entirely successful one by any means, also provided significant knowledge inputs for the formation of the cooperative.[98]

The US based NGO, the SHARE Foundation, has also been important for El Roble´s development as their representatives were involved in the earliest discussions of how to transform the NGDO financial system into a viable cooperative. SHARE has also funded a process of strategic business planning to orient the cooperative's future development and capitalized the specific women's loan fund (SHARE 2003).

As its manager stresses, El Roble has "been part of the Grupo Bajo Lempa from the beginning. We are conscious that it is an organization that is going to benefit the whole sector, because practically who will lead this whole process from the businesses to the social organizations, is not CORDES, but the Grupo Bajo Lempa." He stresses that while CORDES is part of the Directorio or directive council of the Group, "it is not the maximum authority. The perception is that this group will motivate the whole sector, that there is an organization integrating all of the Grupo Bajo Lempa businesses that will provide the mobilization of funds, technical assistance, training, strengthening of capabilities… this is the reason it has been created. We are part of the Grupo Bajo Lempa … and we are content with its development" (cited by Escobar and Zepeda 2003: 413).

Innovative nature and technological transformations

The most innovative aspect of this initiative is arguably the transformation of an NGDO credit program into an increasingly viable savings and loan cooperative, with all the changes this has implied in terms of internal governance structure, credit culture, etc.

[98] In fact, the local SHARE representative, who was involved in early discussions leading up to the formation of the El Roble cooperative, had been the executive director of the COACES confederation, including a Federation of savings and loan cooperatives. He provided first hand knowledge of this experience during the discussions for the formation of El Roble.

The cooperative must still struggle with the problems of providing access to small scale farmers involved in risky agricultural production. It must continue to prove it can responsibly and profitably manage donated funds and administer others for territorial development programs, such as San Vicente Productivo, which must be paid back after an agreed time. However, the cooperative's repayment rate suggests a significant change in the outcomes of organizational practice as compared to the un-sustainability of the financial system under CORDES' management.

To my knowledge, in El Salvador there are few examples of successful transformations of NGDO rural credit programs into viable micro-finance organizations except for the CORDES' network that now includes five cooperatives on the road to consolidation. In contrast, the general practice of territorial development programs, after termination, is to entrust their remaining capital stocks and loan portfolios to (public or private) commercial banks, thus subjecting potential users to their restrictive access regimes. The principal loan funds left by the San Vicente Productivo program are being administered in this way.

The El Roble initiative is playing a central role in the consolidation of primary production related to several of the other economic initiatives within the GBL. The cooperative, for example, is responsible for loans enabling the establishment of productive activities within the association of small scale cattle producers linked to the BIOLAC dairy initiative. A key challenge for El Roble is to be able to mediate the larger capital quantities needed by the GBL business initiatives as working capital and for future investments.

CORDES' regional manager and other key people within the GBL refer to El Roble as the future bank that will finance the development of the Group's economic initiatives. This central aspect of the vision for the future development of the GBL is inspired by the example of the cooperative *Caja Laboral*, which is the central financial institution of the previously mentioned *Mondragón* Cooperative Corporation in the Basque region of Spain. To what extent this will be possible remains to be seen.

LEMPAMAR, Eco-tourism

Emergence and specialization

The Lempa Mar initiative visualizes itself as "A private, independent, innovative and multidisciplinary, local economic development association for the Bajo Lempa." Through "the development of innovative productive and service initiatives" it looks to "generate economic profitability and dignified work for their members and the local population, with equality and a Sustainable Human Development vision" (Lempa Mar, Strategic Plan, 2004). It is, in a sense, an associative platform for the identification of economic opportunities--initially in the fields of eco-tourism, alternative appropriate technologies and artisan fishing--and the mobilization of resources to develop innovative alternatives to take advantage of them.

The main focus of Lempa Mar's activities is eco-tourism, especially in the communities located in the coastal area of Tecoluca. Currently the initiative is involved in developing a restaurant and small hostel in the community of Puerto Nuevo with access by boat to the estuaries and beaches of the Lempa River Delta (see Map 2 of Tecoluca). They are coordinating their efforts with local hostel owners on Montecristo Island, as well as with people offering boat tours, renting bikes and promoting nature trails through community owned woods to lagoons, etc. Lempa Mar also offers package tours to visit tourist attractions in other regions of El Salvador.

The initiative is diversifying its activities in two areas: the coordination of local fishermen and the organized commercialization of fresh fish and the provision of diverse types of irrigation technology to local farmers. Both were conceived as filling business niches where needs/opportunities were identified, although they diverge from the initial business focus.

Task network and external networking relations

The Lempa Mar initiative is rather different from the others linked to the GBL in its organizational make-up, as it is integrated almost entirely by people that are either current or past employees of CORDES Bajo Lempa, including the regional manager. Currently there are only a few people employed on a permanent basis at the hostel and restaurant in Puerto Nuevo (Escobar and Zepeda 2003: 252).

It has received fundraising support from CORDES Bajo Lempa to mobilize the external sources for the establishment of the restaurant and hostel. Especially important have been the territorial development programs localized in the Tecoluca region. Tecoluca's municipal government has been enrolled to provide complementary tourist infrastructure facilities (initially a boat dock with financing from GTZ). The municipality has also been responsible for the progressive improvement of the main access road and the introduction of potable water and electricity, without which the viability of the tourist activities in Puerto Nuevo would be diminished, and is actively pursuing the introduction of electrical energy to Montecristo Island which will facilitate the development of the tourist activities there.

Innovative nature and technological transformations

The conception of the local restaurant and hostel as a tourism related business and the promotion of a network of linked tourist activities, is related to a national and international trend, clearly exemplified by more developed local eco-tourism clusters in Costa Rica. In El Salvador, many localities are now interested in promoting different types of tourism and eco-tourism initiatives and such initiatives are now being consolidated in limited number of localities involving micro and small enterprises, NGDOs and local governments in collaborative efforts. As such, Lempa Mar, is part of a potentially innovative turn in tourism away from traditional large scale, capital intensive resort types of destinations.

On another level, Lempa Mar initiative was conceived to be a positive example of an associative business venture that could provide leadership in its areas of specialization. For example, people from this initiative are promoting greater coordination of municipal level tourist activities, through their leadership in the establishment of a municipal level Tourism Committee. They also occupy a leadership position in the regional Tourism Committee being supported by the GTZ/MINEC program FORTALECE in the Nonualcos Region.

Initially, this initiative has depended on project funding but there are current indications that the conditions are improving for the viability of their tourism ventures. However, there was a concrete interest of starting a business initiative that will be profitable and provide complementary income for its members, as an alternative to increasingly scarce opportunities for project based employment. It can be seen as an attempt by some of the key people at CORDES Bajo Lempa to make an additional contribution to local economic development, independent of their project dependent work at CORDES. It is thus a clear indication of the degree to which a core of CORDES Bajo Lempa's employees have become "localized," living in local communities, taking on additional local identities and contributing to local development processes in ways not directly associated with their work at the NGDO.[99]

AGROLEMPA—Irrigated Vegetable Production and Commercialization Business

Emergence and specialization

The main focus of this initiative's activities is the commercialization of fresh fruits and vegetables in the national market, with the objective of achieving business profitability and improving the incomes and thus livelihoods of its members (www.gbajolempa.net).

[99] This will be discussed further in Chapter 7 as one of the key characteristics that differentiates CORDES Bajo Lempa from other NGDOs working in the regional context, especially international NGDOs and different types of territorial development programs.

The Agricultural Association of Producers from the South of the Bajo Lempa (AGROLEMPA) was legalized in 2000 with 46 small scale producers as founding members. These producers are linked to AGROLEMPA's commercialization business as providers but also through their association as owners. AGROLEMPA is governed by a board of directors and a president elected by the associated producers. It currently is integrated by 60 associated members from the three micro-regions of the GBL who are the formal owners of the business. CORDES has transferred the property rights to the buildings, vehicles etc. subject to certain basic conditions of business consolidation. The land however is still the property of the municipal government under the terms of the land-use agreement signed with CORDES concerning the whole *Poligono de Solidaridad* complex.

The initial project conceptualization and justification was to organize the commercialization of fresh vegetables produced by the associative groups of irrigated vegetable producers from the different micro-regions attended by CORDES Bajo Lempa. However, between the elaboration of the optimistic projections that were incorporated in the project and its implementation, the productive capacity of these producer groups was greatly diminished by the destructive flood that followed the tropical storm MITCH. This created problems for the financial viability of commercial focusing on selling localized production and forced AGROLEMPA to widen the scope of its commercial operations. In order to fill the demands of their final market clients, AGROLEMPA must supplement the supply of fruits and vegetables from local producers with purchases from producer groups in other regions of the country, as well as through wholesale market purchases. This change in scope was accompanied by wider transformational process, as the operational logic associated with NGDO project implementation was gradually replaced by the need for AGROLEMPA to become a financially viable, autonomous business.

Within the national market, the majority of fruits and vegetables are imported from Guatemala and Honduras where production costs are lower, especially with respect to agricultural inputs and labor. Many Salvadoran vegetable growers thus have difficulties competing, even for their own market. In response, AGROLEMPA decided to focus on specific market niches where they feel they can better compete. Their most important market niche is the procurement of fresh fruits and vegetables by public hospitals through bidding processes, where they are paid above wholesale market prices. They are now focusing their attention on competing for procurement contracts with certain important national hotels and restaurants, as well as selling to supermarkets (Escobar and Zepeda 2003: 433-4).

Task network and external networking relations

Besides the key role played by CORDES Bajo Lempa responsible for the initial project formulation and implementation, an important contribution was made by the hands-on project management of OXFAM UK that was financing the project. This was especially due to the problems encountered in the yearly evaluations of the three-year project. It was towards the end of this project phase that the decision was made to form a legalized producer owned business venture. As the initial project ended, protagonism in decision-making and administrative responsibilities were transferred to the business management team and the board of directors, especially the president who is also a lead producer.

The still problematic emergence of this business initiative, received significant additional support from USAID, through a US based NGDO, as part of a project to start similar commercialization businesses in several regions within El Salvador. The NGDO Technoserve, which advertises "business solutions to rural poverty," provided technical and logistical support as well as financing for the construction of physical infrastructure: offices, storage and washing and sorting facilities. TECHNOSERVE also provided the platform for voluntary support by an expert marketing/management consultant (with experience in ACNielsen and Hexacta a Brazilian management consulting firm), to help them develop their marketing, branding and overall business strategies. See Box 7.

Box 7

External Support for AGROLEMPA

"I always stressed the importance of responding to customer preferences," said Felipe. "So it was very rewarding for me when the manager of *Agrolempa* showed me the results of a market research study that he had decided to undertake himself."

José Patrocinio, president of AGROLEMPA and TechnoServe/El Salvador volunteer consultant Felipe Guarnieri (r.) at a new fruit and vegetable packing plant.

Source: www.technoserve.org

More recently CORDES supported negotiations with the EU and GOES project San Vicente Productivo to provide expert financial assistance and financing for producers willing to submit to the "Competitive Agriculture" production regime specified as a basic condition. Similar conditions were also provided to some AGROLEMPA producers who became involved with another USAID project implemented by a private US consultancy firm (FINTRAC), which subsidized the purchase of drip irrigation technology and provided technical assistance under an agreement to adhere to their strict production protocol. FINTRAC was also enrolled through initial negotiations by CORDES.

With the end of the projects administered by the Foundation, the relationship with CORDES Bajo Lempa has also changed. The current relationship is focused on the coordination of projects to support AGROLEMPA's producers. The management and directive council of AGROLEMPA now have complete decision-making autonomy with respect to CORDES.

Innovative nature and technological transformations

This type of model of associative producer owned commercialization businesses, principally specialized in irrigated vegetables, has been promoted in El Salvador through a diversity of recent internationally supported projects, of which this CORDES / OXFAM UK project was one of the first. Generally the model is oriented towards competing against imports from Guatemala and Honduras for the relatively high priced national vegetable market, especially certain niches such as super markets, restaurants and now public procurement contracts. This model also tries to solve a major problem identified as the small producer's dependence on commercial intermediaries for market access.

While AGROLEMPA is innovative in this sense, there are severe deficiencies in this model revealed through AGROLEMPA's experience that are limiting its business performance. These are especially related to productive, managerial and marketing capabilities of the producers and the business support capabilities of the NGDOs on whose support these emerging business initiatives depend heavily at first. The severe difficulties with the transition from externally financed NGDO implemented projects to profitable commercial businesses, reveals a level of complexity that seems not to be adequately taken into account in the project planning phase.

Currently their products are sold without further packaging or the addition of a registered brand name. There are however concrete projections in their business plan to package certain of their best quality products under their own brand name, to sell in super markets and other similar niches. AGROLEMPA is also a registered exporter and has made some limited export sales of sesame seeds, for example. As such they could potentially handle the existing export operations of the SAMO initiative's cashews or future exports by other initiatives such as cheese from BIOLAC or biological pesticides from BIOTEC to the Central American region. However, this potential has not yet been realized.

In fact, in spite of significant capitalization through the initial project and complementary funding from other sources, the AGROLEMPA initiative faces serious problems with its financial sustainability. The current level of sales is not sufficient to cover recurrent operational expenses, especially salaries to management, administrative staff and its sales force. The operational deficit thus produced is eating away at its working capital stock.

Different actors involved frame the problem and solution in different ways. AGROLEMPA´s management argues that the problem is insufficient working capital to purchase the volumes of produce necessary to turn a profit. CORDES' regional manager suggests that there is a more fundamental problem of weak leadership and managerial skills, as well as, an unwillingness to cut costs by cutting "excess" personal.

Being a legal enterprise is necessary because of their size and visibility of their operations and beneficial in that they can participate in public bidding processes and sell in supermarkets and other formal market outlets. However, as the manager argues, operating as a legalized enterprise is detrimental in terms of operating costs and thus the competitiveness of the prices that can be paid. They must compete with commercial intermediaries that are not registered tax contributors and can thus pay higher prices to producers and sell at lower market prices.[100] These intermediaries most certainly have lower administrative and other cost structures. As Avila states, "The Finance Ministry has us catalogued as a large enterprise and frequently they come to conduct audits… we can't afford to evade [taxes]."

The problems with AGROLEMPA's commercialization business are due, in part, to the weak productive capabilities of its associated producers. These producers have an average of 3 *manzanas* of productive land and the majority have irrigation systems that allow them to produce during the extended dry season and reduce their vulnerability to frequent droughts during the rainy season. However, not all of these producers are able to take full advantage of their installed production technology and the land that they own to produce the quantities and qualities of vegetables required by the commercialization operations. Due to a diversity of problems, only an estimated 50% are able to produce during the dry season when the prices are highest (Escobar and Zepeda 2003).

These problems in terms of their individual production capabilities are exacerbated by a collective inability to adequately plan and implement synchronized planting and harvesting regimes that would ensure a regular supply of the priority vegetables over time during the whole year. Instead the producers more or less plan their production independently, although following basic orientations as to what crops are most in demand.

Many of these producers are indebted to El Roble and many also have outstanding debts to AGROLEMPA. The management and directive council decided to risk its capital resources directly financing the member producers, instead of allowing El Roble to administer these funds. This option was taken in order to "save" El Roble's modest administration fee. In retrospect this was unfortunate given the significant capital lost in unpaid debts and the internal problems caused by this situation.

One of the proposals of the management to deal with AGROLEMPA's production problems in the longer terms is to become more involved in cultivating vegetables on a larger scale than the individual producers have been able to manage. This would better guarantee supply but increase the direct risks taken by the business. They also have projections to analyze the feasibility of installing a small or medium scale processing plant for products such as sesame and peanuts that could then be exported (Interview Avila 2004).

[100] For example, one of the leading vegetable producers associated in AGROLEMPA stated that the Association was only able to pay him $11 for a bag of green sweet chilies when the coyotes were buying the same bag from him at $26.

SAAO—*Panela* Sugar

Emergence and specialization

The Organic Sugar Agro-industrial System (SAAO by its Spanish initials) was established in the community of La Sabana in Tecoluca in 1999, with the objective of fomenting the production of organic sugar cane and the production of organically certifiable granulated *panela*. This initiative represents the continuation of CORDES' earlier work to produce *panela* in several similar initiatives through its regional offices serving municipalities in the departments of Cuscatlan and Cabanas.

Panela is a type of unrefined brown sugar produced through techniques based on the evaporation and crystallization of sugar cane juices. In El Salvador the production of solid *panela* is a traditional small-scale agro-industrial activity that has been progressively marginalized by the large scale industrial production of relatively cheaper white sugar. The current market for solid *panela* is principally as an input for the production of traditional Salvadoran sweet breads and other deserts. It can also be used for sweetening hot drinks like coffee or an assortment of cold drinks and as an input for making traditional Salvadoran alcoholic beverages. Due to the distinctive taste that it gives these traditional Salvadoran foods, there is an increasing demand for panela from the Salvadorans living in the United States (being met mostly by Colombian and other South American exporters).

Over the last decades, technological innovations have been introduced into the *panela* production process in South and now Central America, in order to achieve a granulated product. In a limited number of cases, panela producers have also eliminated the use of synthetic chemicals from the primary production and processing operations to obtain an organically certifiable product.[101] The production of granulated *panela* was introduced in El Salvador through the first initiatives supported by CORDES and there are now a couple of other national producer groups: one Colombian national who has imported technology from his country and one group of traditional producers in central San Vicente that are adapting their technological systems to produce this new product.[102]

Task network and external networking relations

The principal actors involved in the original SAAO initiative were the people responsible for project implementation on behalf of CORDES Bajo Lempa, the sugar cane producers and the workers from the *trapiche* (small-scale sugar mill and processing plant). The Basque NGO Mugan Gainetik mobilized the initial financing from the Basque regional government. Through this project CORDES supported the primary production of organic sugar cane through credit, training and technical assistance and managed the initial processing operations. Laboratory analysis were also conducted to determine the nutritional content of the panela with the intention of promoting its use as a healthier substitute for industrialized white sugar.

Originally there was a group of 8 small scale producers organized in an associative production group (UdP). These producers owned the land used for production and had previous experience with sugar cane production, although not organic sugar cane. Initially there were 14 people employed at the SAAO plant, all paid through the project.

The technological system implemented in the SAAO was directly influenced by the experience of the two previous initiatives supported by CORDES. Also important were visits to the Honduran producers that had initially transferred the technology to these initiatives, as well as other experiences in Colombia y Costa Rica. The expert workers from the CORDES supported *panela* initiative in San

[101] For greater information in Spanish concerning the development of solid and granulated panela production in Latin America see the publications available at the web page for the Program for the Development of Rural Agroindustry (PRODAR) (www.prodar.org) or follow the links form this site to contact PANELANET, a related network of specialists in panela.

[102] This group, from municipalities also in San Vicente, was motivated through a presentation of the market possibilities for this new product made by the CORDES Bajo Lempa regional manager and a subsequent visit to the inactive SAAO plant to see the technology. See further discussion in Chapter 7.

Francisco provided several practical trainings both in their plant in Cabañas as well as in the SAAO plant, promoting learning through doing although the results were not completely successful. Limited quantities of solid *panela* were produced and sold to wholesale buyers in the national market, but the SAAO was un-able to produce granulated *panela*. [103]

Innovative nature and technological transformations

The attempted introduction of granulated organic *panela* production represents an initially failed effort to implement a relatively major technological innovation in Tecoluca's regional context. The granulated *panela* production process is qualitatively different from that used for traditional solid *panela*, and required the assimilation of important exogenous knowledge inputs and the development of new markets for this distinctive product.

Granulated *panela* also represents a novel product in the national and regional market. The final product of a traditional *trapiche* is a solid block or cone that requires additional effort to cut or grind it before use. This implies that industrial users must include an additional process (implying machinery, labor, etc.) to use solid *panela* and is a significant restriction for domestic use as a white sugar substitute, to sweeten coffee for example. In contrast, granulated *panela* is ready for use given its relatively easy dissolution in liquid. Compared to white sugar the granulated organic *panela* has a higher content of a diversity of vitamins and minerals from the sugar cane that are lost in the industrialized process, and contains no synthetic chemical additives as used for whitening centrifuged sugar.

The introduction of the technological system for the production of granulated *panela* represents an innovation that is new to the country, in terms of product and production techniques. An additional element that would differentiate the SAAO is the proposal to use certifiably organic sugar cane production and processing techniques. As with several other of the GBL's initiatives, the organizational proposal for cooperative ownership of the processing operations by the small scale producers and plant workers, is also a relatively novel setup for El Salvador, especially in the *panela* sector which seems to be rather exploitative in terms of labor relations and working conditions.[104]

The proposal for the SAAO, was to consolidate the production process, legalize an association or cooperative integrated by the producers and plant workers and then proceed with a transfer of the property rights to the land and installations to this legalized entity. However, production operations were terminated due to a lack of working capital, but fundamentally due to their inability to manage the technological system and produce granulated *panela*. They were also not initially able to produce sufficient quantities of organic sugar cane of a variety adapted to the coastal conditions and adequate for producing *panela*. The most evident problem was that the SAAO management and workers were never able to find the "*punto de panela*" at which the evaporating sugar cane juice would crystallize, producing the granulated product. There were also problems with "organic" sugar cane production as workers wanted higher wages to cut the sugar cane without burning it first as was being proposed.

Currently CORDES Bajo Lempa is completing an experimental process to solve the technical problems with the production of granulated *panela* in the SAAO. This process is being implemented by the head of CORDES' regional agricultural program and an assistant. This process has included collaboration with sugar cane experts from MAG-CENTA and others to identify the sugar cane varieties that are well adapted to the growing conditions in Tecoluca and have characteristics needed to produce *panela*. Examples of the most promising sugar cane varieties have then used to produce granulated *panela* under small-scale controlled experimental conditions and also with one of the initial groups

[103] A similar process was followed in the "transfer" of the technology from Honduras to Cabañas, through the Honduran alternative community commercialization network (COMAL). This involved the sharing of production experience first in Honduras and then in situ in Cabañas. The prior knowledge with the traditional panela production process seems to have been a key in facilitating interactive learning in this case, in contrast to the SAAO.

[104] This is my perception of labor relations in this sector after talking to people involved.

supported by CORDES in Cabañas. At the end of 2004 the technician responsible for this process also traveled to Colombia to investigate the technological alternatives being implemented for the production of granulated *panela*.

Based on their previous experience, this process of "in house" R&D and the lessons learned from Colombia, CORDES designed a new project initiative and came to an agreement with the international NGO Mugan Gainetik, from Spain's Bask region, to finance the reactivation of the SAAO.

The sugar cane being used in this experimental process is grown by members of the cattle producer group that provides milk to the BIOLACT initiative. Currently these producers are primarily interested in the sugar cane as a supplementary feed for their milk cows. With the reactivation of the SAAO they would provide a relatively secure producer base, experienced in the production of the varieties of sugar cane that CORDES is experimenting with. Increasing their production to sell to the SAAO would provide them with a complementary source of income. The proposal is to build on this group as the basis for a new group of organic sugar cane producers.

An important source of motivation for the continued effort to dynamically assimilate this alternative is the relative success that producers from Honduras, Costa Rica and especially Colombia are having after making the transition to granulated *panela*. The available national and international market information also suggests that there is a potential for achieving significantly higher prices for the granulated and organic product than for solid non-organic *panela*, compensating the higher production costs.[105]

BIOLAC—Gourmet Dairy Products

Emergence and specialization

The BIOLAC initiative involves the integration of cleaner milk production by an associated group of producers with a relatively technologically complex processing plant producing European style cheeses. These include cured and semi-cured Manchego, Camembert and fresh Burgos type cheeses, as well as another type of pro-biotic fresh cheese and yogurt, sour cream and skimmed milk. These cheeses are designed to compete with imported gourmet cheeses in higher priced niches for middle to upper class customers and tourists in the Salvadoran market. There are currently no other national producers of these cheeses. This initiative is still in a phase of business consolidation and penetration into the national market.

The as yet insufficient client base includes a range of professionals working at a diversity of international and national NGDOs and other professional offices, several foreign embassies, as well as a limited number of hotels and restaurants. The initiative has had severe operative limitations to provide consistent quality service and expand its client base.

The main purpose for constructing the plant was to provide a secure, just paying, market for the small scale milk producers in the communities related to the GBL, as well as to add value to this production and to generate additional local employment and dividends for the producer owners of the plant. The plant guarantees a minimum price for their milk based on an average between market prices that fluctuate significantly over the year between the rainy and the dry season. Low and unstable prices offered by commercial intermediaries "coyotes" are one of the major problems facing small-scale milk producers in El Salvador (FEDARES 2003).

CORDES' support for cattle production in the GBL's communities began with the first associative production projects in 1993. However, the specific emphasis on agro-ecological and eventually organically certifiable production techniques began in 1999 and these have been validated and improved through a systematic process of trial and error (BIOLACT 2005).

[105] The CORDES Bajo Lempa regional manager identified buyers in the Basque region of Spain interested in buying organic granulated panela at a price that would have made such a transaction profitable even with the high EU sugar tariffs.

Task network and external networking relations

The key actors involved in the BIOLACT initiative are the members of the producer cooperative in formation who are both providers and the future owners of the processing plant, the management and staff of the processing plant and CORDES Bajo Lempa. CORDES has mediated the initial and complementary project financing of the emergence of BIOLAC, as well as exercised an oversight role over the management of production and commercialization activities. This is to be expected as the initiative is still only emerging from what could be called its "project subsidized stage."

The BIOTEC initiative employs a business manager, an industrial engineer in charge of productive operations, two production assistants, a sales representative, an accountant and secretary/administrative assistant. The industrial engineer in charge of productive operations was trained in Spain and was then in charge of training the remaining 2 members of the production staff. The workers are from the communities organized in the GBL, except the production engineer and manager (Escobar and Zepeda 2003: 446).

There are 46 families of producers associated with BIOLACT as owners/providers. During 2003 and 2004, CORDES/BIOLACT began a process to organize these families in a regional cooperative with representatives from each of the GBL's three micro-regions. This has implied an important effort to consolidate the organizational capabilities of the producers and they are currently in the final stages of legalizing their cooperative association. Although not yet legalized, the cooperative's directive council and general assembly are learning more about the processing operations and have become increasingly active in the decision-making process concerning BIOLACT initiative (BIOLACT 2005; meeting with representative of Mugan Gainetik 2004).

The bulk of the financing for the establishment of the processing plant was provided by Mugan Gainetik which is now in the process of studying a project to further strengthen the initiative. In preparation for this project, BIOLACT was supported by a representative of Mugan Gainetik with extensive business management and marketing experience (in the Basque region of France). Part of his role has been to support the reformulation of the new project proposal to more closely meet the specific needs of the BIOLACT initiative in accordance with more rigorous project planning and monitoring procedures to be implemented.

CORDES and El ROBLE have provided support for the producers involved through provision of credit for the purchase of double purpose cattle, subsidies for improving their pastures and building a basic stable for their animals, as well as technical assistance for the progressive establishment of an agro-ecological, organically certifiable, production system. This support was provided through a three year project (2001-2003) financed by the Austrian based development NGDO Horizontes 3000.

Complementary funding has been provided by Mallorca's regional government, principally to finance short term investment needs to improve marketing capabilities. This project is being administered by the FUNDE which is playing a complementary role to CORDES in providing specific support to strengthen BIOLACT's capabilities to implement their business and marketing plans and improve the functioning of its associative governance mechanisms.

Innovative nature

The *potential* innovativeness of the BIOLACT initiative emerges from the basic conception of producing cheeses differentiated by their gourmet organic nature.

Salvadorans in general are accustomed to consuming artisanally processed dairy products, as compared to a few industrially processed cheeses, very few gourmet cheeses and no organic dairy products. However, a recent market study suggests that there has been a process of trans-culturalization in the habits of consuming gourmet type dairy products and projects significant growth potential in this

market and also the regional Central American market for the type, quality and quantity of cheeses that BIOLAC is able to produce (FEDARES 2003).

The gourmet European style of BIOLACT's products differentiates them from the nationally produced traditional artisanal and industrialized cheeses and yogurts sold in the national formal and informal markets. There are currently no other producers of organic processed dairy products in El Salvador and this is a relative novelty in Central America, although there are some producers in Nicaragua and Costa Rica. With organic certification BIOLACT, will be able to differentiate their products from imported gourmet cheeses, not only in price but by their organic nature and possibly national or local origin.

In terms of price, the BIOLACT cheeses are significantly higher priced than the traditional artisanal cheeses and slightly higher than nationally produced industrial types. However they are relatively lower priced than imported cheeses, especially the similar quality European cheeses. CORDES' regional manager describes them as European style cheeses at Salvadoran prices.[106] Another potential competitive advantage of its products with respect to the imported European cheeses is their proximity to the consumers which enables them to more closely meet their demands in time and quantity, not having to wait for shipping and importation procedures (BIOLACT 2005).

This situation offers BIOLACT "a small window to insert itself in a segment of the market that is growing and that is provided in its entirety from the exterior." In general, this study suggests that the most viable strategy for successful insertion in the supermarkets, currently controlled by established rather homogenous industrialized products, is to present "highly differentiated products. This strategy of product differentiation can only be achieved substituting conventional products for organic or gourmet type ones." Another window of market opportunity is the population of Salvadorans with a culture of consuming artisanal dairy products in the exterior. However, in order to access this population group it is necessary to comply with the strict sanitary and other regulations for food products entering the United States (FEDARES 2003).

In conclusion, BIOLACT is in a relatively good position to be competitive in the emerging national and regional market, especially when it is legalized and can sell its products as gourmet and organic certified.

The characteristics of the technological innovations being implemented in this initiative, related especially to organic production and processing, are also potentially ecologically important. Currently inadequate cattle raising techniques are a significant cause of environmental problems in El Salvador, and initiatives such as this could provide a basis for the introduction of agro-ecological and organic production techniques and developing a more general environmental consciousness in the producer families involved. There is also a potential importance for the consumers of quality, organic dairy products as compared to similar ones prepared with chemically contaminated milk and other additives used.

In addition to the potential economic and ecological importance of the technological transformations being implemented in the BIOLACT initiative, it is also implementing organizational innovations with important implications for its social-sustainability. The crucial element here is to increase the livelihood opportunities for small *campesino* producers, creating the conditions under which small-scale cattle production can be a viable primary or complementary economic strategy. This is done through the creation of an increasingly stable market, paying just prices through and linkage with the BIOLAC processing operations. The future transfer of ownership and governance of the processing plant to the associated small-scale cattle producers could prove to be an important mechanism to distribute

[106] According to a 2003 market study (FEDARES 2003: 30) the industrialized cheeses in the Salvadoran market with the lowest prices are Mozzarella, Cheddar, Gouda and Provolone, which are sold at prices between $2.79 and $5.00 / lb. Higher end imported cheeses include Muenster, (Swiss) smoked Gouda ahumado, Emmental, Manchego, Monterrey, Gruyere and Swiss cheeses for fondue, which are offered at prices between $ 5 and $ 12 / lb. This study provides an annex with extensive lists of brands, country of origin, presentations and prices of national and imported industrialized cheeses sold the major national supermarkets.

income generated from adding value to the milk they produce, although the first priority will be to break even and capitalize the business.

This type of organizational structure, vertically linking the organized small-scale milk producers to the processing firm, is innovative in relation to the generally fragmented state of small-scale milk cattle production and their marginalized position within the dairy commodity chain. These mechanisms are designed to locally distribute wealth that is generally captured by the commercial intermediaries to whom these producers would otherwise be forced to sell at lower and more unstable prices, as well as the dairy processors to whom these sell in turn. The horizontal linkages between this group of small-scale cattle producers, also provides important opportunities for interactive learning and coordinated action.

However, it is certainly not unique in El Salvador especially among agrarian reform cooperatives some of which are located in the Nonualcos region, or in Central America, where perhaps the most competitive milk producing firm, *Dos Pinos* from Costa Rica, is a cooperative with many linked small-scale producers. In this sense, BIOLAC is part of a more generalized organizational innovation process within the milk and dairy production sector in Central America, focused on the integration of small-scale producers.

Technological transformations

It must be recognized that significant technological transformations have been made to reduce chemical inputs into the production process, increase animal health and productivity and improve the hygiene of the milk provided to BIOLACT's plant. There are, however, many problems to be solved in order to consolidate BIOLACT's process of technological transformation and realize the benefits of these innovative *potentials*.

For example, at the center of BIOLACT's image is the organic nature of its cheeses and other dairy products. Of particular relevance in this aspect of the initiative has been the focus on developing organic cattle production techniques, thus providing BIOLACT with organically certifiable, as well as hygienic milk. In relation to the agro-ecological and organically certifiable nature of the milk production technology the project evaluation team, including a cattle production expert, concluded the following:

"The type of cattle production practiced, low in external inputs, cannot yet be considered organic and less ecological, given that these processes require two conditions: a clear management of the conceptualization of agro-ecology in the practice of animal production and search for a solution to the use of antibiotics and anti-parasite medicine of synthetic origin that are not permitted by organic certification regimes… The urgency of establishing production systems that are economically profitable in the short term has in part inhibited the establishment of soil management in accordance with agro-ecological principles… There is certain diversification but managed under the same logic as mono-crops" (Gaete and Montero 2004: 15).

With respect to the specific point concerning the use of synthetic veterinary medicines, it seems that these experts are wrong. In fact, within the international norms of International Federation of Organic Agricultural Movements (IFOAM) that regulate organic milk production, the use of conventional (synthetic chemical) veterinary medicine is allowed "when no other (organic) alternatives are available." Vaccinations (except those that are genetically engineered) may be used "when it is known or expected that a disease is to be a problem in the region where the farm is situated, and cannot be treated by other means" (Rita van Leeuwen 2001: 7, citing Erazo et al, 2001; IFOAM, 2000).

The main point, however, is that there is a need to further transform the production technology in order to guarantee organic certification and to be considered agro-ecological in nature, providing significant environmental services.

The cattle production technology being promoted has been especially developed in accordance with the agro-ecological conditions of these communities as well as the management capabilities of the families, through a process of trial and error. All of the families have been trained in the implementation of a "technological proposal for the management and development of their cattle heard;" and they have adopted this proposal in general terms. For example, they are improving their pastures, growing grasses to cut and other feed crops and vaccinating their animals. Some are able to carry out artificial insemination procedures to genetically improve the offspring they raise. The production systems being implemented have also intensified land usage with increased crop rotation and the association of crops like corn and sorghum. However, these efforts do not simultaneously improve soil fertility and the proposed incorporation of forage trees or any trees for that matter, has not been adopted (Gaete and Montero 2004: 1).

There has also been a generalized improvement in hygienic practices during milking through the construction of cement platforms for milking, the use of Teflon food grade filtration of the milk, etc. in order to meet the demands of the BIOLACT plant and other buyers. However, there are still producers that do not follow the established procedures for extracting, separating and filtering the milk in their stables and this could "contaminate the totality of the milk that is used in CORDES' milk processing plant" (Gaete and Montero 2004: 10)

In general, it can be said that the men and women producers have managed to adopt the most basic elements of this technological proposal. However, the evaluation team found no evidence that the producers had clear projections for the continued future development of their production systems. While this suggests little endogenous capability to proactively visualize and search to implement future innovation needs and/or opportunities, it does not preclude the already demonstrated capabilities to transform their existing production systems if presented with attractive alternatives.

In relation to the processing operations, the production process is certifiably organic in the sense of not using any synthetic chemical additives (preservatives or artificial colors). In contrast to many other industrialized dairy products, BIOLACT also does not add imported (subsidized) powdered milk or other additives, generally used to reduce production costs while sacrificing quality. The production process is applying ISO 9002 quality control standards and further specific quality control and hygienic procedures established by the Spanish production engineers that supported the plant's establishment. Upon receiving milk from a particular provider it is laboratory tested to register its most important characteristics, before it enters into the filtration process and is pasteurized. The majority of the machinery is of Spanish origin as are the cheese and yogurt cultures (Escobar and Zepeda 2003).[107]

The main problem with respect to BIOLACT's processing operations is not so much product quality as commercial viability. In short the BIOLACT initiative is in the midst of an economic crisis; its business operations are unsustainable in the short run as the production and commercialization operations are generating net losses that are rapidly exhausting the limited working capital stock. This situation of financial insolvency has been caused by the combination of a lengthy legalization process, insufficient income from sales, the higher than necessary production costs as well as, weak management capabilities to set clear business objectives, clearly identify problems, design solutions and coordinate activities to implement them.

This situation is reflected in the total sub-utilization of the plant's installed production capacity. Although the plant is capable of processing 1,000 lts. per day in one 8 hour shift, BIOLACT is

[107] The plant's technological system integrates a laboratory to analyze the quality of the milk entering the plant, a receiving tank with a maximum capacity of 3,500 lt. capable of preserving the milk for up to 12 hours with minimum temperature increase in case of an energy outage, a pasteurizer capable of processing 1,000 lt. of milk per hour controlled by digital thermostat mechanisms, coagulation tub capable of handling 1,000 lt. of milk at a time, system for pre-pressing coagulated milk to remove excess liquid (suero) (1,000 lt. at a time), horizontal press with the capability of processing 200 kg of cheese simultaneously in kilogram forms, salinization tub with temperature and salt controls to accentuate the cheese flavor, cheese aging (3,000 Kg) and conservation (2,000 Kg) chambers, de-creaming centrifuge with programmable internal temperature and moisture control and multipurpose packing machine (BIOTEC project proposal 2005).

presently processing only 188 lts. per day (5,625 lts. per month) or 19% of its installed capacity. With the current cost structure and prices the BIOLACT plant would have to raise its production volume to at least 550 lts. per day to break even economically (BIOLACT 2004).

However, with the help of the international business management consultant, BIOLACT's management has completed an in depth analysis of the causes and effects of its multiple problems and identified concrete solutions. These form the basis for BIOLACT's 2005 business plan in which concrete activities are set out for resolving the most urgent problems and beginning to turn a profit.

This analysis of BIOLACT's problems and alternative solutions is also the basis for the revised project to be funded by Mugan Gainettik over the next two years. This project will focus on strengthening the organizational aspects of business operations in terms of the legalization of the cattle producers cooperative BIOLACT and the direct participation of the producers in the oversight and strategic decision-making concerning the business' evolution. It will also finance crucial investments in logistics and personnel necessary to improve product presentation and market positioning (BIOLACT 2005).

This problem analysis is presented in Box 8 as a revealing indication of the developing capability of reflexive learning within the BIOLACT task network and for the way it demonstrates the intricate relationship between different aspects of this initiative's technological system under transformation.

Box 8
BIOLACT's Problem Analysis

BIOLACT's primary business performance problem is related to its deficient marketing capabilities. The initiative's inability to further develop its client base is directly related to not being a legalized business and not having obtained the necessary certification from the health and environmental authorities, as well as registering its brand name, etc. It is thus not able to enter into the formal national market or possibly export to the Central American market. In part, this is due to a lack of priority given to this problem by management, directly involved in coordinating the production and initial commercialization process, but also excessive state bureaucracy.

There is poor coordination between the production and commercialization operations in the BIOLACT initiative, resulting in the production of quantities and types of cheeses that do not correspond to the effective demand of their customers and an insufficient variety to adequately meet unexpected demands. This implies not being able to meet demands for some products and also the sale of products that are close to their preferable consumption date, thus causing discontent in their customers and lowering their future purchasing volumes. Also, when products cannot be sold before their expiration date they must be discarded resulting in additional economic losses.

BIOLACT´s insufficient attention to client needs, is also related to a poorly planned provision process and general inability to establish and comply with agreed upon times and days of delivery. BIOLACT currently does not systematically collect information concerning client purchasing preferences, quantities and frequencies, and thus lacks the information necessary to plan production based on the dynamics of market demand. There is also no way to learn from potential client feedback concerning product quality, presentation, selection, price, etc. Besides individual client in-satisfaction, this situation creates a generally negative business image that is perceived by other potential clients as well.

Additional commercialization problems include inadequate transport logistics. BIOLCT does not having a vehicle dedicated exclusively to sales (but is also responsible for milk purchasing, etc.) and the currently cold storage transport system does not guarantee the quality of products sold (reducing their shelf life) and the damaging the quality of those unsold items that must be returned to the

plant for storage and future sale. The quantity of unsold items also reflects inadequate information concerning client demands and weak or non-existent distribution routines with each client or client group within given organizations (NGOs, embassies, etc.).

Lacking sanitary permissions, also provide no customer guarantees of product hygiene, leaving unsubstantiated BIOLACT's claims concerning product quality. Currently BIOLACT is offering its products in generic packaging without a registered trade mark, thus diminishing from the product image and market positioning. Lack of market positioning is also related to weak and generally unplanned publicity and product promotion process. The current packaging is also not up to formal market standards as defined by similar imported gourmet dairy products, which in addition to diminishing product image also reduces its shelf life.

Internally, there is also a problem with worker productivity related to imprecise specifications of their work tasks and responsibilities. This creates confusion among the workers and limits management's capability to analyze worker performance and to make rational decisions concerning the number of workers needed in relation to the production volumes. Currently with the reduced production volumes, there are more workers than needed which in turn, raises production costs, raises product prices and lower per item profit margins.

BIOLACT's weak administrative capabilities also cause a variety of problems. For example, unclear and untimely business accounting procedures prove to be a major obstacle for management decision-making and transparent communication and strategic decision-making with the producers participating in the cooperative's governance mechanisms. In general, there is a disorganized style of solving immediate problems that makes it difficult for the members of the producers' cooperative to participate in a meaningful way, especially in dealing with the initiative's more structural problems.

Weak business controls concerning production inputs, especially the imported ones, cause costly delays and further contribute to the problems meeting client demands. Additional problems with key larger customers have been caused by inadequate control of product sales and the resulting contradictions concerning payment. In general, there is insufficient control over sales transactions and thus the resource management and performance of sales personnel.

BIOLACT's business objectives and strategy are poorly defined, suggesting the need for an overall strategic plan to strengthen and integrate key aspects of the production process with the processing and marketing operations.

Due to its financial insolvency, the plant has been unable to make opportune payments to the members and future owners of the plant and has not been able to cover other production costs. The continuation of this situation will cause the termination of operations due to the inability to cover one or more vital financial commitments such as, milk from local producers, imported cheese and yogurt cultures, workers salaries, electricity or propane gas.

BIOLACT's working capital funds are insufficient to cover the 60 to 120 day waiting period before payment that super-markets impose on their suppliers. This is a further limitation to selling to higher income customers through the specialized sections for gourmet cheeses in the national supermarket chains.

The financial weakness of BIOLACT is also reflected in its inability to repair crucial machinery, like one of the cooling components for the milk reception tank which is currently inoperable. This is especially due to the high costs of replacement parts and/or specialized repair personnel. This situation also reflects the risks of innovating through the importation of complex machinery which is difficult to fix or replace in case of problems.

Source: BIOLACT 2005.

Impact of innovation on family livelihoods

Due to the initial problems faced by BIOLACT's processing operations, the expected positive impact on the livelihoods of the families involved has been diminished significantly. Fortunately, however, many of these families have been able to significantly improve their extremely precarious economic situation, taking advantage of the opportunities provided to develop their double purpose cattle and milk production capabilities.

An external project evaluation of the Horizontes 3000 project (directly involving 31 of these families) revealed that this support had enabled the families to "increase the number of days laboring on their own land, increased the productivity of their land under production, increased their total income and establish a better economic return on days labored on their farm." The families made "notable improvements in their family economies, in addition to dietary improvements, the establishment of a profitable enterprise, family employment and certain future economic security" (Gaete and Montero 2004: 3, 10).[108] Further details of the economic livelihood impact of this project are provided in Box 9.

Box 9
Economic Impact on the Livelihoods of Cattle Producers

Compared to the daily payment for seasonal and relatively scare agricultural day labor opportunities in the region (US$ 3.5/day), the labor productivity (total income/days labored) achieved through this activity are significantly higher: from US$ 5.3/day to US$38/day.

In relation to this, the families are now dedicating significantly more days to laboring on their own farms; registering increases of from 68 to 209 days labored in the case of the ones with least family labor available and from 187 days to 288 in the case of the families with the greatest family labor force available.

These families have also experienced a significant increase in their consumption of nutritive milk products and their additional income has further enabled them to purchase other foods to diversify their diet.

In the 4 cases where it was possible to compare the net family agricultural income (after all related expenses) for the year before implementation and for the year of the evaluation, all families increased their income significantly, between 47% and 53%.

The combination of these dynamics suggests a significant total increase in family income and the livelihood improvements due to involvement in this activity.

Source: Gaete and Montero 2004: 14-15, 17.

All of the milk purchased by the plant at this time is from this group of producers. However, the producers have developed their own marketing networks in order to sell the milk that the plant is unable to purchase. The prices paid in this informal market are, however, significantly inferior, especially during the rainy season. Other families are also producing artisan cheese and cream for local sale. In addition, many of the producers are active in raising young bulls for sale (demanding significant milk input). Some are looking to add value to this production by training them as *bueyes*

[108] This conclusion was based particularly on the analysis of a detailed survey providing information as to the impact of the project on the livelihoods of a sample of 8 families selected from different communities as representative of the group as a whole in terms of when they entered the initiative (1st, 2nd or 3rd year) and their previous cattle raising experience.

to pull carts, instruments for preparing land and planting crops, etc. It is through selling these animals that the majority have been able to maintain regular credit payments. "In this sense, it seems that the producers have the problem of [selling] the milk resolved" (Gaete and Montero 2004: 15, 21).

These producers are in the process of paying off a credit of $3,000 from El Roble used to finance the establishment of their cattle activities. This implies a monthly payment of $57.00, indicating the urgency of regular income (BIOLACT project proposal 2005). In general, the credit system is functioning well and the producers have been able to meet their financial obligations. The early payment of credits has permitted new loans for the establishment of six similar cattle production systems.

The SAMO Cashew Initiative

Emergence and specialization

In Tecoluca the task-network actors have taken advantage of an existing cashew plantation in one of the local communities, Montecristo Island, to extend the area of cultivation as part of a strategy for diversifying and increasing the profitability of small-scale agricultural and cattle raising activities. They also took advantage of the 13 years of rest and recuperation of the land during the war to introduce organically certified farming techniques for cashew production.

The Organic Cashew Agro-industrial System (SAMO) integrates the cultivation of organic cashews in diversified agro-forestry systems with the processing of the cashew nuts and other cashew products in a medium scale agro-industrial plant. These organic and fair trade certified cashew nuts are sold in niche markets in Europe and North America. As stated in Chapter 2, the SAMO cashew processing plant is the most consolidated business initiative within the Grupo Bajo Lempa. It is, however, still an emerging business initiative that has just recently been able to cover its needs for working capital and generate a minimal annual profit.

Task network and external networking relations

The core task-network of actors involved in the case study initiative for cashew growing, processing and commercialization in Tecoluca are: CORDES Bajo Lempa, the small-scale cashew producers integrated in the legalized APRAINORES association, as well as the management and workers of the SAMO processing plant.

As a key member of the task-network, CORDES has played a complex and dynamic role facilitating internal organizational dynamics of the task-network and mediating relations and resource flows between local producers and external actors. However, recently the SAMO management and, to a lesser extent, the APRAINORES directive council have progressively taken over key aspects of this role, as a reflection of their increasing "independence" from CORDES. The contribution of the producers and the plant workers to the innovative efforts should also not be underestimated.

Currently there are 63 families of producers cultivating cashews in southern Tecoluca and Zacatecoluca. In 2003 they were producing approximately 250 mz. of cashews although 100 mz. of these had not reached productive maturity. This same year they produced approximately 64 metric tons of raw cashews. The locally produced cashews are purchased by the administration of the SAMO processing plant. In 2003 the SAMO also financed productive activities of another associative group of producers owning another 280 mz. of certified organic cashews, in order to increase its production volume.

The small-scale producers are organized in the APRAINORES association which was legalized as a non-profit NGDO. Recently CORDES has transferred the property rights for the processing plant to APRAINORES. The plant is organized with a board of directors from the APRAINORES association, the general manager, an operational plant manager and approximately 80 workers, divided among the operations for frying, shelling, oven-drying, pealing, sorting and packing.

The export quality SAMO nuts are sold through cooperating commercial intermediaries in "green" and "fair trade" niches of North American and European market. An important advance has been the establishment and progressive development of market relations with their principal European buyer, GEPA from Germany.[109] This company distributes the SAMO's organic and now fair trade certified cashews in the German market and acts as a commercial intermediary for sales to other EU distributors like Oxfam Belgium and Oxfam UK / Equal Exchange. In 2003 the SAMO also sold organic cashews to another German distributor (Rapunzel) and began sales of their organic nuts in the North American market through the US company Just Cashew. [110]

The SAMO is not in itself a discreet legal entity, but uses the APRAINORES organization's legal status for operating. The growing, processing and commercialization operations are being progressively formalized in terms of the strict regulations for organic and now "fair-trade" certification under which they operate. The growing and processing operations of the SAMO/APRAINORES initiative are organically certified by an international organization (*Oko Garantie* from Germany) as well as the Fairtrade Labeling Organizations International (FLO). The SAMO plant management is also involved in implementing an international system for quality and sanitary controls to improve export presentation.[111]

The initial financing for the construction of the current SAMO plant (1998-1999) was negotiated with the European Union and a Regional Government in Spain, channeled through two European NGOs (Oxfam UK and Paz y Tercer Mundo PTM from Spain) to CORDES that was initially responsible for SAMO's management.

In 2003 the SAMO was able to obtain a low interest "development" loan for $50,000 from an Italian financial organization (ALTERFIN) against a mortgage on their property. They were also able to obtain $60,000 from a Salvadoran savings and loan cooperative (FIDECOOP) based on a second mortgage, $30,000 from a USAID program (ROCA) and $30,000 from the AGROLEMPA initiative, also a member of the GBL. They were able to pay these loans (except for $15,000 from ROCA which is now under administration by CORDES).

As the SAMO was able to pay these loans based on the sales of the final products, they were able to negotiate an additional loan of $100,000 from ALTERFIN, and an low-interest loan for $60,000 from another Italian bank (Credit Sud). The contact with this organization and the approval of this complementary loan was supported by ALTERFIN, suggesting the importance of this emerging relationship. FIDECOOP also increased their loan amount to $80,000. In addition to providing working capital these loans were used to make necessary improvements in the plant infrastructure, such as completing the sanitary services for workers. The SAMO was also able to leverage additional resources to finance their export operations from the USAID program EXPRO.

Innovative nature

The commercial growing and processing of cashews in El Salvador is an activity that dates at least to the 1970s when the principal plantations were established, although it has never been of any great national economic importance. The original Montecristo Island cashew plantation in Tecoluca was established at that time by a foreign national. He reportedly selected high quality genetic stock for the trees and cultivated them organically. Besides selling the nuts for processing, he used the cashew false fruit as the basis for producing hard alcoholic beverages sold on the national market.

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[109] For additional information see: http://www.gepa.de/htdocs_en/profil/index.html

[110] The prices offered for the US market are, however, lower than for Europe. For example, at a recent trade fair in the United States, there were several businesses interested in buying SAMO's cashews but they were offering only $3.20 / lb. as compared to $3.90 paid for organic fair trade cashews in Europe. Rapunzel paid $3.81 for their organic but not fair trade certified cashews in 2003.

[111] More information can be found on this system, know as Hazard Analysis and Critical Control Point (HACCP), can be found at http://vm.cfsan.fda.gov/~lrd/haccp.html.

In the national market the most important actors involved in the cashew business are two diversified Salvadoran snack food companies, as well as recognized multinationals. The national firms buy shelled cashews on the local market and import others to finish processing and sell through formal market outlets in the Salvadoran and Central American markets. There is also a sizable informal market for roasted cashews and also a limited trade in fresh cashew false fruit through municipal markets, etc.

In El Salvador, besides SAMO, there are several other associative or cooperative ventures that integrate rural families in their cashew production and processing operations besides. The three principal initiatives of this type, including the SAMO, are the only ones producing certified organic cashews. One of these initiatives is an association of cooperatives also exporting their processed nuts to the North American and European markets. The other industrial processing plant belonging to another cooperative is currently inactive and the producers sells their raw cashews to an intermediary who sends their certified organic nuts for processing in India, before re-sale in Japan.

In the Central American context, the information available suggests that the SAMO initiative is comparable to the limited number of cashew processing businesses that exist in terms of the complexity of its technological systems and marketing. In the international context, there are significantly larger agro-businesses dedicated to cashew growing and processing that manage more complex and capital intensive technological systems for primary production and processing, capable of achieving higher production efficiency as well as volume. In general these international producers are not selling certified organic cashews, which provides SAMO a chance to compete. However, the possibility that progressively more large producers could make this transition represents a serious threat that could erode the premium prices for organic cashews. This emphasizes the importance of consolidating marketing relationships, especially in the "fair trade" sectors, already initiated by SAMO through FLO certification.

The SAMO initiative is also distinctive as compared to similar small and medium sized business initiatives in Tecoluca and the immediate regional context, in terms of the relative complexity of the technological systems it manages, employment generation, the value added to production and its export capabilities.[112]

The relative novelty of the SAMO initiative in these national and international contexts is related to: (i) the integration of the small-scale producers in the APRAINORES association that owns the processing plant, (ii) commitment to paying premium prices to local producers for their organically certified cashews and progressively improving working conditions in the SAMO plant, (iii) organic and "fair trade" certification of the production and processing operations and (iv) the extent to which the task network has been capable of placing their products advantageously in specialized niches of the international market. These represent novel ways of integrating considerations of income distribution and social sustainability issues into local business initiatives. The integration of certified organic techniques into the whole production process can also be seen as a significant eco-innovation, part of an evolving new technological trajectory in cashews.

Evolution of organic cashew growing and agro-forestry systems

Cashew cultivation is a relatively novel agricultural activity in El Salvador with a significant development potential. This is due to the adaptability of the trees to diverse ecological conditions, including marginal soils where other commercial tree species do not grow as well.[113] Cashews can

[112] This is clear in a comparison of the SAMO and other GBL initiatives with another 178 economic initiatives included in a recent survey in the Nonualcos Region. The SAMO was judged as having the greatest expressed development potential based on a set of 10 composite criteria (FORTALECE 2004).

[113] This includes the sandy coastal soils of Montecristo where the original plantation was re-established. A technician from the San Vicente Productivo Program questioned the economic rationality to growing cashews on other more fertile lands in Tecoluca that could support more capital intensive and potentially profitable crops. This analysis would seem to be contingent on the producer's capabilities and motivations to assume these extra risks (personal communication 2004).

be integrated into a diversity of production systems including different agro-forestry systems, adaptable to the conditions of small-scale producers and also larger, more capital-intensive plantation systems. Especially important for local economic development is the wide range of agro-industrial options to create employment, add value and provide a stable market for cashew nuts, nut shells and also the cashew false fruit.[114]

Cashew plantations provide environmental services as cashew trees protect against soil erosion and facilitate water filtration due to their strong root structure. Cashew trees produce good quality fire wood and maintain their foliage throughout the year which favors the reproduction of wild animals (Ortega, 1996). For this reason, the possibilities for increasing cashew tree production on a national and regional basis would have important positive economic and environmental implications for local economic development efforts in rural areas.

The establishment of organic cashew production has represented a substantial change in the production systems of the families involved as compared to other producers in rural Tecoluca and the surrounding region. Organic cashew production involves different production techniques, organizational forms and knowledge necessary for system management, as compared to systems of small scale subsistence agricultural and cattle production or the larger commercial producers of cotton (in the past), sugar cane or cattle.

The regional manager for CORDES states that cashews are not a crop to get rich by. However, he argues that for the local families involved in primary cashew agro-forestry system production, this activity provides an opportunity to diversify their current income and represents income security in the medium and long term (Interview Espin, 2002). The cashew trees have a relatively long productive life (30+years) and a significantly lower risk of loss due to problems such as flooding or drought, after reaching certain maturity. Some additional local families are also able to benefit from employment related to cashew production, especially harvest activities.

Taking the producer families from Montecristo as an example, their average income in 1999, after discounting estimated production costs, from the sale of their raw cashews to the SAMO was approximately $1,020.[115] As a general comparative indication, the average income from this one activity is equal to 100% of the average yearly income for rural families whose main economic activity is agriculture or cattle production. It is equal to 40% of the average yearly income for rural families, in general, and 30% of the average yearly income of both urban and rural families from the department of San Vicente, where Tecoluca is located (DIGESTYC 1999). Income levels for the families growing cashews in the other communities where the trees are just now reaching productive age are obviously lower (Cummings 2002).

Although the quantity per producer family is not very high, cashew production provides a secure income base that could facilitate investment in complementary activities with higher risk levels but also greater income generating potential. For example, two families of cashew producers from Montecristo are investing in small-scale tourism activities. Another inland producer has invested in an irrigation system and is producing vegetables. These producers recognized the current and projected income from cashews as enabling factors for their diversified investments.

The cashew production system reaches maturity in the medium and long term as compared to the yearly cycles of the *milpa* corn systems. Thus the importance of generating income earlier in the life-

[114] The cashew nut is the best known of the cashew tree products. It is covered in a shell which contains a special type of caustic oil which has a diversity of product applications, including use in airline breaking fluid. Also the cashew nut grows attached to the tree by a fleshy "false fruit" or cashew apple which can serve as an input for fresh juices, juice concentrates, different alcoholic beverages and as a cut and dried snack-food.

[115] This average income estimate is based on data from 1999 concerning production from Montecristo provided in an external evaluation of the SAMO initiative (Rombo Consultores 2000) and production cost information provided by Luis Erazu in an interview, 2001. More detailed information and analysis is needed to be more precise in estimating family incomes from cashew production.

cycle of the productive system and maximizing the use of the scarce land available for productive activities motivated CORDES to promote the cultivation of smaller areas of cashews in association with other organic crops in agro-forestry systems. This strategy should also increase the economic viability of cashew production for small producers, as the other crops should provide short-term income and reduce the break even time for the investment in the system as a whole. [116]

Among the producers interviewed, there are several cases where the associated crops are indeed generating additional income in the short term and represent an important element in their economic diversification strategy. For example, one producer reports his main income source to be the plantains that he is harvesting from the cashew agro-forestry system. They do not provide a lot of money, but he compared them favorably to corn production, preferring to grow plantains and buy beans, corn, etc. to subsist on. The plantains have also diversified his family's diet. He was not yet harvesting significant numbers of cashews.

Other producers have benefited from the complementary relationship between the cashews and their cattle production. For example, several families with mature plantations have invested money from the sale of the cashew nuts in beef cattle for fattening. With the sale of the cattle they cover the costs for cashew and cattle production and have made a significant profit, in relative terms. The cattle help minimize the costs of cleaning the plantation of weeds while the cashew plantation provides land for grazing and food from the cashew false-fruit.

This production strategy does not have the same capital requirements as producing irrigated vegetables, for example, in terms of the initial investment, especially working capital needs. This makes cashews a less risky and thus more appropriate investment for many families with limited capital accumulation and/or regular access to financing.
However, in practice this strategy of developing cashew agro-forestry systems has produced only moderate results due to crop destruction through floods, as well as problems adapting the alternatives selected to the local environmental conditions, theft of these crops located on unguarded plots away from the house, lack of producer experience, etc. Facing these problems has led to a continuous process of trial and error learning between producers and technical staff to find suitable alternatives.

Innovations in cashew nut processing

A second fundamental innovation introduced to the local production system through this initiative has been the processing of the organic cashews. In order to finance and manage the initial processing and commercialization of the cashews, CORDES and the SES established a strategic alliance with an NGO related to CORDES specialized in agro-industrial technology and export commercialization.[117] Together in 1995, they constructed a second processing plant to replace the earlier artisanal experimental operations and organized the Organic Cashew Agroindustrial System (SAMO).

This second plant incorporated still rather basic artisanal techniques utilized for deep frying the nuts over a wood fire, shelling them by hand with rocks and then drying them in a wood heated oven. However, from the first to the second plant there occurred an important change in the scale of operations and the upgrading of management capabilities, through the hiring of an industrial engineer to replace the young local woman who had been in charge of the initial operations.[118]

Over time incremental innovations were implemented in the plant's technological systems, principally based on learning through internal trial and error and the plant manager's observations of relatively more advanced national and Central American cashew processing operations. These innovations were sufficient to develop the capabilities for managing the technological components of the production

[116] Short-term profitability is one important factor that has been cited in numerous studies as motivating small producers to integrate trees into their agricultural and cattle production systems (Cummings 2001).

[117] This alliance with AGRODESA was short-lived and in subsequent operations CORDES absorbed the functions of management oversight of the processing operations.

[118] She was incorporated into another area of CORDES local operations.

system and also beginning the export commercialization. However, the limitations of this second plant became apparent as it lacked the productive capacity needed to continue developing the initiative's export marketing operations.

In 1997, this situation motivated the principal task-network actors to organize a participatory evaluation and strategic planning process.[119] Based on their problem analysis and projections, the task-network began a fundraising effort to build the current SAMO processing plant. The construction process was completed in 1999 with an initial investment of approximately $450,000. The most important innovations introduced into this evolving technological system through the construction and operation of the new processing plant, are indicated in Box 10.

Box 10
Innovations in the SAMO Processing Plant

- The distribution of the distinct activities of the productive process within the plant, specifically the physical separation of the peeling and classifying processes from the frying, shelling and oven drying processes, given the vulnerability of the nuts to contamination during these last two processes.
- Incorporate new machines for frying and drying the nuts that use propane gas as fuel.
- Adapt the gas ovens originally designed for bread baking in collaboration with the producer in order to incorporate safety mechanisms on the gas lines and thermometers to control oven temperature necessary to lower the percentage of browned nuts.
- Find by trial and error the right frying time in order not to brown the nuts but also not to leave them too "green" (not enough time) which makes them harder to shell and complicates the oven drying operation as they have to make adjustments.
- Find the right oven temperature and time for drying the nuts in order to achieve the moisture content and color required for export marketing.
- The installation of concrete tables for shelling, air extractors in the main space and air conditioning in the peeling and classification rooms to improve working conditions.
- A new machine for air tight sealing to avoid the costs and hassles involved in using CORALAMA´s packing services.
- Improve hygiene through strict regulation in the use of uniforms, the non-use of make up, finger nail polish, etc., and the personal cleanliness of the workers. They also installed screens on all the windows to keep insects out, alcohol dispensers for hand washing before entering the peeling and classifying rooms, and air extractors above the doors to limit the entrance of dust, etc. with the workers.
- Improved monitoring of basic production and worker costs and output information with the support of a computer program designed to manage this information.

Source: Cummings 2001a: 47-48

The initial design of the processing plant was discussed between the principal actors involved and the architect in charge of the building, however, this proposal was changed in important ways based on interaction with a diversity of cashew processing "experts." Several of these experts also contributed to incremental innovations that have been the basis for the plant's performance improvements.

[119] This process was facilitated by external consultants and the participants included the European responsible to the EU for the project, associative cashew producer groups, the Directive Committee of the micro-regional organization SES, the SAMO plant manager and the NGOs AGRODESA and CORDES. See Chacón and Lanao 1997

Box 11
Sources of Innovative Knowledge for Processing Innovations

An international cashew expert was consulted concerning the new plant design and he suggested separating the frying process from the rest as it was dirty, which lead to a first change in this proposal. He also recommended moving the heaps of shells from in front of the plant.

The certification agency representative suggested the separation of the classifying area from the other processes due to the ashes and the dust present. The nuts needed to be taken from the oven to separate rooms for pealing and classifying which also implied installing air conditioning to make this room bearable in the coastal heat.

The SAMO management has also received systematic consultant help throughout the implementation process from the international agencies involved in financing its construction and initial operations (*Paz y el Tercer Mundo* from Spain and Oxfam Great Britain). For example, an Oxfam representative helped with information concerning how to meet EU organic certification and export quality standards and about the sanctions that were applied for non-compliace. The PTM representatives helped solve problems adjusting the frying and oven temperatures, through systematic trial and error experimentation.

Another NGO, CRECER, contributed analysis focusing on making the productive process more efficient so that the SAMO could increase the workers' pay; thus contributing to both economic competitiveness and social sustainability. The economic competitiveness of the processing operations depends on having workers with the experience and dedication necessary to do a good job, which in turn requires the right incentives in terms of salary and working conditions.

Source: Cummings 2001a

The SAMO plant is capable of processing approximately 204 metric tones (MT) of raw cashews to produce 41 MT of shelled nuts per year. However, in 2002/2003 they were only able to produce 23 MT, 56% of installed capacity. This however, represented a significant increase over the production for previous years, before they had negotiated buying additional raw cashews (Technoserve 2003; Escobar and Zepeda 2003; Cárdenas Lavezzari 2003). Table 2 shows the evolution of final production volumes and sales.

Table 2

Historical Evolution of Processing Volumes and Sales

Year	Production output (MT)	Sales (USD)
1998	5.3	41,845
1999	9.0	70,285
2000	12.5	107,371
2001	11.9	74,162

Source: Torres 2002, citing Technoserve 2002

A diagnostic study of the SAMO's processing operations in 2002 estimated that the equilibrium point for profitability of the plant, using its current cost structure, production system and current selling prices, would be 96.7 MT (2,127 *quintales*)[120] of all organic cashews. However, if capital depreciation is not taken into account the approximate economic equilibrium point (processing only organic cashews) is 70.2 MT (1,545 qq.) At the time of this study the plant was operating at significantly below this threshold processing approximately 59.1 MT (1,300 qq.) in 2001-2002 (Miranda 2002: 9, 60). However, through improved access to financing SAMO was able to increase this amount to 104.5 MT (2,300 *qq.*) in 2003 and 225 MT (4,950 *qq.*) in 2004, combining local and other national producers of organic and non-organic nuts (Interview with Carranza 2005).

Innovative marketing of certified cashews

The most important improvements in the commercialization process have been directly linked to the establishment of the processing operations. This, and the legalization of APRAINORES under whose name the nuts are sold, has allowed the SAMO to move up the commercialization chain. The SAMO is now selling their certified nuts on the North American and European organic and "fair trade" markets directly to cooperating wholesalers that are willing to share more of the premium prices they receive.121 The consumers pay premium prices in recognition for the organic nature of the cashew nuts and the more "just" social conditions under which they are produced.

Although the SAMO's nuts have been sold in the "fair trade" market through businesses like Oxfam UK Twin Trading and Equal Exhange, it was not until 2004 that FLO has provided them with fair trade certification. In part this was due to the SAMO being the first cashew processing business to receive this type of certification by FLO, thus implying the further development of the fair trade regulatory framework.[122] This framework also suggests a minimum selling price for the certified products based on their production costs. Due to some unspecified confusion, the initial price proposed by FLO was unduly low leading to some confusion with their potential buyer of conventional cashews (Equitable).

In 2004, SAMO experimented with purchasing "conventional" non-organic cashews from other producers also located in the Bajo Lempa regional context (coastal communities similar to Montecristo with significant areas under cultivation). Although these producers do not use agrochemicals, laboratory tests do indicate trace amounts of chemical contamination that would make organic certification impossible at this time. Of the 225 MT processed in 2004, 70% were organically certified and 30% were "conventional". The estimated final production volume for the recently finalized 2004 operations is 43 MT of which 15 MT are conventional and the rest organic. All are being sold as fair trade certified by FLO. Although the SAMO is not able to sell their non-organic cashews to their "organic" customers, they have contacted a French buyer "Equitable" that operates in the fair-trade market. He asked for 10 MTs in 2004 and is interested in significantly increasing this amount depending on market acceptance.

The progressively improved market positioning of the SAMO's nuts represents a significant step in the diversification and consolidation of their market access. Key steps were their participation in one of the most important international organic products trade fair (Bio Fach in Germany123), participation in trade fairs in the United States through the EXPRO program and through the use of internet connections. This was the result of combined work of the management and the international marketing

120 1 quintal (qq) or hundred weight = 100 lb. = 45.36 kg.; 1 metric tonne = 1000 kg.

121 Exactly how much of the final sale price is shared with the SAMO is unclear and probably differs among the different buyers depending on their final markets, etc.

122 FLO for example, provides a detailed framework of initial and progress requirements for associated small producers/processors, exporters and international buyers to be certified as "Fairtrade" compliant organizations. Requirements include the formal organization of predominantly small producers, adequate health and safety conditions for workers, the establishment of fair trade premium prices between exporter and buyer, the sharing of premium prices with workers and producers, democracy and transparency in the organization, among others (http://www.fairtrade.net/sites/aboutflo/aboutflo.html).

123 For further information see: http://www.biofach.de/main/d3zq3jg8/page.html

expert working directly with them, through CORDES' development program. The European marketing expert collaborated with the SAMO management through a position as a paid volunteer at CORDES central office. His support was especially instrumental in the organization of presentations at the Bio Fach exhibition and initiating the FLO certification process.

In addition to the conventional nuts to be exported and sold in France, the SAMO is developing a local market with one of the major national snack food companies (Banzini) and also with a national company exporting traditional candies to Salvadoran's in the United States (Dulces Malu). This last company buys cashew flour made from the waste materials left over from the "skinning" operations as input to their candies. Other national market outlets include a private university (the UCA) and the CORDES' central office, among others. They are exploring sales to restaurants as well.

In conclusion, in terms of positioning within the value chain the SAMO initiative has made significant steps to deepen and diversify their access to the international but also national market. The principal limitation for commercialization is still the relatively low production volume as compared to market demand due to the plants limited installed capacity. In 2003, the SAMO was unable to comply with the size of the orders placed by their multiple buyers. In correspondence with the market acceptance of the SAMO's cashews and the increased production volumes of the recently finalized processing operations for 2004-2005, there are increased expectations for future purchases by their principal buyers.

The SAMO cashews are recognized as having a distinctly sweeter, more agreeable taste, than those of their competitors in countries such as India and Brazil.

Organizational innovations in APRAINORES[124]

The realization of the potential innovative nature of the SAMO's organizational configuration has been a slow and problematic process and this is still a fundamental area of weakness for the initiative.

One important achievement has been the formation and legalization of the APRAINORES producer association. However, as Carranza states, the organizational and governance capabilities of APRAINORES are "very weak." In part this is due to the association's history. Initially the organization was integrated by producers from the three organic productive "lines": cashews (SAMO), sugar cane for *panela* (SAAO) and milk production for processing (BIOLAC). However, with time it was evident that each initiative had its own internal dynamics and thus demanded its own organizational structure.[125] Given this situation the decision was taken to restructure APRAINORES to integrate only cashew producers as members.

However, even after this re-structuring, the directive council does not function as it should to comply with its strategic oversight responsibilities. They do have monthly meetings with the plant manager and their own internal meetings without his presence. However, Carranza argues they have basically left the responsibility for running the plant to himself and the president who accompanies him in many activities as the association's legal representative, thus maintaining a working knowledge of the plant's functioning, finances, etc. For this work he is paid a monthly stipend. This weakness in the associational governance of the SAMO initiative was identified as a problem by the FLO representative in charge of the certification process and represents a threat to the sustainability of the initiative, if the manager were to leave for any reason, for example.

Carranza argues that the producers see themselves more as providers and not as the owners of the processing plant. They have benefited from the improved business performance through obtaining prompt payment for the cashews they sell to the plant and even limited cash advances to help cover their working expenses before and during harvest. Some of the producer families, especially the women

[124] Sub-section based on interview with SAMO manager Vicente Carranza 2005.

[125] For example, around this time the sugar cane producers disbanded when the SAAO ceased producing panela. The BIOLAC processing plant was still at its early stages of development under the direct management of CORDES with little initial participation of the milk producers.

and young people studying, also work in the plant and thus benefit from the increased stability and wages working during the entire year in 2004. He, however, believes that there will only be greater appropriation as owners when the plant is financially able to distribute part of its profits among the cooperative members. The weak level of organizational appropriation within APRAINORES is reflected in the non-payment of the "social contributions" by the members as mandated by the association's bylaws as a means of internal capitalization.

The Brazilian expert in cashew tree cultivation also identified the clear need for the primary producers linked to the SAMO to change their vision with respect to the crop. The producers need to be actively cultivating the trees to improve their productivity, as opposed to the current situation where many passively wait for the fruits to fall off the tree to recollect them, dedicating little additional effort to improving productivity.

Innovations, business performance and family livelihoods

The processing plant provides a stable market for local producers that maintain their organic certification, paying higher prices than they would get from the exploitative commercial intermediaries that dominate the informal cashew market or the national snack-food companies. Likewise the processing of the nuts and especially the installation of the new processing plant adds value to the raw nuts and makes export marketing possible. The construction of the new processing plant and the systematic process of incremental innovations that have been implemented subsequently have increased the volume of production, improved productivity and increased employment generation.

SAMO has been able to progressively reduce the percentage of browned nuts produced, the percentages of whole nuts produced through shelling and the system's overall productivity, comparing the weight of raw nuts entering the process and the finished products. This has been achieved through a systematic process of trial and error with temperatures and times, measuring the variables and "applying common sense," especially in the shelling and oven drying processes. An analysis of the productivity of the SAMO plant as compared with composite bench-marks obtained from data concerning processing plants with similar technological systems, revealed that in general SAMO had obtained average or above average productivity results.[126] The critical factors identified by the author to explain these constant productivity increases are: the quality of the raw nut inputs and the workers' skills using the manual shelling method, which in addition to being equally effective may also be less risky than the semi-mechanized knives used in many plants of a similar scale. Experience gained by the plant's management team has also been important (Miranda 2002: 15, 29-33, 40, 64).

The operations for 2003 were the first time that the enterprise registered a genuine, although modest, operating profit of $1,800.[127] In 2004 the increased volume of cashews processed allowed the plant to come close to its maximum operating capacity, working a full 12 months (February 2004-February 2005). However, at their current level of production and with the comparatively high prices obtained through their market development efforts, their profit margins are still reduced due to their high operating costs as compared to relative productivity. Recent increases in these costs have come from the responsibilities to pay into the Social Security and pension funds, as well as significant increases in their monthly electricity bills and the prices of key inputs such as vegetable oil for frying the nuts before shelling.

The increased production capability of the SAMO plant has also been reflected in an increase in the number of plant workers and the number of months for which they have been employed. This progression is reflected in Table 3.

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[126] The data sources for this comparison included: two years of production statistics and production plan for CORALAMA made by the author, statistics collected during exploratory visits by SAMO staff to a plant in Honduras, statistics and experimental results from a CRECER-AID project, analysis of the results of the mechanization of the shelling process in similar plants made by the author, as well as interviews by the author with cashew processing plant experts and manufacturers of mechanical processing machines (Miranda 2002: 30).

[127] For 2004 the projections are more positive but no concrete numbers were available as the operations were not closed as of February 2005.

Table 3

Employment at the SAMO

Year	Number of workers	Months of employment
2002-3	60	6
2003-4	**ND**	7
2004-5	98	12

Source: Interview with Carranza, February 2005

Extending production during the whole year is an important step in terms of providing labor stability for workers which will reduce worker turnover, reduce the recurrent costs of new workers acquiring the experience necessary to be productive, increase labor productivity through learning by doing and increasing returns to training.

The average monthly wages paid to the workers at the SAMO plant are however, generally under the minimum monthly wage established for industrial operations (USD $158) or those established for the *maquila* assembly industries (USD $151) (GOES 2003). The established minimum monthly wage for agricultural labor is USD 74 / month. In general these wages are comparable to the average daily wage paid for agricultural activities in this area ($4 to $5 a day) and to work as domestic servants in San Salvador (between $70 and $100 / month). To what extent the SAMO is indeed providing dignified rural employment is therefore questionable, but it must be said that the year round local employment at the SAMO represents a significantly better option than the other more sporadic local agricultural employment or travel to find work in urban areas. The SAMO manager argues that they are paying at or above wages in similar cashew processing plants in the country and the world, with whom they compete (Personal communication Carranza 28/04/2005) The average monthly wages paid at the SAMO are included in Table 4.[128]

Table 4

Employment and Average Monthly Wages at the SAMO 2004

Work area	Number of employees	Average monthly wage
Frying	2	$180
Shelling	**20**	$147
Pealing	32	$71
Classification	14	$76
Packaging (part time)	3	$29
Recollection[1] (6 months)	4	$89
Total	75	$94*

Source: SAMO, Report of financial results 2004[129]
Average does not include wages for part time packaging.

[128] Although SAMO pays its workers for their production outputs, the minimum wage decree states that the average daily earnings must not be below the established minimum daily wage (GOES 2003).

[129] The reason for the discrepancy between the two sources of employment data for 2004 from Table 4 to Table 5 could not be immediately clarified, but may be related to an increase in the first months of 2005 reported as part of the season 2004-5 in the latter.

The location of the plant in close proximity to the communities has opened the possibility for many of the women workers to enter into the paid labor market for the first time. In 2004, 66% of the workers at the processing plant were women, including the plant's operational supervisor. This increases personal income which women tend to prioritized for things such as family nutrition, health and education. The plant location also allows women to maintain regular contact with their families as compared to other options that require at least two hours of daily travel to the nearest *maquila*, for example, and significant travel expenditure. There are also a significant number of young men and women (15 in 2004) that work half day and study the other in local community middle and high schools. Their work enables their families to cover their study costs and/or allow younger siblings to stay in school. Work in the shelling operations, which are the hardest and dirtiest but best paid jobs, complements other seasonal agricultural work for men and their own small scale agricultural or cattle raising activities (Interviews with plant workers in 2000; data from Funde 2004, Flores 2004).

The currently low levels of profitability do not allow the SAMO to further increase wages or provide additional benefits for all workers. However it has been necessary to include the permanent administrative staff under the public Social Security regime, which gives them access to subsidized health care among other things. Both the employer and employees are also required to contribute to the privatized pension fund system. This change was necessary in order to meet the USAID EXPRO program's requirements for financing. The SAMO's required contribution to these programs has placed additional pressure on their initial profit margins, adding to their already high operating expenses. However, the importance to the employees is exemplified by the female plant supervisor recently being able to access better quality public health services when having her baby and to receive (limited) maternity leave payments.

The FLO certifiers also insisted that SAMO explicitly recognize the right of the plant workers to form a trade union, if they so desired. This perspective created certain apprehension in the Directive Council, due to their perception that the organization of a labor union would lead to labor/management conflicts. However, this has stimulated the process of incorporating workers that meet certain established criteria, as cooperative owners of the processing plant.

Proposed technological innovation

Miranda (2002) suggested that the key to increasing the SAMO's profitability was increasing their production volumes, which was achieved as proposed. A second step involving some substantial investments and changes in their current production technology was mentioned in this earlier report. This alternative was further developed by Miranda (2004a) as a feasible alternative, following the analysis and recommendations of Brazilian cashew processing experts visiting the plant in 2004. Their analysis suggests that the two major challenges facing the SAMO were to improve its overall production efficiency and further increase its production capacity.

The current overall efficiency of the plant (2004) is measured in the production of 36% whole nuts, 12% halves and 48% smaller pieces. The proposed new technology is said to be capable of raising this efficiency rating to 60% wholes, 28% halves and the rest pieces. This new technological system would also facilitate a significant increase in the plant's production capability, from approximately 227MT (5,000 qq) under the current conditions to approximately 523MT (11,500 qq.). Put another way, the SAMO would have to more than double the quantity of cashew nuts that it is currently capable of purchasing in order to maximize the productivity of the new technological alternative and make this a viable investment.

The central change in the current technological system would be the introduction of foot pedal operated mechanical knives for cashew shelling, to replace the use of worker selected rocks. In order to be efficiently used, these shelling machines require the pre-classification of the cashew nuts into small, medium and large, to be able to adjust the knives accordingly. The proposal recommends purchasing a machine designed for this purpose.

Additional technological changes include: the introduction of a high pressure vapor cooker to replace the frying machines that currently use vegetable oil, a machine capable of removing 60% of the skin in order to facilitate the manual removal process, and an additional machine to re-humidify the final nut in order to improve its appearance, removing wrinkles, before packaging.

The package investment proposed by the Brazilian company totals $96,000, with $70,000 going for the imported equipment and the remaining $26,000 going towards installation and 30 days of on site training by a Brazilian technician.

Based on the Brazilian proposal and this feasibility study (Miranda 2004a), SAMO is in the process of soliciting long-term financing from a German bank, under the auspices of the USAID EXPRO program. The formulation of this investment proposal has been supported by a team of consultants from El Salvador, Costa Rica and the United States. The SAMO is also involved in negotiations with OXFAM America to obtain a complementary loan of unspecified value, for the purpose of making this investment.

The main argument for this proposal is that the current technological system has reached an approximate maximum to its overall efficiency which, when combined with the current cost structure does not allow for the necessary increases in profitability. This problem is to be solved through the proposed alternative focused on increasing the overall efficiency of the process, through investment in more capital intensive mechanical techniques. Also, assuming the increased production volumes that would be required for the viable implementation of this technological alternative, the increased mechanization of the process would be accompanied by a relative increase in the total employment in the plant, as compared to the current volumes.[130]

The SAMO management is also searching for alternatives to diversify their production operations. The primary alternative under investigation is the production of cashew false-fruit juice concentrate and experimenting with cooking and drying them to be presented as a snack food product. In both cases, they are in the pre-marketing phase of solving problems with the product characteristics, presentation and commercialization strategy.

In addition, the SAMO has an additional small plant that was used earlier to process cashews and has more recently been used to process (dry, shell, season and package) peanuts. It has the capability to process up to 23MT (500 qq.) / month of peanuts. The SAMO's current frying machines could also be used to fry yucca, plantains or potatoes, as well as peanuts. Processing these other products would, however, require further investments and an ok from the organic and HACCP quality and sanitary control certifiers. The SAMO could also put greater emphasis on adding salt and flavoring to the cashew nuts for the national and possibly international markets, evaluating the technology to use and the packing depending on the market (Miranda 2002).[131]

The cashew tree offers a diversity of possible sub-products of significant economic value. Two areas of significant economic interest are bio-medical products and polymers derived through relatively technologically complex processes from the cashew nut fruit and from the Cashew Nut Shell Liquid (CNSL) (Blazdell 2000: 225; Smith et. al. 2002: 1). Examples of products and processes related to CNSL processing are discussed briefly in Annex 2. Interestingly, several of the principal products and processes mentioned could represent a continuation along the green technological trajectory that the SAMO is currently on. There are thus significant options for technological innovation and business development in relation to cashew processing.

[130] What is not immediately clear in the analysis of the proposal is if there are other alternatives that would also produce the desired increase in profitability, while further increasing the total employment, for example.

[131] This consultancy report analyzed the costs involved and break even levels for six investment alternatives for the SAMO to further develop its final cashew product, and diversify into other product presentations.

5.4 Functional Innovative Capabilities of the Task-network Actors

This section, builds off of the previous one, providing a synthetic characterization and comparative analysis of the innovative capabilities demonstrated by the task-networks involved in the SAMO and other of the GBL's economic initiatives. The innovative capabilities are presented in relation to the functional categories identified in Chapter 3 (used as sub-sections here). In characterizing these functional innovation capabilities, it is evident that the first two are intimately related in practice and they are thus discussed together. This characterization is used as the basis for the more in-depth analysis of the task-network's innovative capabilities in Chapter 6, applying the conceptual framework from Chapter 3.

Here, I argue that the task-network actors involved must be motivated and capable of coordinating their activities to meet challenges in each of these areas in order to achieve innovative performance contributing to substantial improvements in the livelihoods of the rural families involved.

Reflect systematically on their business practice to identify challenges in terms of problems to be overcome, opportunities to be taken advantage of, or exogenous threats that demand action.

Conceive and progressively refine design specifications for innovative technological alternatives to address the problems and opportunities analyzed, articulating needs for mobilizing internal and exogenous resources.

The design process for the layout of the physical infrastructure and the configuration of the technological production system for SAMO's new processing plant demonstrates the capability of the task-network to integrate knowledge inputs from a variety of exogenous and endogenous sources to refine design specifications (see Box 11). The elaboration of detailed technical proposals for making significant changes, including comparative analysis of options offered by different machinery providers and the economic feasibility of their implementation taking into account the SAMO's current situation, demonstrate the progressive importance given to planning future investments.

The SAMO task-network's developing capabilities in this area are further demonstrated through the continuous enrollment of external experts to carry out a succession of diagnostic and market studies to identify problems and opportunities for the economic consolidation of the initiative's processing operations. An initial participatory diagnostic study and proposal served to motivate the construction of the current processing plant (Chacón and Lanao 1997). A subsequent diagnostic study of the processing operations detailed the causes of the economic problems SAMO was facing and analyzed the economic viability of future operations under diverse scenarios (Miranda 2002). This analysis has informed business strategy, especially the negotiation of increased quantities of both certified organic and non-organic cashew nuts.

Two additional alternatives, initially proposed in this study were developed in later works by the same consultant (Miranda 2004a, 2004b). These are the basis for current investment planning to make significant changes in the technological system. These are designed to increase the scale and efficiency of the cashew nut processing and diversify these operations to include the production of cashew juice (from the false fruit) and other tropical juices.[132] In addition, a recent cashew nut market study was carried out by the *San Vicent Productivo* program to further clarify market opportunities for cashew nuts and included a specific analysis of the SAMO's market positioning and proposal for improving its marketing practice (Technoserve 2003).

[132] This proposal builds off of several national and international market studies and proposals for the development of agro-industrial juice production in El Salvador.

These examples reflect a systematic strategy, coordinated between SAMO management and CORDES Bajo Lempa over time, to use professional consultants as a complementary source of knowledge to inform strategic decision-making within the initiative. The reports produced have also been used as tools to support proposals for the mobilization of resources to invest in the technological alternatives selected through this search process.

On another level, CORDES Bajo Lempa has demonstrated a significant capability to design innovative and potentially complementary project initiatives to support the emergence and consolidation of the GBL's economic initiatives. There is also a demonstrated weakness in project planning with respect to the real conditions under which these innovative ideas will be implemented. The current economic crisis of several of the other GBL initiatives reflects a recurring weakness in the initial project planning combined with weaknesses in project implementation and a lack of sufficiently strong corrective steps along the way. The limitations of project financing of innovative ventures are revealed when the assumptions built into the initial project design prove to be inadequate, as in the initial cessation of the SAAO's production operations and the current crisis in BIOLACT's diary processing business demonstrate.

The AGOLEMPA initiative, during its project phase, was the subject of several in-depth project evaluations that clearly identified the emerging problems that the initiative would face transforming itself into a business initiative. Subsequent analysis (SVP 2004) has also revealed deficiencies in its more recent business performance at all levels. While some of the recommendations that resulted from these analyses have been implemented others have not. The persistence of these problems suggests a relative weakness in management's capability to incorporate these knowledge inputs into the design and implementation of the internal transformations necessary for improving business performance, within the very limited room for maneuver for this commercialization initiative.[133] Incorrect assumptions concerning the productive and managerial capabilities in the project planning phase, and deficient project management through the implementation phase, resulted in conditions that have severely limited the consolidation of these initiatives.[134]

However, there has been a significant area of learning within CORDES. Over time there has been an increasing professionalization of the NGDO's endogenous project planning capabilities, complemented by the enrollment of expert support to cover areas of recognized deficiency. In this sense, the enrollment of expert support for the reformulation of the project for strengthening the BIOLACT initiative to more closely address the priority requirements for achieving the economic sustainability of the processing operations reflects CORDES' current strengths and weaknesses in this area. Of especial relevance is the depth of their current problem analysis, concerning primary cattle production activities and BIOLACT's processing and commercial operations. This suggests an increased recognition of the importance of critical reflection to clearly specify alternative solutions to be implemented.[135] How this knowledge will be applied and the impact on BIOLACT's business performance is still an open question.

The systematic attempt to build up the necessary knowledge base concerning sugar cane varieties and production techniques necessary to produce granulated *panela*, before investing new project money in the reactivation of the SAAO, is another telling example of learning through reflection on initial failures by CORDES'.

Motivate task-network members to take risk-able innovative steps, applying their individual abilities in complementary ways.

[133] Analysis of the exogenous limitations on AGROLEMPA's development is presented in Chapter 7.

[134] These in-congruencies between planning and reality were also due in part to the significant lag time between project implementation, during which time the tropical storm MITCH eliminated already weak productive capabilities.

[135] These analysis are reflected in Gaete and Montero (2004), FORGAES / SVP (2003) and the project proposal from CORDES/Biolact for Mugan Gainetik (2004).

As would be expected, the principal motivation for the integration of producer families into these initiatives is to diversify their existing economic activities and generate complementary income for their families.

With respect to the SAMO initiative, the initial decision to take advantage of the condition of the Montecristo Island plantation to produce certified organic cashews was made by CORDES. However, the decision to maintain this trajectory has been made by the producers. The producers' decisions to integrate and maintain their participation have been based on the material results they perceived; especially compared to the economic experiences of other communities, which in many cases were not favorable. Other producers from the area were motivated to solicit project financing for cashews as they observed the economic benefits perceived by the Montecristo producers. This is, positive tangible examples have been important motivating factors for the local families to become involved and maintain their active membership in the cashew initiative.

As suggested, the producers interviewed demonstrated a special interest in cashews for the longer term income security that this type of "permanent" crop represents, especially given the existence of the processing plant. Producers were also motivated by the fact that cashew production provided the possibility to associate other crops and later cattle within the same area in order to maximize land use.

CORDES has played an important role motivating these families to organize themselves and implement the systematic innovations required in their production systems. The organization of the producers, however, has been a complicated endeavor, indicating the existence of factors that create doubts and a lack of confidence in achieving the expected results from the process. Several of the producers interviewed were interested in the consolidation of what came to be APRAINORES as a necessary step towards their control of the SAMO processing operations, although they also remained rather skeptical at the time. Not all of the producers initially integrated have maintained their participation reflecting the fragility of the appropriation by the *campesino* producers of project financed ventures like this one.[136] Increasing producer motivation is especially important in order to significantly increase the local production of organic cashews and thus make the processing and international marketing operations an economically sustainable alternative.

The motivation for constructing the plant and maintaining the SAMO processing operations, even when not initially profitable, was based on the recognition that the sale of raw cashews, especially on the national market, offered little potential for profitability. This is especially true as compared to the significantly higher prices offered by the international niche markets that SAMO has been able to access over time. CORDES had also committed its reputation and thus future fundraising capabilities to making SAMO a "success." This future is now in the hands of its management and the APRAINORES directive council.

A further consideration was the socially felt need to create more employment opportunities for local people, especially the women and youth that combine to make up the majority of plant employees. The CORDES regional manager contrasts this aspect of the social profitability of their efforts with the situation at the other cashew growing cooperative where the processing plant is now dormant. Although, selling their raw cashews for *maquila* style processing in India is a relatively more simple option to deal with their debt problem, it does not provide local employment in El Salvador. The question of the SAMO's capability to continue to improve the quality of these employment opportunities is another, still open question, but they have demonstrated the motivation to do so.

In relation to the GBL's other initiatives, the importance of motivating the families involved to take the necessary risks to contribute to the development of these initiatives is underscored by the problems faced by the AGROLEMPA initiative to motivate producers to integrate themselves as reliable input

[136] An extreme case was a group of producers from one community that decided to uproot the young cashew trees financed by one project to introduce cattle into the area instead.

providers. It is clear that economic considerations are of primary importance beyond any form of loyalty of producers for being members and owners of the initiatives. This can be seen both in AGROLEMPA's inability to capture the production of the leading vegetable producers in this area due to price competition from commercial intermediaries. It is also reflected in SAMO's similar problems before obtaining the financial solvency to make prompt payments, partially finance production and maintain higher prices for organic cashews.

The motivation of the families that now form part of the BIOLACT cooperative was consolidated through their own collective efforts to increase the economic viability of their milk and cattle operations, without depending on the plant's capacity to buy their milk. Their relative success in cattle production has motivated other producers and there has also been a notable yearly increase in the proposals made to El Roble in order to obtain financing for this technological production alternative from the first year of the project to the present. There are more proposals to implement this type of cattle production system, taking the risk of their properties, than El Roble has capital to finance until further resources become available.

Networking with relevant exogenous actors to enroll their cooperation in acquiring necessary knowledge, financial, human and technical resources.

CORDES Bajo Lempa's capability to mobilize interest and convince a diversity of international and now increasingly national agencies to fund its project proposals has been a key factor enabling the initial emergence and consolidation of the GBL's economic initiatives. The mobilization of the diverse resources, especially knowledge and financing, necessary for innovation has required the production of novel, substantiated project proposals, the ability to produce the proposed results and present them in such as way as to motivate continued cooperation. Through this process several of the cooperating agencies have been more fully enrolled into making long term commitments to development of these initiatives and the GBL in general, contributing more than just capital resources. Clear examples are Mugan Gainetik's contributions to the BIOLACT and SAAO initiatives, Oxfam UK's involvement in the emergence of SAMO and AGROLEMPA and Horizontes 3000's organizational and economic support for cattle production by families related to BIOLACT.

These networking capabilities are embodied in CORDES' regional manager who has developed specialized skills that make him particularly effective in this role, especially for the presentation of the GBL's advances towards building an alternative model of sustainable rural development and the specific economic initiatives in this context. He has developed extensive network ties with international funding agencies, especially in Europe, but increasingly with the international agencies behind several territorial development programs operating in the Bajo Lempa region and national line ministries that manage relevant programs. He is especially adept at identifying, creating and cultivating reciprocal network relationships with key people within these agencies.

In the SAMO initiative, the development of external networking capabilities has been a key causal mechanism accounting for innovative practice. CORDES and SAMO management have demonstrated increasingly important networking capabilities in their search for and acquisition of a diversity of knowledge and financial resources from national and international sources. These have been applied to the implementation of innovations in the different components of the technological systems for growing, processing and marketing organic cashews. The best example of this is CORDES and its networking partners' mobilization of the resources necessary for the construction and equipping of the new processing plant, as well as the external knowledge resources mobilized to adjust the design and then make key incremental innovations to improve the performance of the technological system.

In terms of the financial resources necessary to consolidate the process of technological transformation under way in this initiative, CORDES and the SAMO management have been working to leverage funds from state agencies and locally installed internationally financed development programs for

complementary infrastructure, technical assistance and market studies. Increasingly however, CORDES has prioritized other more emergent initiatives within the GBL and the SAMO management has had to assume the responsibility for securing the resources necessary for continued innovative performance.

The transfer of the property rights to the SAMO processing plant (land, building, machines, etc.) from CORDES to the legalized APRAINORES association marked a fundamental turning point in the evolution of this initiative's financial status. The transfer enabled the SAMO to access the resources that it needed to guarantee swift payment to the associated producers, thus avoiding their selling elsewhere to obtain quick cash for their immediate needs. It also enabled the administration to negotiate the purchase of additional nuts from other producers to complement those available locally. The improved access to financing, suggests that the SAMO is progressively increasing its capability to mobilize the resources it needs to expand its operations.

The capabilities associated with resource mobilization are insufficient, as compared to the needs to continue expanding their operations. For example, SAMO has not yet acquired the resources needed to stimulate the local production of sufficient organic cashews to maximize the installed production capacity of the SAMO plant or meet future demand increases as production capacity rises. It has not been possible to recuperate local production capabilities after significant investments in areas of young cashew trees and accompanying crops were wiped out by the flood during the tropical storm "Mitch." SAMO and APRAINORES, do not have the capability to finance their own technical assistance needs as CORDES' ability to mobilize enough external financing to maintain the quality of their technical assistance to the producers is diminishing. The SAMO's current levels of marginal profitability are not sufficient to allow self-financing of these operations and thus reduce their dependence on external financing, even under the favorable conditions provided by their current financial partners.

In terms of marketing relations, the SAMO's experience with their international buyers has been generally positive as they have all been responsible with the scheduling of payments for purchases made. GEPA pre-pays up to 40% of the scheduled shipment upon signing the contract for the sale. SAMO has had to learn to respect delivery dates, as these clients demand a similar level of responsibility as they deliver. SAMO management stressed the importance of the development of the relationship with GEPA as loyal as well as demanding buyers that provide an important level of stability for the enterprise. All of their most important buyers have visited the plant in El Salvador indicating their interest in getting to know local production conditions and build stronger relations with the people involved.

Several of the GBL's other initiatives have also demonstrated significant networking capabilities in relation to their innovative practice. BIOTEC for example has from its inception developed important relations with scientists in Cuba and El Salvador as a complement to their professional knowledge base, for the development of their products. They are also developing increased networking capabilities in relation to the marketing of their products creating relationships with potential consumers such as producer associations and the business service providers supporting them, as well as potential distributors on a national and regional basis. In the case of the SAAO, CORDES has demonstrated significant capabilities to search for and acquire relevant knowledge inputs for beginning and now consolidating the process of technological transformation implied in making the production of granulated panela a viable business venture.

In conclusion, it can be said that the development of the GBL's economic initiatives and especially its entrance into exclusive national and export markets has and will continue to require flexible management of dynamic networking connections. External networking capabilities are central to the contribution of CORDES Bajo Lempa to the emergence and initial consolidation of the GBL's economic initiatives.

Develop innovative technological alternatives through dynamic assimilation of exogenous elements and/or endogenous efforts and implement them in transforming the initiative's technological systems.

The analysis of the GBL economic initiatives reveals that the combined process of dynamic assimilation of exogenous elements and endogenous development of innovative technological alternatives requires complementary task-network capabilities related to interactive learning and coordinating activities within and across organizational boundaries.

Innovative knowledge management

An initial knowledge base for cashew production in the SAMO initiative was provided by many of the Montecristo Island cashew producers who had accumulated relevant knowledge living near and working on the privately owned cashew plantation located there before the war. This knowledge acquired as plantation workers was not; however, the same as required for their management of this same plantation as owners and cashew production was a novel activity for most of the producers involved in this initiative.

Over time, the technological knowledge necessary for improving cashew plantation management, including the introduction of organic agro-forestry systems, has been built up incrementally through the application of knowledge derived from reflection on the practice of trial and error and external searches for market and other information. Producer training has been an important service provided by CORDES directly or indirectly through negotiations with other specialized service providers. There have also been knowledge exchanges with producers from other CORDES' regions, where the local producers have learned about the design and management of more developed agro-forestry systems.

Until recently there were no systematic interactive learning dynamics among the producers integrated in APRAINORES. In this sense, the task network was not taking advantage of the diversity of accumulated knowledge posessed, built up through the varied experiences of the different producers. This has changed recently with CORDES' technicians promoting interactive learning through on farm experimentation to select the genetic material to be used in replanting the cashew plantations and the methods to be used (Inverview with Tasso Hettershmidt 2004). This process is being promoted by an agricultural technician from a Dutch NGDO which has a long term commitment to provide technical support to CORDES' agricultural program. Her predecessor was instrumental in establishing, among other things, the technological proposal for organic cattle production.

SAMO's manager said that she has presented a "beautiful integral proposal" for improving cashew cultivation, which was elaborated based in part on this process of experimentation. This proposal focuses on improving the cultivation of the cashew trees themselves, but also identifies further ways in which other types of crops and animal production systems can be combined with the growing of the cashew trees to form integrated production systems.

Carranza emphasized that the implementation of this proposal will require a systematic training or interactive learning process which is an area where, he argues, the methods employed by technicians from CORDES' agricultural program have not obtained the expected results. He fully recognizes, however, that the capability of this program to support the cashew producers, without any direct project funding is limited. These deficiencies in CORDES' program are now highlighted as the IICA-MAG Program FRUTALES no longer provides technical services to the cashew growers.

As a part of their more general strategy for technology transfer, CORDES has provided opportunities for a reduced group of producers to be trained and serve as "popular technicians," linked to the different production "lines" being promoted. In the case of organic agriculture, a young local man has received specialized training and now carries a significant part of the work load for technical assistance. He has learned about organic production, visiting experiences in Central America and Cuba and also through trainings in El Salvador by experts that have put special emphasis on practical application. However, the evaluation of the cattle production project supporting families related to the BIOLACT cooperative identified problematic weakness in the mechanisms for direct knowledge exchange between producers in this area and corresponding dependency on the limited technical staff from CORDES.

On an organizational level, the Agricultural Program of CORDES Bajo Lempa has benefited from the experience that the agronomist in charge accumulated working with agro-forestry systems in another of CORDES' regional offices. He has brought a distinct focus to the promotion of agricultural production, implementing smaller parcels on a family level and not larger extensions that the producers had trouble managing as a family unit or in associative groups.

In relation to the SAMO's processing operations, interaction with exogenous knowledge sources has been especially important for innovative practice. The designing of SAMO's processing plant is a good example of the task-network's knowledge search and interactive learning capabilities. The different innovations implemented in the processing system (see Box 10) also demonstrate the capability of the task-network to acquire knowledge from external sources in areas that have been identified as critical. For example, when the SAMO bought the frying machines and the ovens (originally designed for bakeries) for the new plant, they worked with their Salvadoran supplier to incorporate mechanisms to improve safety and enable more precise monitoring of the temperature and time. This demonstrates the SAMO's emerging endogenous capability to adapt exogenous technology.

The innovative application of the contributions of the different exogenous actors has been dependent upon the SAMO management's capability to elicit these contributions and to translate the knowledge obtained into changes in the plant's design and technological system. The innovations in the cashew processing technology have required detailed knowledge of the requirements of the international market for organic "fair trade" cashews. The implementation of these innovations also demonstrates an integral understanding of the technological system beyond that necessary to utilize the productive techniques involved. The knowledge base that has allowed the managers and the workers at the processing plant to creatively integrate the exogenous elements into their production system has been built up by learning through productive practice and reflection on the process itself.

In regard to commercialization, the task-network has used the experience of selling their nuts in the national and especially the international markets as a basis for incremental improvements in their marketing practice. An important lesson gained through interaction with their international buyers is the continual need to increase the quality of their products.[137] Their continued presence in the *Biofache* trade-fair, as well as an increasing diversity of other such fairs is also an important learning opportunity.

In contrast to SAMO, the SAAO initiative task-network was initially unable to dynamically assimilate the imported and adapted production techniques, consolidating the knowledge and organizational capabilities necessary to manage the production and commercialization of granulated *panela*. They were unable to achieve the expected results in terms of the product quality, quantity and marketing that were used as the basis for project planning and analysis of business feasibility. This initial failure reveals the significant risks involved in this type of innovative process, due to uncertain knowledge of production techniques and market acceptance, as well as uncertainties inherent in the novel organizational. The SAAO, thus, represents an extreme case within the context of the GBL demonstrating the limitations of the capabilities of CORDES and their associated task network to dynamically assimilate exogenous technological alternatives. BIOLACT is another telling case.

One strategic element that seems to have failed in the dynamic assimilation of this exogenous technology, is the methodology employed for the learning process. One problem seems to have been the insufficient attention paid to the importance of tacit knowledge accumulation for the adequate functioning of the production team. The SAAO was not able to initially overcome the lack of local workers with the necessary knowledge to undertake the production process successfully. In contrast, the traditional *panela* producers involved in the Cabañas initiative and others from San Vicente, have

[137] Their principal German buyer (GEPA), for example, specifically asked that they separate the whole nuts that have been too scratched during "skinning" from those that are more intact. These will now be sold as a price between the white halves and wholes. This suggests the need for reducing scratching during this operation, but also improving the quality of primary production to deliver nuts with fewer blemishes that must be scratched off.

been able to assimilate the changes necessary in the process to produce granulated *panela*. Their largely tacit "traditional" knowledge base, built up through productive experience was the key to making the transition to the granulated product, especially the know-how necessary to identify the *punto de panela* at which the evaporating sugar cane syrup crystallizes for granulation.

In addition, the initial exploration of exogenous experiences involved sending the plant manager to visit Costa Rica and Colombia, when she had no previous productive experience and was not directly involved in the productive practice of the SAAO. This is in contrast with the most recent visit to Colombia by the agricultural engineer and his assistant in charge of the experimentation process, only after they had conducted local production experiments under controlled conditions and in the *trapiche* in Cabañas. This systematic approach to learning through a combination of methods and from a diversity of sources reflects CORDES' Bajo Lempa's capability to reflect and learn from previous experience.

The continuation of the SAAO initiative suggests that initial failures may be considered as part of the process of eventual dynamic assimilation of exogenous technologies. The perseverance of CORDES' and their collaborators from Mugan Gainetik in mobilizing the knowledge necessary to develop a new technological proposal to solve the original production problems encountered and the resources necessary to implement this alternative, also demonstrate the depth of their innovative capabilities measured over time.

The process of developing the new technological specifications for resolving what has turned out to be a rather complex technological problem of producing organic sugar cane and granulated organic *panela* in the SAAO, is indicative of a growing capability to combine endogenous research and development with exogenously acquired knowledge. The capability of the BIOTEC initiative to elaborate product specifications for their biological pesticides, taking into account the priorities of producers as potential users, as well as their accumulated knowledge base and exogenous knowledge resources, seems to be another especially relevant indication of an increasing capability to conduct endogenous research and development.

Organizational capabilities for innovative implementation

The agents involved in the SAMO initiative have demonstrated the internal organizational capability to implement innovations related to the incorporation of organic cashews and other organic crops in agro-forestry systems as well as their cashew processing and marketing operations. Together they have overcome, at least partially, the significant limitations encountered along the way.

The economic viability of the agro-industrialization of cashew nuts and related by-products depends on the social organization and coordination of the producers' productive efforts to guarantee a sufficient and stable supply of raw nuts. The organization of APRAINORES has facilitated the associative management of their individually limited resources in terms of land, labor, knowledge, capital, production volume and marketing capability. In general, the transfer and dynamic assimilation of organic production technologies is facilitated by organized interaction between the producers and technicians. Furthermore, the associative organization of the producers is a requirement for organic certification for economic reasons and is an express condition for fair-trade certification.

The innovative capabilities of one actor within the task network are clearly linked to the complementary capabilities of the other actors. The importance of CORDES' role as a bridging and mediating agent managing the acquisition and innovative assimilation of exogenous technological components and capital resources cannot be overstated. However, the role played in the innovative processes by the producers and workers integrated into this initiative should not be underestimated either. They are, after all, the ones taking the risks implementing innovations in the production systems on which their families' livelihoods depend.

It must be recognized, however, that power, expressed in decision-making and external networking

and fundraising capabilities, control over resources, etc. has been concentrated in CORDES and now progressively with the SAMO's management and presidency. One problem, in this sense, is that CORDES and now the plant manager have been slow to involve the APRAINORES directive council in greater strategic oversight of the processing and marketing operations. However, there are real limits to the organizational and managerial capabilities of the producers elected to the APRAINORES Directive Council that must be recognized. These limitations are difficult to solve due to their structural causes, specifically the low educational level of the producers and their lack of an entrepreneurial culture of being "business owners."

Coordinated action between producers has also been important during BIOLACT's emergence, as they were forced to work together to find other local market outlets for their milk. The fact that they were able to do this on a collective basis, improved their negotiating position with commercial milk intermediaries. They were also able to negotiate in block with the cooperative El Roble to adjust the original terms of their loans to better suit their economic situation.

In relation to the producer's role in the associational governance of the BIOLACT initiative, the evaluators suggest that "the transfer of the processing plant to the producers in this moment could prove to be an important distraction from their principal challenge of consolidating their ecological cattle production" (Gaete and Montero 2004: 21). However, it may be that their early experiences with collective action, the recent work to consolidate their understanding of the production and commercial operations, and the formation of a legalized producer cooperative, will serve as a sufficient experiential base for them to begin active participation in decision-making as the plant's future owners, learning as they go.

Reflect critically on the different phases of their innovative practice in order to learn from their advances and difficulties to be able to consolidate their current innovative endeavors and continue with their innovative practice in the future.

As stated earlier, reflection on previous experiences with the implementation of innovations has led to changes in strategies implemented in subsequent efforts. For example, reflexive learning in relation to organization for primary production has led to a progressive move to promote smaller more family based production units, instead of larger associational producer organizations that proved difficult to govern and unresponsive in term of credit payment. This had fundamental implications for the development of the El Roble cooperative. Also, the production systems being promoted in relation to the SAMO, BIOLACT and AGROLEMPA initiative are more integrated and diversified and there has been a related shift from more to less capital intensive production technology, most notably in the types of irrigation technology being promoted.

In general, reflexive learning from the development of the SAMO initiative has informed key aspects of the project designs for other initiatives such as the SAAO, BIOLACT and AGROLEMPA initiatives in terms of their focus on organic or cleaner production techniques and associational governance mechanisms.

A current area of reflection where there is an identified problem but no agreement as to its resolution, is how to best manage the diverse operations related to market promotion of the GBL initiatives' products, relationships with clients and the logistics for commercialization in the national and international markets. The basic problem is how to align the different perspectives of the actors involved as to the nature of their commercialization problems and potential solutions, negotiating their particular interests. Initial attempts to discuss this problem and come up with any type of collective solution have not yielded positive results.

Another pressing area for reflection is how to best deal with the transition phase between projects managed by CORDES and the emergence of autonomous, consolidating economic initiatives, members of the GBL. In relation to this, Espin (2003) argues that innovative visions backed up by the best feasibility studies that CORDES' limited resources could pay for, have been indispensable first steps in

the process to consolidate the GBL's economic initiatives. However, he acknowledges that there are many risks inherent in the implementation of project initiatives and their transformation in to business initiatives. Frequently, the suppositions made in the feasibility studies are shown to be inadequate in practice. In a later reflection he states, "Not all of the projects reflected good business fundamentals in their formulation and thus in their implementation, which produces a crisis the day after the project ends and in their conversion into a business" (Espin 2004).

The other side of the coin however is that "Not all of the directive boards and business managers, feel ownership and manage business activities with the necessary responsibility in the project phase and in the [transition to becoming] a business" (Espin 2004). Espin places special relevance on "the capability, honesty, exclusive dedication, creativity, initiative and leadership of their management. However, it is necessary to pay for this capability and at market prices." An unresolved problem, in this respect, is that these market prices are frequently beyond project budget allocations and the limited economic resources of the business initiatives during their initial "post-project" phase, when they need these key managerial capabilities the most. The same could be said for paying for adequate project planners and staff in charge of project implementation.

5.5 Final Reflection on the Innovative Nature of the GBL's Initiatives

The GBL's economic initiatives are innovative by design. They were designed to complement existing economic activities and build off of the basic resource base of the producers to be involved, especially their land, access to water, the existing Montecristo cashew plantation, etc. The basic design features that make them innovative, differentiating them from other economic initiatives in their regional context, are based on a particular conception of economic competitiveness and social and environmental sustainability. The design focus has been on:

- adding value to local products through small to medium scale agro-industrial processing and organized commercialization and thus providing stable, better paying, markets for local producers and creating local employment opportunities;
- differentiation of products and production processes through a strategic emphasis on organic and fair trade certifiable products, as well as, production processes and associational forms of governance involving small-scale producers as owners.

The GBL economic initiatives must be differentiated from "normal" SMEs in that they have all emerged or are emerging from an initial phase of direct "development" project support, into a more autonomous business initiative phase. In this new phase the management and the established governance structures are the primary actors responsible for the initiative's development, as opposed to the project phase where the NGDO CORDES Bajo Lempa held this responsibility, accountable to the project funders. Even so, the NGDO still plays a significant role in continuing to support the strengthening of most of the initiatives.

The GBL economic initiatives can also be differentiated from the majority of SMEs involved in similar agro-industrial and/or commercialization operations, in that there is a vital linkage between the enterprise and the associated primary producers. These producers provide an important part of the raw inputs (cashews, milk, fruits and vegetables) that are processed and/or commercialized. However, they are also the (actual or future) owners and, as such, have important responsibilities for the governance of the initiative through similar associational governance mechanisms. In general, the GBL´s initiatives can be considered innovative in the national context due to the relatively novelty of their production techniques and systems being implemented, as well as their organizational structuring.

The development of the SAMO initiative has implied a process of interactive learning that has resulted in the incremental dynamic assimilation of exogenous elements and the internal generation of changes in the technological system. The SAMO task-network has progressively increased its motivation and capabilities to skillfully meet the challenges faced in consolidating the technological transformations

implied in making the growing and processing of cashew products a viable economic alternative. In doing so, they have steadily improved business performance and consolidated income generating and employment opportunities for local families.

Although this analysis suggests that there are many areas where weak capabilities have and are limiting the SAMO's innovative practice, their innovative capabilities are generally more consolidated in comparison with the GBL's other initiatives. However, many of these other initiatives are developing specific capabilities in areas where the SAMO needs strengthening. For example, the collective efforts of BIOLACT's producers to deal with common problems and their emerging protagonism in the associational governance of the initiative are suggestive in relation to the consolidation of APRAINORES. Another suggestive example would be BIOTEC's capabilities to take greater advantage of university based knowledge resources. In general, there are significant potentials for further synergistic interaction between the GBL's economic initiatives to develop their innovative capabilities, as is discussed in Chapters 6 and 7.

CHAPTER 6

Innovative Technological Capabilities in the GBL's Initiatives

This chapter analyzes how and why the diverse task-networks of actors involved in the GBL's economic initiatives, lead by CORDES Bajo Lempa, have been able to work together over more than ten years, mobilizing local and external capital and knowledge resources to invest in transforming their technological systems. The analysis presented applies the conceptual framework developed in the relevant sections of Chapters 3 and 4. Section 5.4 makes frequent reference to the SAMO initiative as a central example, complemented by others from the remaining initiatives.

Based on the characterization of the innovative nature of the most important economic initiatives integrated in the GBL in Chapter 5, it is now possible to take a step back and analyze the process of technological transformations in greater depth. Section 6.1 deals with the technological transformations in the GBL's economic initiatives. This includes analysis of the dynamics of technological transformation, the nature of the technological innovations implemented, and their importance for sustainable performance. Section 6.2 applies the conceptualizations of innovative local economic development initiatives to characterizing the GBL's economic initiatives and the internal relations within the task-networks.

The chapter then turns its focus to analyze the co-evolution of the GBL's economic initiatives, the incipient processes of interactive learning and collaboration between them and in general, the relevance of their territorial agglomeration for their innovative practice. Section 6.3 analyzes the GBL as an agglomeration of linked economic activities. Section 6.4 deepens this analysis discussing the development of the GBL's specialization pattern, vertical and horizontal linkages and potential synergies, the emergence of new business opportunities and complementary initiatives, the GBL's particular organizational and institutional set-up, as well as their efforts at technological niche development and management to support innovative practice.

Finally, at the heart of the case study analysis presented in this chapter, I build on the comparative description of the functional innovative capabilities in Section 5.4, to explore the mechanisms that explain the emergence and expression of the deeper innovative capabilities related to interactive learning and networking. Section 6.5 focuses on interactive learning within and between the GBL's economic initiatives, the human capital base for innovative practice, localized accumulation of innovative knowledge and the emergence of specific interactive learning dynamics and innovation. Section 6.6 presents the analysis of the endogenous and external networking capabilities and the coordination of innovative practice within and between initiative task-networks. Section 6.7 brings this discussion together analyzing the task-network capabilities for the dynamic technological assimilation of exogenous technological novelty. Section 6.8 concludes the chapter synthesizing arguments with respect to the emergence of innovative capabilities in the GBL's task-networks.

6.1 Technological Transformations in the GBL's Economic Initiatives

This section builds off of the discussion of the problems and innovative potentials of the technological systems being implemented in each of the GBL's economic initiatives to present a synthetic analysis of the dynamics of technological transformation and the nature of the initiatives themselves. The conceptual framework applied through the analysis in this section is developed in Chapter 3, sections 3.1 and 3.2.

The dynamics of technological transformation

The descriptions provided in Chapter 5 suggest that understanding dynamics of technological innovations being implemented in the diverse GBL economic initiatives demands a broad systemic definition of technology as Muller (2003), Bell and Albu (1999) and Hilledebrand *et al*. (1994) argue.

Applying Muller's (2003) definition, the SAMO initiative's technological system through which raw cashews are processed to obtain the final product ready to market is constituted by: (i) the knowledge that the actors apply in the production process or that is embodied in the machines, plant design, the production and managerial routines and organizational forms, etc., (ii) the techniques used and

processes employed in the productive operations, (iii) the ways in which these operations and their management are organized and (iv) the final products which embody a specific history "imprinted" upon them through their production process. This processing system is linked to the systems of primary production and commercialization which, as a whole, are operated with the purpose of consolidating the SAMO business enterprise and providing income to improve the livelihoods of the families of the producers and workers involved.

As Muller (2003) argues, analysis of the innovation dynamics in the GBL's economic initiatives reveals that changes in one system component has required complementary changes in the others, within and between the linked technological systems of growing, processing and commercialization.

In the SAMO and BIOLACT initiatives, the process of assimilating new production techniques and the certification of processing operations have created qualitatively new product characteristics that have demanded marketing innovations to take advantage of them. These are accentuated by the organic and fair trade certification of SAMO's cashews. Likewise, the innovations in the techniques used in these initiatives' processing operations have required new knowledge of the people directly involved in the production process to operate the new machines, to follow new hygienic procedures, etc. as well as for the management of new organization forms for production.

In general, the introduction of new production techniques for new crops (irrigated vegetables, organic cashews and other fruit trees) and the cleaner production of more traditional crops like sugar cane, as well as milk products, have required new forms of organizing the production activities of the families involved as well as the organizational forms of the initiatives themselves. These transformations have required endogenous learning processes through reflexive production practice to more fully adapt these techniques to the local agro-ecological conditions and the production capabilities of the families involved.

In the initiatives where exogenous and endogenous learning processes have been consolidated, the introduction of new production and processing techniques have gone more smoothly and there is greater evidence of progression from basic operative assimilation to the introduction of incremental innovations to adapt these techniques to local conditions and improve their productivity; for example in the SAMO processing plant and the cleaner cattle production system for BIOLACT´s providers. On the contrary, task-network inability to establish functional learning mechanisms have created specific problems leading to the initial abortion of the innovative process in the SAAO *panela* initiative, the disarticulation of larger scale associative irrigated vegetable production and slow growth of family based production for AGROLEMPA and the lengthy process of increasing local cashew production and diversifying cashew production systems.

The importance of the organizational component within the initiatives in order to combined exogenous and endogenous learning processes related to the introduction of new techniques is demonstrated in all cases. For example, the inability to manage the organizational aspects of associative management of larger-scale schemes for the production of irrigated vegetables, double purpose cattle, sugar-cane and cashews, led to initial production problems in the corresponding initiatives. The corresponding process of organizational innovations within the primary productive base of these initiatives was the result of an interactive learning process within and between the GBL´s economic initiatives, motivated by pragmatic necessity.

The detailed analysis of BIOLACT's problems becoming a sustainable firm, reveals the intricate ways in which the production, processing and commercialization operations are linked in what can be virtuous, or in this case, vicious cycles. For example, how the lack of adequate production planning affects commercial operations, but also how the lack of systematic information gathering and feedback concerning customer demands and preferences, denies management key inputs needed to better coordinate these two aspects of BIOLACT's operations. These combined problems limit sales growth which is the most important cause of the business's current operational deficit, along with costs disproportionate to the low production volumes.

The importance of considering the product as an integral part of the technological system is highlighted in several ways in the discussion of the GBL´s economic initiatives. This conceptualization facilitates understanding the flow of intermediate products through the linked systems of production, processing and commercialization. The management of this overall flow demands an in depth understanding of how the characteristics of the products emerging from one system affect the functioning of the production techniques in the related systems. This is especially notable within the context of institutional regimes for organic and fair trade certification in the SAMO initiative, as well the formal quality control regimes under which the SAMO and BIOLACT operate.

The in-depth understanding of the specific characteristics and history of the final products is determinant for the design and successful functioning of the commercialization operations: marketing techniques, organizational forms and routines and the value added to the material product by the service provided. This integral understanding of system functioning and requirements is a fundamental aspect of the knowledge components of these linked systems, not only embedded in the managers but diffused throughout the task-networks.

Marketable product characteristics are not only tangible biological or chemical characteristics but intangible aspects of the production process like the wages paid, the organization of initiative ownership, the history of the people involved, etc. These product characteristics are however, not initially apparent and therefore must be revealed to the customer through certification stickers and the more general establishment of product image through consumer education, etc. These intangible aspects are crucial for SAMO's product differentiation through fair trade certification, BIOTEC's certified organic products as well as the image of the, as yet uncertified, BIOLACT products.

The initiatives are characterized by their specific historical emergence and the evolution of their technological systems. These characteristics have the potential to facilitate or constrain future innovative practice and business performance through the establishment of virtuous or vicious dynamics related to learning, cooperation, democratic governance and transparency, external openness, etc. Analysis of the process of technological transformation in the GBL initiatives suggests that, especially in contexts such as those from which the GBL initiatives have emerged, the innovative process can only be understood taking a holistic perspective. A perspective is required that links the emergence of the need to innovate, the design and/or selection of alternatives, their initial implementation and then their consolidation through subsequent incremental adjustment in the linked technological systems of production and commercialization. In a similar way, the development of an innovative initiative is a continuous process requiring more or less radical and/or incremental transformation over time.

Characterizing the technological innovations

In relation to Freeman's (1982) typology of innovations (placing them on a continuum between incremental and radical depending on the level of novelty and thus risk involved), the technological innovations being implemented in the GBL's initiatives can be characterized as involving relatively high degrees of uncertainty. They imply major product innovations within the national market context, as well as relatively radical changes in production routines and the organizational structures of similar businesses in the immediate territorial and national contexts. Even in the international context, the products, production processes and organizational forms taken on by these initiatives maintain certain distinctiveness or novelty. In general, the progressive transformation of the GBL's technological systems towards the adoption of cleaner organic and fair trade certifiable production routines and products can be considered part of a relatively radical innovative trajectory in the national and Central American context.

With specific reference to the SAMO initiative, the changes in primary production can be classified as major innovations in the products and the production processes in the established cropping systems. The innovation process has involved a moderate degree of uncertainty as it has implied

new experiences for both the producers and the technical staff in charge of managing these new production systems. In some cases the risk due to factors like floods and theft of unprotected crops have caused producers to desist from cultivating some of these cropping alternatives, although almost always continuing with cashews.

Similarly, the installation of the new processing plant can be characterized as an innovation implying moderate to high uncertainty due to the major incremental modifications to the different technological components of the processing system. If the current plant system is compared with the initial operations, there are similarities, in techniques and tacit knowledge related to the shelling, pealing and classification processes. However there are also relatively radical differences in the overall plant design, its size and production capacity, the fixed and variable investments involved, management qualifications, organization for production and production techniques, especially frying and drying, as well as the marketing functions.

The degree of uncertainty involved in the processing innovation process is considerable, taking into account the resources that have been invested in the new plant, the challenges faced gaining access to financing for the processing operations after the "project" subsidies have ended and especially the progressive, but incipient, integration of the producers and plant workers as active owners and strategic decision-makers in the initiative.

Most of the products from the GBL's economic initiatives are not entirely new to the globalized market, with the apparent exception of the SAMO´s organic *and* fair trade certified cashews (according to its management the SAMO was the first cashew processing plant fair trade certified by FLO). However, most products represent novel contributions to the national market, especially when considering the more intangible aspects that characterize them. When BIOLACT´s cheeses enter into the formal market, they will be differentiated from their imported European rivals by price but fundamentally by national origin, the nature of the productive initiative and the history of its members, as well as organic certification (depending on further technical innovations). BIOTEC´s products can also be differentiated in this way from similar imports into the national market. In general, these products are being marketed in specific niches of the national and international market where only a select group of producers are competing. The service products provided by AGROLEMPA are adding value to vegetable and fresh fruit production, marketing them in the specific niche provided by public hospital bidding processes.

Using Freeman's criteria (1982, cited in Lindegaard 1997) related to radical innovations, it can be argued that progress along the technological trajectories being followed by the GBL's economic initiatives, is requiring different types of research and development. This is especially true in terms of the assimilation of general cultivation principles, like those associated with diversified agro-forestry systems, organic milk production or granulated *panela* production, and their creative application to establishing production systems viable under the localized agro-ecological conditions and the constraints of producers. In several initiatives CORDES, especially, has demonstrated an emerging but important capability to conduct in-house R&D to make possible and complement the absorption of exogenous knowledge inputs. Different types of relationships with basic science are required, as in the case of the localized BIOTEC firm and its cooperation with external scientists, but also the development of R&D priorities based on the problems of local producers.

As stated, these initiatives have required different types of marketing to gain certified entrance into specialized niche markets exporting to the North and to create viable markets in El Salvador. The emergence of the GBL's economic initiatives has required subsidized financing by external agents to cover the additional costs of the trial and error learning processes implied in developing this trajectory, especially due to the significant endogenous and exogenous constraints they face. Finally, innovations along this trajectory offer the perspective of a different pattern of productivity gain based on adding value to products through tangible improvements in product quality and presentation, but also less

tangible biological and social characteristics revealed through product presentation and organic and fair trade certification processes.

As Freeman (1992) also argues, the relatively radical innovative trajectories being followed by the GBL's initiatives, have required, and will continue to require, a constant process of incremental innovations to improve business performance. The technological systems being managed present novel combinations of exogenous and endogenously developed components, integrated through a continual process of incremental innovations. As these initiatives evolve and enter into more competitive national and international markets, it is clear that they require continued cooperation from exogenous actors; for example, to develop the market niches that recognize the distinctive quality of their products and to support their endogenous capabilities to continuously improve and diversify their products to exploit these market opportunities.

The stress on the *relatively* high degree of uncertainty and radical nature of these innovation processes suggests the importance of contextualizing the analysis of technological innovations. As Sverrison's (2002) and Parilli's (2002) discussions of technological innovation in small scale manufacturing industries in the South suggest, innovation in the context of the GBL's initiatives must be understood in relation to the specific endogenous capabilities and the exogenous constraints and opportunity conditions (room for maneuver) in which they exercise their innovative practice.

Innovation's importance for sustainable performance

Analysis of the SAMO initiative demonstrates that both the more radical innovations and the complementary incremental changes that followed in the cashew technological systems have been important for the emerging competitiveness and sustainability of productive and commercial operations and will continue to be so in the future. The change toward the organic production, the cultivation of the cashews together with other organic crops, the introduction of processing operations and innovations in processing plant technology and the entrance into premium price paying niches of the international market are clear examples of this.

In general the experiences analyzed suggest that the innovations being implemented in the GBL's economic initiatives are of *potential* importance for their competitive business performance. The realization of this potential, however, depends on the continued strengthening of their capabilities related to the dynamic assimilation of exogenous technological alternatives and their endogenous adaptation to be able to increase production volumes, improve productivity and competitively place their innovative products in select markets.

Similarly, the realization of the *potential* social and ecological importance of the technological innovations being implemented depends on the consolidation of their operations in terms of the quality and quantity of the income and employment opportunities generated. Important aspects that need continued improvement are the profitability of operations to be able to pay dividends to cooperative members, the working conditions, especially the pay in processing operations, functioning of their participatory mechanisms for associational governance, the environmental services provided by primary production processes, the environmentally responsible use of "waste" products from the processing plants, etc.

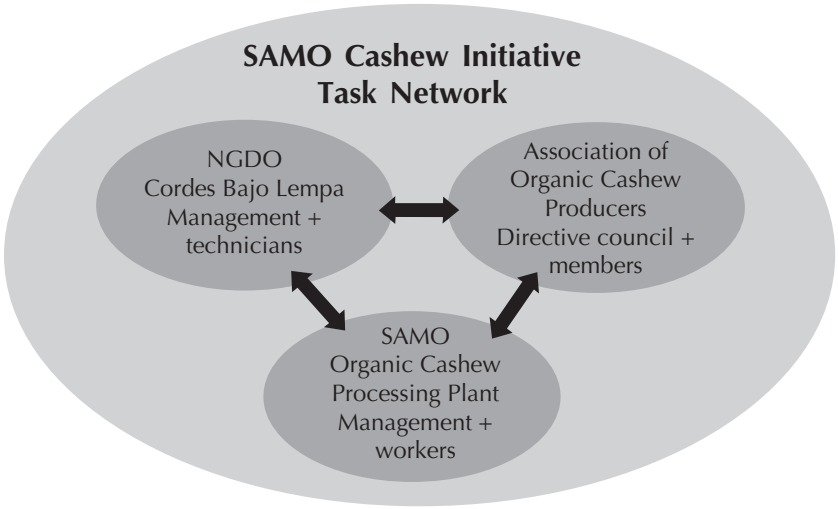
The discussion of the economic, social and ecological impact of technological innovation in these types of economic initiatives, must take a medium to long term view of technological innovation as a complex, progressive, dynamic process. It is clear that there is a fundamental inter-dependence and synergy between the economic, social and ecological sustainability of the initiatives. For example, the specific social and ecological history of the SAMO's cashews, make them marketable in Northern markets and thus an economically viable production alternative. Likewise the current and projected expansion of organic cashew production in this region and others, driven by increasing demands

on production volume at the SAMO plant has important ecological implications as discussed in Chapter 5. Also, the increasing emphasis on fair trade certification will continue to put pressure on improving the social working conditions at the plant and the functioning of the SAMOS' associational governance mechanisms.

6.2 Innovative Economic Initiatives

The GBL's economic initiatives involve specific configurations of local actors engaged in coordinated efforts to create and strengthen sets of interrelated economic activities, involving the introduction of innovations in their productive and marketing practices. Figure 1 illustrates the SAMO initiative's task-network which is similar to that of BIOLACT, AGROLEMPA and the future configuration of the SAAO.

Figure 1
SAMO Initiative Task-Network



Although many of these initiatives are not yet viable self-sustaining businesses, emphasis is placed on the intentionality and directionality of their interactive practice towards achieving sustainable business performance (Orozco 2004) and thus improving the livelihoods of those families involved. This section further characterizes these initiatives with reference to the complementary conceptualizations discussed in Section 3.3.

Task-networks of combined social technology carriers

The use of the task-network concept of the GBL initiatives as combined social technology carriers highlights the key fact that their innovative practice is best understood through an integrated analysis of the coordinated actions of the multiple actors involved. For example, it is insufficient to analyze the BIOLACT initiative from the exclusive perspective of the incipient processing and commercialization operations, given the importance of the organizational and agro-ecologically sound productive capabilities of the cooperative's producer base for consolidating the initiative's future. The emergence of BIOLACT's processing plant is part of a continuing process of trial and error to develop cattle production as an environmentally sound economic alternative in the region; an effort which is already producing positive results for the producer's involved.

Furthermore, it is clear that the analysis of the innovative practice of the GBL's emerging business enterprises cannot be understood in isolation from an analysis of the evolution of CORDES Bajo Lempa's

capabilities as an innovative NGDO business service provider. In fact, CORDES' role is more like that of a centralized business management organization that is responsible for: the initial conceptualization and design of the initiatives, the mobilization of the resources necessary for the initial phase of their development, control of business management during this initial project supported phase and then as a potential strategic partner as each one struggles to become economically self-sustaining.

Techno-economic network

The complementary conception of the GBL's economic initiatives as specifically delimited types of techno-economic networks (as proposed by Callon 1991, 1992) emphasizes how each initiative is forming a particular identity characterized by the actors involved and the dynamic relationships between them, *as well as* their interaction with the non-human elements of the technological systems they are managing. This conceptualization provides a framework for understanding, for example, how the intangible social and ecological characteristics of the SAMO's products, key for organic and fair trade certified marketing, emerge from the particular structural arrangement of actors and techniques and the dynamics of their interaction in these networks. This integral focus also reveals important aspects of how BIOLACT's identity or social meaning is evolving as a collective entity with the consolidation of the cattle producer's cooperative, their dynamic assimilation of the proposed agro-ecological production system and the assimilation of exogenous technology for dairy processing for the production of differentiated gourmet products for the formal market in El Salvador.

In this sense, it is possible to synthesize the conceptualization of these initiatives as formed by task-networks of combined social carriers of technological transformation, with specific capabilities embedded in their particular tecno-economic network configurations. These constructs are characterized by the internal relationships and dynamics between the human and non-human elements of the GBL's initiatives, but also their exogenous linkages and the dynamics of their relationships with elements from outside the initiatives' boundaries.

Social interface situations

This understanding of the GBL's economic initiatives is complemented by their conceptualization as structured social interfaces (as proposed by Long 2001) which explicitly focuses our attention on the inherent contradictions in the relationships between actors from divergent "life worlds" and unequal relative power positions, as well as the motivations and linkages that bind them in their collective effort.

Among the people involved in the GBL's economic initiatives, a major source of social discontinuity are the divergent knowledge bases and perspectives acquired over time by the *campesino* producers and owners of many of these initiatives, the workers in the different plants, the professional plant managers and administrative staff, CORDES' professional staff (agricultural engineers, business managers, etc.), CORDES' management and representatives of external supporting organizations.

As Long (2001) suggests, continued interaction between the task-network members in these initiatives has established organizational boundaries, institutionalized roles and relationships and created certain shared expectations concerning the outcomes of their collective actions. The process by which these configurations have become institutionalized and acquired organic form begins with the financing and implementation of the initial projects out of which these initiatives have emerged. The projects establish the roles to be played and the rules of the game for CORDES in relation to their financers. It is also within this context that CORDES enrolls other actors, fundamentally the primary producers and staff to be employed by the project. The families of producers must make important decisions in terms of the dedication of their time and resources to the project activities and the relationship the new activities will have to their existing economic livelihood strategies.[138]

[138] Although, producer's motivations and the relationship between the activities implied by integration into these initiatives and other aspects of their economic livelihood strategies were touched upon in Section 5.4 and are discussed further in this chapter, especially in relation to the SAMO initiative, further exploration of these issues is identified as a key area for further research in Chapter 9.

Along these lines, analysis of the GBL's economic initiatives suggests that development projects are inherently unstable interface configurations. This is demonstrated by the failed attempts to consolidate the associative producer groups (UdPs) for management of larger-scale irrigation systems for vegetable production, double purpose cattle production, cashew production, etc. through project implementation. This is also suggested by the temporary disintegration of the SAAO *panela* initiative after the project ended and the processing operations failed to consolidate.

One way in which these initiative task-network configurations are acquiring further organic form and being institutionalized is through the formation and legalization of cooperative organizations integrated by the producers and (some times) the workers employed in business operations. A fundamental additional step towards the consolidation of these organizational entities is the transfer of the property rights to the main productive assets from CORDES to these legalized cooperative associations (with the exception of BIOTEC which is owned by CORDES).[139]

Within the context of the GBL's economic initiatives and within the GBL itself, there is a continual process of negotiation and mediation of interests, problem definitions and heuristics related to selecting between alternative solutions. There is also an ongoing negotiation of the institutionalized roles to be played and the relationships between the different members.

This includes discussions over the appropriate relationship between CORDES and the management of several initiatives, especially SAMO and AGROLEMPA, in terms of the supporting role of CORDES and the relative independence of the management from CORDES. The transfer of decision-making power and ownership from CORDES to the business initiatives in the hands of legalized cooperative associations and their hired management implies a significant transformation of the relative power relations between these members of the initiative task-networks. In the case of SAMO and AGROLEMPA, the autonomy of the business initiatives has implied an intentional distancing of relations with CORDES, making synergy more difficult. This contrasts directly with the strategic relationship being progressively consolidated between El Roble and CORDES Bajo Lempa in the context of their relative decision-making autonomy. How these situations are dealt with or mediated are related to the perceptions of key people in each of these organizations concerning the benefits of interacting with the other actors. This is in turn heavily influenced by the quality of the personal relationships between them.

Within the initiatives, another crucial, arena for negotiation is the conditions under which the producer members of the SAMO, BIOLACT and AGROLEMPA are to sell their products to these initiatives as providers, especially given that they also are or will be the owners. In the SAMO initiative, there was a problem with producers selling to commercial intermediaries in order to get immediate payment which the SAMO was not offering. This problematic situation has now been resolved as SAMO has the working capital necessary to pay small advances and make prompt payments, thus avoiding a crippling loss of raw cashews being sold to local intermediaries paying lower prices but immediately.

Another similar situation was caused by CORDES' inability to follow through on its promise to buy 100% of the milk offered by the producers that were adopting their proposed technological alternative for agro-ecological cattle production. This situation forced the producers to develop alternative market outlets, including artisanal production of cheese, cream and other traditional dairy products for local sale. It also increased their focus on raising cattle for sale in order to pay their credits. Their independent marketing capabilities have increased their negotiating power with the processing plant, as the plant is more dependent on them than they are on the plant. This situation was also used in their re-negotiations with El Roble to obtain more favorable financing conditions. Now that the BIOLACT cooperative is being legalized, the producers will have still greater powers for collective negotiation with the plant administration.

[139] This transfer complements the earlier transfer of the individual property rights to housing plots and productive land to members of the families linked to these initiatives under the Land Transfer Program established by the Peace Accords in 1992.

A potentially more problematic ongoing negotiation is between the vegetable producers linked to AGROLEMPA and its administration over the conditions for provision (the prices paid, quality requirements, production planning, etc.), the provision of technical services by the business to its members/providers and the payment of outstanding debts of producers to the business. The combined dynamics of the commercial operations depending less and less on local production, many successful local producers deciding to commercialize their products directly to alternative buyers at higher prices, other producer members ceasing to produce vegetables and the generalized non-payment of loans to the Association, suggest that this "negotiation" could result in the disintegration of the producer base of this initiative.

In synthesis, the interface situations created through the implementation of technological transformations in the GBL's economic initiatives, are arenas in which actors from diverse life-worlds deploy and construct their knowledge bases. In some cases, there is a complementary co-evolution of knowledge bases and their related perspectives on the task at hand. In contrast, contested "knowledge frames and evaluative modes" as to the current situation, problems and future trajectories of these initiatives are tending towards the disintegration of other relationships and independent action trajectories (Long 2001: 71).

The relationship between knowledge discrepancies and power discrepancies is further exemplified through the interaction of a Salvadoran professional business manager who was in charge of CORDES Bajo Lempa's business support program and an external marketing "expert" from the Basque region of France brought in by Mugan Gainetik and the CORDES' regional manager to support BIOLAC and its producers. My perception of how these discrepancies played out in the evolution of this initiative are presented in Box 12.

Box 12
Knowledge and Power at Play in the BIOLACT Initiative

On the one hand, there was a clear divergence between the strategies of the two professionals claiming marketing expertise. A conversation with the Basque expert revealed a clear disagreement with the business planning methodology applied by the Salvadoran expert to determine the economic equilibrium point for productive and commercial operations in BIOLAC, as not very useful in practice. He instead proposed a pragmatic focus on how to take advantage of BIOLAC's limited working capital to turn a profit.

The initial relations between the foreign expert, the producers and BIOLACT's manager were tense, due to what the latter perceived as culturally inappropriate forms of verbal expression in interactive situations on behalf of the Bask expert, as well as a disagreement with the way he was becoming involved in setting budget priorities for a future project. However, through continued interaction it seems that these cultural obstacles were overcome in a participatory process increase their understanding of the marketing problems facing BIOLAC and potential solutions.

The Salvadoran expert had on several occasions made power point presentations of his diagnosis of BIOLACT's economic problems, explaining that to obtain the business equilibrium point was it was necessary to produce certain amounts of cheese and showing them differing business projections based on varying suppositions. However, it seems that the producers understood little of what he was talking about and thus were not able to make any meaningful contributions to business decision-making. In fact, it seems that his presentations were more meant to be informative rather than input for deliberation. At least, this is the Basque expert's interpretation of the situation.

At the end of the day, the contract for the professional services of the Salvadoran business advisor was not renewed in 2005 and the Basque's work is reflected in BIOLACT's current business plan.

Source: Personal perceptions based on participant observation and conversations with the BIOLACT manager and the international and national marketing "experts" (2004).

The point to be made here is that the analysis of interaction within the task-network context must be framed in terms of the actors' relative power positions, knowledge bases, cultural perspectives, etc., if the specific outcomes are to be understood. For example, it is important to understand how the specific characteristics of the diverse knowledge bases that actors bring to a situation frame their understanding of problems and alternative options for solving them as in the case cited (Loasby 2001, 2002).

Long's (2001) observation concerning the importance of individuals who become skilled at representing their organizations in inter-organizational is relevant for clarifying the position and importance of individuals playing such boundary spanning roles: CORDES' regional manager, the processing plant manager and the president of the producer organization involved in the SAMO initiative. Especially interesting here is the role of the elected directive council presidents from several initiatives (especially SAMO, AGROLEMPA and El Roble) who are playing key roles in strategic relationship with the business managers. The question is to what extent are they able to manage these ambivalent positions between social domains and hierarchical levels; facilitating the adequate functioning of the directive councils and building a transparent, communicative relationship with the producer membership base as well as working directly with the business managers. Available information suggests that improving their dual functions remains to be a significant challenge.

Fundamentally, what must be understood is how the interplay of these different aspects influences how actors can or cannot bridge their differences, creating ways to collaborate in innovative practice. A

more detailed analysis of "… how discrepancies of social interest, cultural interpretation, knowledge and power are mediated and perpetuated or transformed" (Loasby 2001: 50) in the context of the GBL's economic initiatives is a challenge for future research discussed in Chapter 9. Here, it is sufficient to state that the nature or such discrepancies, how they are expressed and dealt with, are defining characteristics of the initiatives, directly related to innovative performance. Although the specific outcomes of these negotiations are contingent on the dynamics of each initiative, the conciliation of their divergent interests depends on the existence of an underlying mutual economic and organizational inter-dependency, present to a greater degree in some of the GBL's initiatives than others.

Interactive learning spaces

The technological innovation processes being implemented in the GBL's economic initiatives have required exogenous knowledge inputs, implying the creation of *interactive learning spaces* between the task-networks and different types of knowledgeable actors. This concept, developed by Arocena and Sutz (2000, 2004b) focuses our attention specifically on the creation of spaces that facilitate problem solving through interactive learning.

For example, the representatives of international certification agencies and other informed exogenous actors have proven to be an important source of knowledge and motivation for the implementation of crucial incremental innovations in SAMO's production system, necessary in order to obtain certification, improve working conditions and consolidate initial business performance. The SAMO's continued search to improve the sustainability of its performance outcomes has led them to establish systematic interaction with a Salvadoran expert on cashew processing over several years, complemented by other external knowledge inputs, in the development of proposals for investments to take additional steps to increase production volume and efficiency as well as diversify production activities. In this sense, the SAMO initiative provides a context that facilitates continued interaction between these external actors and the SAMO's management and people in charge of key production activities, specifically oriented towards developing innovative solutions to problems.

However, within the scope of the GBL initiatives, the BIOTEC initiative most closely resembles the conceptualization and concerns of Arocena and Sutz (2000, 2002) when they discuss interaction between "knowledge" actors and those directly involved in production activities. The BIOTEC initiative is specifically designed to generate and use science based knowledge to produce biological inputs to vitalize the emergence of organic agricultural production technology. The use of these types of inputs is increasingly seen as a way to improve the sustainability of production operations and develop differentiated products with a competitive advantage in the national and international market.[140]

6.3 The GBL as an Agglomeration of Linked Economic Activities

The discussion in the previous sections concerning the nature of the GBL's innovative initiatives and the technological transformations they are implementing, is complemented here by a more precise conceptualization of the territorial agglomeration of these initiatives and supporting NGDO service providers within the consortium as a whole.

One initial question that must be asked in relation to the application of the conceptual framework from Section 4.4 is: does the conglomeration of the GBL's economic initiatives exhibit characteristics of

[140] This echoes Sutz's argument that the cultivation of biotechnology capabilities in the developing South could be a means of vitalizing "traditional" industries such as cattle ranching in her native Uruguay. This industry has significant competitive potential due to the naturally low cholesterol levels in its free range produced beef, but is severely threatened by the Laftosa cattle disease. She argues that this situation demands an integrated solution, combining the significant wealth of cattle production and commercialization knowledge with science based inputs, in the production of appropriate vaccines that can work on the localized strains of the disease. (Personal communication with Judith Sutz at SUDESCA project internal workshop, Granada Nicaragua 2002).

an industrial "cluster"? A related question is how and why the geographical agglomeration of primary production, processing and commercialization among the diversity of GBL initiatives has facilitated their innovative practice and thus business performance?

Initially it must be said that there are several important differences between the conglomeration of GBL initiatives and what would typically be considered as an emerging or consolidated cluster of (agro) industrial firms either in the North or the South. One key difference is that the economic processes through which industrial clusters tend to emerge and develop are dissimilar to those through which the GBL's initiatives have emerged. Associated knowledge bases and interactive learning as factors explaining the emergence, growth and boundaries of a cluster of geographically proximate firms, are in the GBL case of secondary importance as compared to the initiative of a local NGDO. CORDES Bajo Lempa has enabled the development of these economic initiatives through the successive implementation of development projects and facilitated the process of their integration in the GBL Consortium for local development reasons.

Although efforts have certainly been made to induce industrial clustering in determined regions and especially to politically induce the consolidation of what might be considered initial cluster formations, most of the clusters analyzed by the author's cited in Chapter 4, both in the North and the South, are not the product of such intervention. In fact, several of these authors express skepticism as to the possibilities for politically inducing clustering in any determined region (see Schmitz 1999; Meyer Stamer 2003).

It can, however, be argued that the territorial agglomeration of the GBL's economic initiatives has facilitated the strategic role played by CORDES Bajo Lempa in managing their emergence and accompanying their initial steps towards business consolidation. Their physical proximity has enabled CORDES' management and technical teams to accumulate a detailed knowledge base, learning from the experiences of each initiative through regular contact with their management and directive council members, as well as interaction with the workers and producers involved. This knowledge base has then informed subsequent work to support the consolidation of each of these initiatives and the lessons learned from the experiences of certain initiatives have been incorporated into the design of subsequent ones.

The process of developing the GBL's economic initiatives has involved the mobilization of under utilized local resources, transforming primary production systems and adding value to their products through integrated processing and commercial operations. One of the fundamental lessons being learned is to break the investments down into more risk-able steps, especially in the case of the progressive reduction in the size of primary production units promoted and the investments of the technologies being implemented. This change in development strategy is the result of (a largely inferred) interactive learning processes between the key actors involved over more than a decade of work together. The territorial agglomeration of activities has facilitated this learning process, capitalizing on good ideas and avoiding the same types of costly mistakes committed by other co-localized initiatives. This learning process has increased the effectiveness of resource use; directly reflected in the repayment of loans and progressive capitalization of El Roble as compared to the constant de-capitalization of CORDES' initial financial system, for example.

Thus, following the arguments of Schmitz and Nadvi (1999), it can be said that territorial agglomeration has facilitated the mobilization and effective use of local resources, breaking down investments into risk-able and manageable steps and constructing ladders that facilitate the development of subsequent initiatives, although the specific mechanisms at work are not exactly the same as those functioning in the small-scale industrial clusters they analyzed.

Also, in relation to the general conception of clusters, the Bajo Lempa Consortium does represent a territorial agglomeration of a limited number of business initiatives involved in similar and (at least potentially) related economic activities. These initiatives add value to primary agricultural production

through processing and commercialization or through the provision of complementary support services, like financing, production and/or sale of agricultural inputs and transport and agricultural machinery rental. Several of these business initiatives are also developing organically certifiable production systems and one produces bio-pesticides that can be used by several of the producer groups supplying the agro-industrial initiatives. The majority of these initiatives are also similar in their organizational structure, integrating horizontally associated producers as the owners (or potential owners), as well as suppliers of the agro-industrial or commercial operations. In general, the conceptualization of learning mechanisms between firms co-localized within clusters can also be used to explain the similar mechanisms at work between producers integrated into the GBL business initiatives.[141]

One of the explicit aims of the GBL's formation was to promote greater cooperation between the different business initiatives to take advantage of knowledge sharing, complementarity in commercialization strategies, sharing costs for business services like accounting, etc. Towards this end, the *Directorio* of the Group has formed the Economic Initiative Working Group with the participation of the managers and the presidents of each business initiative and also representatives from CORDES and FUNDE. As its first task, this group has elaborated a strategy for the collective strengthening of the diverse economic initiatives and the productive activities of the families integrated into the GBL. However, the process to arrive at concrete cooperation agreements and begin implementation of this strategy has been rather difficult. Within the different initiatives, and especially with the managers, there exists a perception that these meetings will end up without concrete results like earlier efforts with similar aims.

Thus, one key area of negotiation at the level of the GBL, reflecting Long's (2001) conceptualization of social interface interaction between CORDES's regional management, the leadership of the GBL and the business managers, is the degree to which actors from these initiatives participate in the GBL's dynamics and specifically its multidisciplinary business working group. CORDES's management and the GBL's directive council see this working group as a necessary space to foment greater cooperation between the diverse business initiatives and facilitate the elaboration of joint proposals to solve the priority problems. Their position is that all future efforts by the GBL directive council, CORDES and El Roble to strengthen the businesses initiatives (expert technical assistance or training, financing through grants or loans, etc.) will be based on proposals made through this working group.

On the other hand, some of the business managers invited to participate in this group frequently do not participate in meetings, ostensibly due to conflicting activities, and have expressed skepticism about the possibilities of achieving concrete results. In the past, similar efforts to promote greater cooperation between business initiatives in solving their problems have indeed achieved only limited results and have been abandoned. How this current "negotiation" will play out is yet to be seen, however, it will clearly have important implications for the GBL if the business initiatives choose not to participate and increasingly seek individual solutions to their problems outside the consortium.[142]

There are also some recent experiences of failed attempts at collaboration between business initiatives that have not helped this climate. For example, there was an agreement between SAMO and the commercialization initiative AGROLEMPA to export cashews under the latter's legal name and share the 6% export incentive that did not work out for unclear reasons, resulting in a joint loss of this potential income. Sharing distribution facilities for commercialization in the national market is also a potential area of collaboration that is recognized but that has not been implemented as SAMO and AGROLEMPA have separate facilities in the capital city.

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[141] This same logic would apply to learning mechanisms at work in the diffusion of knowledge from these integrated producers, to other geographically proximate producers that could potentially adopt elements of their technological production systems. This was however, not within the scope of the research conducted so far.

[142] Further discussion of the dynamics of the GBL's economic working group is provided in Section 6.3.

6.4 Development of the GBL's Technological Specialization Pattern

The conglomeration of the GBL's economic initiatives represents the emergence of a regionalized pattern of technological specialization, characterized by the unique integration of dynamics occurring within and between these initiatives. As Best (1999) suggests, this is related to the synergy developing between the consolidation of innovative technological capabilities within the initiatives, the opportunities for further developing their specialization patterns and those for starting complementary specialized business, provided by relations within the GBL and the emerging regional innovation system.[143]

Loasby's (2002) arguments concerning the progressive development of options in adjacent fields are applicable to explaining the dynamics within the SAMO initiative related to their progression from organic to fair trade certified product marketing. They also explain the emergence of opportunities to exploit cashew false fruit and eventually cashew nut liquid and the decisions regarding the exploitation of these opportunities, both within and without the initiative itself. Knowledge generated in one field of action motivates and supports innovative action in adjacent fields. This conceptualization also explains the progressive focus on organic production techniques within a growing diversity of the GBL's economic initiatives. Emulation effects, learning from observing the successful practice of others, help explain the subsequent integration of organic production technologies, vertically linking primary production and processing operations, focusing commercialization of innovative products in higher value, national or international, niche markets.

Following the arguments made by Dosi (1988) and Schot (1992), CORDES Bajo Lempa's management and other key actors have applied heuristics built up over time through participation in the emerging cleaner / organic / fair trade technological regimes and the specific trajectories followed by each initiative, to the development of new projects. This is one of the mechanisms that explain the directions technological developments have taken within the GBL's economic initiatives, i.e. the development of variation based on an understanding of the viability of the perceived alternatives within the selection environment that characterize these trajectories and regimes.

The decisions made by the regional manager of CORDES Bajo Lempa related to the conception and design of the projects to finance the emergence and subsequent strengthening of these complementary innovative initiatives, may be similar to those taken by managers at clustered firms in relation to their complementary specialization in relation to other firms or entrepreneurs involved in the emergence of spin-off firms within this same context (Maskell 2001; Best 1999). In both cases, the decisions reflect path-dependent learning processes in terms of their relation to previous decisions and the general development of the agglomerated firms along specific technological trajectories.

Making decisions regarding and establishing new connections is thus a key innovative capability that is the basis for differentiation and competitive advantages between the GBL's economic initiatives and other regional or national ones. Loasby's (2001) description of this process and the associated idea of "the imagined deemed possible" (Shackle 1979) is directly relevant for the analysis of CORDES and specifically the regional manager's contribution to their emergence and consolidation. Paraphrasing Espin's arguments, it is possible to say that the key is the creative combination of the aspirations of the population, with innovative yet technically and economically viable options that can be transformed into business initiatives (Interview with Espin 2004).[144]

This decision-making process is thus path dependent although not path determined, as there is significant potential room for maneuver making connections within the context of the technological

[143] See further discussion of the importance of the regional innovation system in Chapter 7.

[144] Along these lines, I distinctly remember a conversation with Espin (ca. 1996) when he expressed significant skepticism about the results of initial experimentation with organic agriculture (supported by the SHARE Foundation in the mid-1990s) in the face of the problems many producers faced with chemical resistant pests, for example, but he progressively changed his mind, making new connections to the possibilities of exporting organic cashews and then to the expansion of this focus in other initiatives, until this has become a central part of their collective image.

trajectories and more general regimes in which these initiatives are embedded. Examples that have been identified are agro-ecological production techniques, including bio-pesticides that BIOTEC could produce, the further diversification of cashew production systems introducing bee-keeping and thus the option for new processing initiatives, new product options for the SAMO processing plant, as well as eventual "higher tech" progressions possible in relation to the use of the cashew nut liquid (see Annex 2).

Within the GBL as a whole, there is also definite path dependence to the progression of organizational designs of how the business initiatives have proposed to incorporate local producers both as qualified suppliers and as "owners" through specific governance structures (Loasby 2002; Best 1999).

Vertical and horizontal linkages and potential synergies

One important element that characterizes the GBL's economic initiatives as a whole is the potential for the horizontal and vertical integration of their economic activities. Escobar argues that this is a basic characteristic that serves the purpose of "increasing the growth and development potential of each individual initiative as well as the development of the initiative [the GBL] as a whole." These synergies can be visualized, imagining a small scale producer from one of the communities interested in beginning or diversifying organic cashew cultivation, obtaining technical support for his idea, financing for the investment, agricultural inputs and complementary transport and mechanization services, selling his cashews for processing and other fruits for direct commercialization, all within the context of the GBL's initiatives (2005: 1204-5). In addition, for local families, linkages with these initiatives also serve other purposes such as identifying opportunities for their adolescent sons or daughters, possibly with higher educational levels, to obtain non-agricultural employment.

Those initiatives that integrate primary production, processing and commercialization are able to add value to primary inputs and thus increase the prices obtained for their products in the market. The process of vertical differentiation within the territorial context has stimulated a progressively more intense learning process to enable improved coordination of primary production, processing and commercialization operations (Maskell 2001). This learning process has been especially important in relation to the business strategy of presenting novel products in the national and international market as thus has required progressive technological transformations at all levels and a more detailed accounting of the product's particular conditions of production and processing.

The GBL's economic initiatives are potentially complementary by design. Each initiative can thus be seen as potentially complementing and feeding off of the others; specializing its services to meet the demands of the others. They do not compete directly with each other as their products are differentiated and are intended for sale in similar types of niche markets. This could facilitate co-operation in their marketing efforts and give rise to further specialization of the commercialization function within the GBL.

At this point in the investigation, it is clear that some of these potential synergistic relationships do exist in practice and also that others are not being fully taken advantage of. The initial dynamics of horizontal and vertical linkages that have been identified, and those obviously missing, are discussed in the context of the GBL's initiatives, especially the SAMO initiative in Chapter 5. Those present resemble those suggested by Best (1999) and Maskell (2001) in relation to the emergence and development of clusters.

The organized groups of agricultural producers (rural micro-enterprises) linked to these different business initiatives are also geographically agglomerated. In this case, the concepts developed for the emergence and development of industrial clusters help explain the dynamics of horizontal linkages between these producers, respecting as well the significant differences in the types of actors involved. Especially relevant, is the relationship to be explored between Maskell's (2001) arguments concerning

the firm strategies for entering the cluster and specializing their economic activities and network ties within the cluster, and the economic livelihood strategies employed by families in relation to the diversification and/or specialization of their economic activities through integration into the GBL's economic initiatives.

Evidence from the interviews with several "inland" cashew producers suggest that they were motivated to dedicate productive effort to this initiative after observing the relative economic "success" of the earliest cashew producing families from Montecristo. It can be inferred from practice, that as this group of physically proximate producers has been consolidated, the producers have been able to benefit from intelligently observing the diversity of productive systems created through experimentation with cashew production techniques and the integration of complementary productive activities into cashew agro-forestry systems.

In addition to organic cashew growing, other examples include the introduction of small-scale irrigation systems for vegetable production, the extension of the use of agro-ecological production techniques in cattle production and the slow but increasing diffusion of the use of Bio-Tric among local irrigated vegetable producers. It could be argued that within the population of producers in the area of the GBL's influence, diversity challenges and motivates others to creatively replicate what they see as successful strategies for diversification into new economic activities. As Maskell (2001) suggests, the creative combination of the complementary knowledge bases between producers linked to the different initiatives should be facilitated by their territorial proximity.[145]

The agglomeration of primary producers involved in similar activities has also, in part by design, created the conditions for the emergence of processing and commercialization operations, to which these producers are vertically linked as providers and owners.

The co-development of the GBL's economic initiatives creates opportunities for new specialized initiatives to emerge: for the commercialization of final products, the generation and/or sale of diverse production inputs, provision of diverse business services (financing, elaboration of feasibility/ market studies, accounting, computer maintenance) and other related services like food provision for agglomerations of workers at the SAMO and the *Poligono de Solidaridad*. This dynamic can be explained in terms of Best's (1999) arguments concerning specialization and the creation of new opportunities for linked firms with complementary capabilities.

For example, although BIOTEC has a national and projected regional marketing strategy, the initiative was designed to complement and strengthen the GBL's collective ecological focus on a trajectory towards certifiable organic production. More generally, the El Roble cooperative provides a specialized service to many of the producers related to the GBL's initiatives, as well as other local producers that are specializing in market oriented production or non-agricultural manufacturing or commercial activities. The continued capitalization of the cooperative is also intricately linked to new capital infusions (donations, managed funds or loans under favorable conditions) facilitated by CORDES. The continued development of the GBL's economic initiatives is necessary to expand El Roble's potential membership base, improve the profitability of current productive activities to guarantee loan repayments and motivate continued investments. A further example of these synergistic internal dynamics is the development of a business initiative specialized in providing a diversity of irrigation technological alternatives designed to meet the differentiated needs of local producers.

Maskell's (2001) arguments concerning the importance of cluster specific institutional endowments are reflected in this co-evolutionary development and increasing synergy between the configuration of the GBL's economic initiatives and their pattern of productive specialization, on the one hand, and

[145] Further exploration of these issues, to be able to substantiate the conjectures made here on a more anecdotal basis, is a key area for further research as proposed in Chapter 9.

the specialized capabilities of the NGDOs and small firms providing business support services. This dynamic is especially important for the ongoing consolidation of existing initiatives and facilitating the emergence of new initiatives that fit well within system's configuration.

In addition, membership status in the GBL provides an institutionalized identity for the diverse economic initiatives integrated within the GBL that differentiates them from other geographically proximate economic initiatives. This framework also provides a positive image that each can potentially be used to their competitive advantage, especially in international niche markets of socially conscious buyers and with development support organizations.

However, the institutional framework on which the GBL is based also imposes a series of restraints on the actions of each initiative. For example, there are institutionalized expectations of democratic governance and co-responsibility within the initiatives as well as just economic relations between the processing operations and the primary producers. This institutional set-up provides the framework for negotiations between actors contesting issues such as prices and conditions for purchasing primary goods from producers integrated in these initiatives, loyalty of primary producers when selling their produce, and the transparency of business management.

The GBL as a niche enabling the emergence of technological variation

The GBL's economic initiatives are embedded within certain technological regimes, for example that related to cheese, *panela* or cashew production, processing and commercialization on the national and world market. Within these regimes, they are progressing along specific technological trajectories towards organic and fair trade certifiable production systems. Their evolution along these trajectories enables their efforts to position their products in specific market niches that recognize their specialized qualities. The importance of technological regimes, trajectories and specialized market niches as exogenous factors enabling and constraining innovative practice is discussed in Section 7.1.

It is within this context, that the formation of the Grupo Bajo Lempa, embedded as it is in the territorial context of Tecoluca, represents a technological niche as conceptualized by Schot (2001, 2002). Understood in this way, the GBL represents a relatively safe space for technological novelty to be developed within its emerging economic initiatives, with special conditions for financing and support service provision that allow them to develop economic viability sheltered initially from the harshest conditions of the selection environment.

These initial conditions have proven crucial for the SAMO, for example, to enter and consolidate a relatively competitive position within the international organic and fair trade markets for certified cashews. This is in turn is a basic condition for the sustainability of this business initiative as it could not compete on the international market for non-organic cashews and would have problems competing in the national market against the two established agro-industrial snack-food firms. This synergistic connection to the international organic and fair trade intermediaries can be seen as an extension of the relatively protected niche being created for this innovative economic initiative.

The GBL can also be seen as an enabling environment for the attempts of the other initiatives to develop and commercialize relatively novel products (goods and services), in niches that recognize their specialized qualities. In some cases, the GBL's economic initiatives themselves provide an important initial market for services, as is the case of El Roble and BIOTEC (as well as others not discussed selling logistical and agricultural inputs), although most must quickly branch out into other markets to survive economically.

The development and management of this niche environment has involved a complex process of articulating expectations and enrolling diverse local and external actors for different purposes, at different moments in the process (Schot 2001, 2002). The key actors integrated into the dynamics of niche development in this case are the economic initiative task-networks (basically producers, workers,

business management and CORDES), the external supporting actors that have been enrolled to support the development of technological variation and the commercial intermediaries and consumers of the products that provide a receptive selection environment.

In some ways the external financial partners are also part of the selection environment as they must be enrolled to "buy" the project initiatives they are being "sold" by CORDES Bajo Lempa. As with organic fair trade certified cashews, this marketing effort is focused both on giving these external actors a sense of being enrolled in the historic development process of the GBL and the resettlement of this particular set of communities (the product's more intangible qualities), as well as demonstrating the potential contribution to this process of the concrete project being proposed.

As Schot (2001, 2001) argues, the development of niches as enabling environments for the emergence of technological innovation requires key actors playing technological nexus roles. In this sense the GBL's initiatives and the GBL itself are organizational spaces in which key people within CORDES Bajo Lempa and now increasingly business managers are attempting to bring together the opportunities for the generation of technological variety along certain trajectories with the requirements of the specific niches within the selection environment.

For example, taking advantage of the market opportunities represented for the SAMO by organic and now fair trade certification required developing capabilities to implement multiple incremental innovations in their technological system for cashew cultivation and processing. The FLO requirements for free trade unionization were met through opening the opportunity for membership of certain plant workers in the SAMO cooperative under formation. The expectations of certifiers for continued improvement in the agro-ecological aspects of organic cashew cultivation are part of the motivation for increased effort in this sense. However, the SAMO task-network is also proactively building relations with actors within this selection environment and negotiating the application of the certification regimes; indeed contributing to the articulation of FLO's expectations concerning what is indeed a fair trade certifiable cashew processing plant.

As will be stressed in Section 6.7, the practice of specific groups of people playing the technological nexus role implies both specific capabilities exercised in spanning the boundary of the organization in which they are embedded and relating to external agents, but also working internally to promote the changes implied in implementing the innovative options created through this process.

6.5 Interactive Learning Within and Between the GBL's Initiatives

This section analyzes the individual and collective capabilities of the task networks involved in the GBL's economic initiatives to learn from reflective internal processes and interactive situations with exogenous knowledge sources. This analysis applies elements from the conceptual framework developed in sections 3.4 on innovative knowledge and interactive learning dynamics, as well as section 4.4 concerning the mechanisms that facilitate inter-firm learning in clusters. It builds off of the characterization of functional innvative capabilities presented in section 5.4.

Human capital base for innovative practice

The importance of adequate formal and informal mechanisms for human capital formation for innovative performance, as stressed by Dalum *et al*. (1995), Edquist (2004) and Bell and Albu (1999), is revealed in several ways in the experience of the SAMO and other of the GBL's economic initiatives. For example, the historical exclusion of a large number of the adult men and women producers and workers related to these initiatives from the formal educational system is a limiting factor in relation to their capability to absorb new innovation relevant knowledge, depending in part on how it is presented. Low educational levels were also cited as a crucial factor weakening the administration of the associative *UdP* producer

groups, including the initial Montecristo producer cooperative which was eventually disbanded, as well as the general continued weakness of the business management and oversight skills of the producers involved as the new owners of several of the GBL's business initiatives.

There are also few professionally trained local people capable of taking on the overall management responsibilities for these rather complex business initiatives or occupying key professional positions within CORDES Bajo Lempa. The resulting dependence on external professionals has proven to be an endemic weakness for business management and support services. On the one hand, the process of their enrollment takes time and as Espin puts it, not all "vibrate" in the same way (i.e. share the same perspectives and development goals) with respect to the GBL's local development process or demonstrate the same amount of dedication to their tasks (Espin 2003, 2004). The travel time, irregular working hours and conditions, as well as the economic limitations of projects and the emerging businesses, have limited the quality of external professionals willing to work for CORDES and the GBL's economic initiatives. An interesting phenomenon has, however, been the enrollment of some of these professionals over time in such a way as to move from San Salvador to nearby intermediate cities or even into the communities as in the case of the CORDES regional manager and several key employees, including the SAMO's manager. However, it could be expected that professionals of local origin would be more willing and able to enroll themselves in these processes.

With time this situation may change as young people from this region do make it through university or post-secondary technical training programs, and then make the decision to return to this area to work. However, as will be discussed further in Chapter 7, the regional university center is weak, one of the technical training centers is now a storage facility for the Ministry of Education and the other is a private academy focused almost exclusively on computer training.

In this sense, one of the weakest overall components of the CORDES Bajo Lempa's agricultural and business support service provision is the establishment of practical training programs that provide systematic opportunities for producers and workers to strengthen capabilities to contribute to innovative practice in the GBL's economic initiatives and improve the income they receive for their efforts. Although, over time, CORDES has dedicated significant resources to training efforts, project resources have not been a sufficient base for the articulation of an integral training program. One telling example is the purchase of land and the building of basic infrastructure for an agricultural practice based training center in Tecoluca, available to students at agricultural program at the local high-school and local producers in general. This center is currently inactive.[146] The development of an integral training program, currently under design, is one of CORDES main priorities, as are advocacy efforts to strengthen the quality of local public educational facilities at all levels.[147]

Localized accumulation of innovative knowledge

Analysis of the GBL's economic initiatives reflects the importance of the social and spatial dimensions of tacit knowledge accumulation and application for innovative practice, as argued by Morgan (2004) and Spender (1996). Tacit knowledge accumulation through practice in the SAMO's processing operations has been the principal mechanism behind the consolidation of team skills and organizational routines related to the innovation process which, along with more conscious trial and error experimentation, has been key to increasing operational efficiency.

The analysis of the SAMO initiative also reveals the contextual contingency of interactive learning related to innovative practice, as argued by Fleck (1997). This is reflected in the particular way in which diverse types of specialized knowledge (from local producers, plant workers and management,

[146] A more systematic analysis of the effectiveness of CORDES' diverse project based training efforts remains as another challenge for future research.

[147] See Section 7.5 for further discussion of these types of efforts to create structural room for maneuver on a regional level.

consultants from organic and fair trade certification agencies, diverse national and international cashew growing and marketing experts, etc.) have been creatively combined and applied to innovative practice in the evolving *milieux* of this initiative. For example, the eventual outcome of organic and fair trade certification depends on how these regimes are translated locally in negotiations between the agency representatives and the task network. Over time, this dynamic negotiation process involves claims and counterclaims as to the "correct" characterization of the local cashew cultivation and processing techniques, the working conditions for plant employees, the extent to which producers organized in APRINORES participate in the associational governance of the SAMO, etc. The realized importance of the knowledge embedded in these regimes and their representatives was also contingent on the SAMO task-networks' ability to elicit and apply this knowledge to implementing the changes needed for compliance.

In this case, SAMO's experience can be contrasted with that of the SAAO, where a lack of people with sufficient accumulated tacit knowledge, was one of the main reasons for the task-networks initial inability to apply the imported technological design to produce granulated *panela* under the local conditions in Tecoluca. As Fleck (1997) suggests, the implementation of this technological alternative was constrained by a host of locationally specific knowledge contingencies. These were related to finding sugar cane varieties adapted to the coastal conditions also adequate for *panela* production, managing the specificities of the newly constructed *trapiche*, the historical lack of *panela* production knowledge among the local people involved, the difficulties involving other national expert producers in their productive effort, the way in which exogenous knowledge acquisition was managed, etc. This localized technological system demanded certain types of contingent knowledge that the task network involved was not able to adequately mobilize and apply, at least initially (Spender 1996; Fleck 1997).

The importance of locationally "sticky" tacit knowledge for innovative performance is demonstrated through its embodiment in certain people that have assumed key roles in the development of the GBL's economic initiative, as well as the contextually dependent application of their knowledge in established relationships (Asheim and Isaksen 2002, Asheim and Coenen 2004). The clearest example of this is CORDES's regional manager, Emilio Espin, who although of Spanish origin, now lives in Tecoluca and has established a definite localized identity. His style of management, with its positive, but also negative, implications for innovative practice in the GBL's initiatives, is an expression of his largely tacit knowledge accumulation through experience as a central actor in their emergence and initial consolidation over more than a decade.

The presence of individuals like Espin in key leadership positions within the GBL confers particular characteristics on this consortium that differentiate it and its economic initiatives from other existing local economic development processes. Espin's accumulated, largely tacit, knowledge base is expressed in CORDES Bajo Lempa's particular ability to enroll the financial backing of exogenous agents in order to implement the initiatives and the personally embodied networking and negotiation capabilities implied in this. However, dependence on his capabilities also confers a marked fragility on this process, as the innovative drive behind the process would be significantly diminished in his absence.

The fragility of the GBL's initiatives, in this sense, has been accentuated by internal problems that have led two key members of Espin's strategic management team to leave. It is my perception that these people provided an important complement to him in managing CORDES' relationship to the other task-network members in the GBL's economic initiatives. Their presence enabled him to dedicate more time to his areas of specialization: the strategic projection of the GBL, the generation of innovative ideas and the cultivation of external networking relations to mobilize resources for consolidating existing initiatives and launching new ones. Their complementary areas of specialization were meeting the increasing requirements for project formulation and the complexities of managing project implementation. In other words, their presence was crucial for transforming Emilio's relatively radical innovative ideas into viable economic initiatives.

This organizationally specific configuration of the peoples' complementary knowledge bases, working styles, networking relationships, etc., constituted a key collective capability that enabled CORDES to mobilize and add value to exogenous resource inputs in a relatively unique manner, as Spender suggests (1996). There is currently a process underway to re-configure this strategic management team around the remaining core, which will certainly offer variants to the current configuration of capabilities.

There is also, a similar synergistic relationship developing within the SAMO initiative between a key group of people, including the plant manager, the young local woman in charge of production supervision at the plant and the president of APRINORES. A key member of this team was also the international marketing expert that recently finished his two year contract, supporting CORDES' business development program.

Thus, a key challenge facing the GBL is how to make the tacit knowledge accumulation in key people like Emilio and the remaining members of his strategic management team within CORDES, more accessible and transferable, to the members of the GBL's directive council and emerging configurations of people related to the management and governance of the consortium's diverse economic initiatives. This will depend on the regional manager's capability to progressively engage the business managers, key members of their directive councils and the directive council of the GBL itself in interactive learning to develop their specific knowledge bases and inter-personal networking skills that define this capability. As Nonaka and Takaeuchi (1995, cited in Morgan 2004) argue, this process of interactive capability transfer will require building trust through continued socialization and the building of a mutually understandable explicit language to facilitate communication. As suggested earlier, these are qualities currently lacking in some of these relationships.

Interactive learning dynamics and innovation

Dynamic assimilation of exogenous technological elements and the generation of performance improvements in the production, processing and marketing systems of different GBL initiatives have required synergy between the knowledge using, acquiring and creating capabilities, as defined by Bell and Albu (1999). They have required synergy between the dynamics of learning by producing, searching and exploring (Johnson 1992), as well as learning from various kinds of internal technological activities and exogenous sources (Bell and Albu 1999).

The strengths and weakness of the SAMO's capabilities can be seen in relation to their efforts to improve the productivity of cashew growing, as well as the diversification of cashew cropping systems in order to improve profitability for the producer families. Exogenous knowledge inputs have been acquired from sources such as the Brazilian cashew growing expert that recently visited them as well as several international experts that have stayed to work with CORDES' agricultural program for more extended periods. Input from these sources has been complemented by that generated through an active endogenous process of trial and error concerning the combination of cashews with other crops, beekeeping, small animal and cattle production, etc. Recently, one of the international *cooperantes* has also promoted participatory experimentation with producers concerning diverse techniques for vegetative grafting to renew unproductive trees, biological pest control and the production of organic fertilizer. In addition, CORDES' agricultural program has also been experimenting with artisanal irrigation technologies, some of which are now in use in the cashew agro-forestry production systems as seen below.

Member of APRAINORES' directive council, Manuel Enriquez, on his bicycle water pump to water cattle and irrigate new citrus trees in his cashew plantation.

The search for alternatives to the problems caused by limited initial income generation from land under cashew production began, as Loasby (2002) suggests, with uncertainty and proceeded through trial and error making connections between knowledge generated by producers involved in the initial experiments and the growing knowledge base of CORDES' technical staff as to possible alternatives. The evolving diversity of productive systems among producers represents the interactive process of developing configurations that make sense within the context of their economic livelihood strategies.[148]

A similar process is at work among the cattle producers linked to the BIOLACT initiative. Especially interesting is the way in which organic sugar cane production is being integrated into these systems. This reveals an emerging synergy between growing organic sugar cane as a supplemental feed for their cattle and also as an input for the re-activation of the SAAO *panela* initiative. This innovative connection between the needs of both production systems was made by the local head of CORDES' agricultural program. This reflects Loasby's (2002) description of innovations resulting from new combinations of existing productive knowledge developed initially in different businesses or in this case, within the development trajectories of the two initiatives.

These examples reflect a more general trend within CORDES's agricultural program to progressively increase their capabilities to endogenously generate innovation relevant knowledge. This trend is reflected in the interactive learning processes established with producers related to the BIOLACT initiative and the internal R&D efforts to enable the production of granulated *panela*. As Bell and Albu (1999) state, their capabilities to learn from supporting productive practice are being extended to more systematic efforts to incorporate reflexive learning mechanisms, as well as practical experimentation into their work with producers. BIOTEC's efforts to develop its novel products also reflect the increased local capabilities to conduct R&D efforts specifically relevant for solving the problems of local producers and contributing to the GBL's consolidating focus on cleaner, eventually organic production.

Loasby's (2001, 2002) emphasis on the interaction between actors with a diverse knowledge bases, reflected in divergent conceptions of problems and solutions for innovative practice, further highlights the importance of constructing synergistic learning connections between local producers and NGDO technical staff, also between industrial workers, plant management and business support personnel. The formation of *interactive learning spaces* (Sutz and Arrocena 2000, 2002) and making innovative connections between their dissimilar knowledge bases built up through experience and different types of informal and formal education, has the potential to overcome the limited frameworks of thought that each possess as to the problems and challenges faced by the initiatives and the development of

[148] In another limited number of cases the "alternative" selected has been to leave cashew production altogether, selling land or completely changing land use.

alternatives to meet these challenges. The inability to do so represents a "waste" of potential resources and is generally problematic, as reflected in several conflictive situations already discussed.

As Long (2001) argues, the creation of synergistic horizontal learning connections between the producers can be seen to be important where present (through the work of the popular technicians and within the context of participatory experimentation in the SAMO). Where these types of relationships are absent they have been identified as a source of weakness. The evaluators of the Horizontes 3000 project, for example, identified a dependence on CORDES' limited technical staff capabilities for knowledge diffusion among families involved in cattle production in relation to the BIOLACT initiative, and proposed the development of more horizontal mechanisms to facilitate interactive learning between producers (Gaete and Montero 2004). As the producers, linked within and between initiatives, are not competitors on the market it would be expected that interactive learning would be facilitated, as it is in their collective interest to consolidate primary production activities and thus make the processing operations they own (or will own) sustainable.

For example, what could be called interactive learning between primary producers and the SAMO management has been limited to ensuring organic and now fair trade certification. The management has also learned that prompt payment and small production advances, not just paying above market prices, are necessary to consolidate the loyalty of the producers as providers to the plant. In essence, they are learning how better to coordinate the vertically integrated growing and processing operations. Implementing the current proposal to increase productivity and further diversify the plantations, as well as the need to promote the growing of additional cashew trees to meet future needs, demand improvement in this area; especially as the sustainability of CORDES' contribution to this process is unsure.

The initial advances made in the generation and diffusion of technologies related to primary production activities have been facilitated by "reciprocal and positive external economies" between the associated producers, as Carlsson and Jacobsson (1997) argue. For example, the informal information flow between producers as to the relatively positive initial results obtained by producers implementing the agro-ecological cattle production systems within the BIOLACT initiative has motivated progressively greater numbers of producers to access financing to implement similar systems. This would suggest the creation of a shared view of the future perspectives for this type of productive system that has reduced the perceived risk of putting their land up as a loan guarantee to make the required investments. The need to find market outlets for their milk products that the processing operations were not able to purchase, motivated collective action for joint negotiations with market intermediaries to obtain more reasonable prices. The formation of the cooperative represents an additional step in consolidating the capabilities for these producers to implement their collective vision in relation to the BIOLACT processing operations.

With respect to both the BIOLACT and SAMO initiatives, the most important weaknesses in the process of dynamic assimilation are the organic mechanisms for an adequate diffusion of the innovative technical knowledge, accumulated through practice and assimilation from exogenous sources, to the wider group of producers. The mechanisms for motivating and supporting the adoption and adaptation of these techniques over time to improve the productivity of their production systems are also weak, depending almost exclusively on CORDES' agricultural program. The initial development of the popular technicians program that has yielded positive results suggests the need for continued, more systematic development of local producer's capabilities along these lines.[149]

As Cooke (1999) argues, explicit efforts searching for new knowledge have enabled the task-network to evaluate and progressively improve their exploitation of options in relation to SAMO's cashew production. For example, knowledge search processes have resulted in important changes in the initial

[149] This is an area where greater interchange with CORDES Chalatenango would be useful, as they have further developed a similar system of popular technicians.

design of the processing plant, proposals that were implemented to increase production efficiency and volume and now the development of an investment proposal to make substantial changes in the technological system to further increase production capacity and productivity. In addition, knowledge seeking through participation in international trade fairs as well as through routine interaction with buyers, motivated them to apply for and finally achieve fair trade certification, which provides additional product differentiation and competitive positioning with respect to increased competition in the organic cashew market. The SAMO is considering investments needed to diversify their production operations based on a feasibility study that details various alternatives to begin the production of cashew false fruit products (juices and dried "raisins"). They have also begun feasibility analysis of investments to process other crops (peanuts, plantains and/or yucca).

The BIOTEC initiative demonstrates an emerging task-network capability to understand the potential importance of knowledge developed by Cuban and Salvadoran scientists through exploratory knowledge generating processes and to translate this knowledge into forms applicable to the development of their innovative products. It should further be highlighted that the specifications for their search for applicable scientific knowledge have been developed through interaction with producers in the Bajo Lempa region and others such as certain sugar cane growers.

Within the initiative task-network and especially CORDES Bajo Lempa there is an increasing capability to engage in what Sunbo (2003) denominates strategic reflexive practice; making an explicit effort to learn from experiences in implementing technological innovations that have led to strategic changes in their continuing practice. Following Sunbo's arguments, the evolving local economic development strategy being promoted by CORDES embodies the result of an integral analysis of the market restrictions and potentials for local agricultural products and the internal resources and capabilities of local families of producers. The market analysis suggested severe restrictions for the commercialization of basic grains and primary agricultural and dairy products. There was thus a definite need to add value to local production and create differentiated products that could compete in higher priced national and international market niches. The evolving analysis of the productive and managerial capabilities of the local producers has suggested the need to break down the investments required for their integration in the different initiatives into riskable steps making them more viable.[150]

These evolving elements of CORDES' strategy were embodied in the project initiatives from which the different innovative economic initiatives have emerged. Reflection on the experiences of implementing these innovative initiatives has enabled a continual process of refining the overall strategy. One strategic change of this type was the formation of the El Roble cooperative based on reflections concerning the need to consolidate and institutionalize financial service provision within the GBL. A further example is the transformation of the associative form of organization for production being promoted among primary producers and the institutionalization of the practice of linking these family based producers horizontally in cooperatives and vertically with the processing and commercialization operations of the different initiatives as both providers and owners. In the SAMO initiative it is possible to see how additional critical reflections on the market position and the internal business dynamics motivated the feasibility studies and the development of concrete proposals for investments to expand and diversify their processing operations.

Thus, the general pattern for strategic reflective practice that Sunbo (2003) visualizes can be observed within CORDES Bajo Lempa and the GBL's economic initiatives, although in a considerably more chaotic form, reflecting the progressive construction of these capabilities among task-network actors.

In conclusion, as Loasby (2002) argues, new knowledge relevant for innovation in the GBL's economic initiatives has been created making connections with exogenous knowledge bases through "appropriate receptors" and endogenously through connections between existing knowledge structures (for example, the knowledge bases of producers, plant workers, management and supporting consultants in the SAMO initiative).

[150] This characterization is based on various interviews with Espin and Erazo (head of the Agricultural program), but also inferred from practice.

Although some of the actors involved in different GBL initiative task-networks have made this type of learning connections through intelligent observation of others, facilitated by physical proximity as Maskell suggests, it seems that the most important learning connections involve more direct interactive learning mechanisms, such as the R&D efforts of BIOTEC and CORDES' agricultural program to reactivate the SAAO. This more closely follow the arguments made by Giuliani (2002) and Giuliani and Bell (2004) concerning knowledge flows within clusters.

The processes of knowledge diffusion and recombination implied in the development of diversified cashew production systems, irrigated vegetable production, agro-ecological cattle/milk production and the use of biological pesticides implies a complex of several interconnected dynamics. For example, the inter-connection of actor strategies and capabilities for "drawing on existing knowledge repertoires and absorbing new information" in the implementation process as well as "validation processes whereby newly introduced information and its sources are judged acceptable and useful or contested" as reflected in their motivation to continue their enrolment in the initiative task-networks (Long 2001: 175).

6.6 Networking Capabilities and the Coordination of Innovative Practice

From the emphasis on the interactive learning mechanisms by which innovative options are being developed in the SAMO and other of the GBL's economic initiatives, this section shifts the focus to the importance of networking for innovative practice, how the task-networks of actors develop their networking capabilities, as well as the initial dynamics of coordinated innovative practice between these different initiatives. This section builds off of the initial characterization of the internal and external networking capabilities demonstrated by the different task-networks in Section 5.4.

The evolution of networking capabilities

Using the approach of Saviotti (1997), this analysis of the networking capabilities of the task-networks involved in the GBL's economic initiatives focuses on the development of synergy or self-catalization dynamics in their internal and external networking relationships, as well as the stability of these networks and their effectiveness in achieving their collective goals.

In terms of external networking capabilities, CORDES Bajo Lempa has demonstrated significant capabilities for establishing synergistic long term networking relationships from which they have been able to leverage the significant financial and knowledge resources that have permitted the establishment and initial consolidation of the GBL's economic initiatives. Especially important have been the relationships with an important group of international NGDOs from Europe and North America that have worked as partners in mobilizing resources to invest in the GBL's initiatives from their constituencies and other public and private sources in their respective countries. Although not all the results that CORDES has been able to produce from the projects they have financed have been totally satisfactory, the continuation of these relationships over the years reflects a degree of mutual commitment to the GBL process and mutual benefit from their partnership (self-catalization). The capability to motivate the initial and continued enrollment of these actors, embodied within certain key people in CORDES Bajo Lempa, has been one of the most important causal mechanisms enabling the technological transformations in the GBL's economic initiatives.

Building these relatively horizontal and long-term relationships is also crucial for CORDES Bajo Lempa to be able to maintain its relative decision-making autonomy with respect to the innovative local economic development strategy it is promoting. This is especially true in a context marked by a steady decline of international funding from this type of "solidarity" international development cooperation and the increasing dependence of many Salvadoran NGDOs on financing as service providers through competitive funding from the national state and multilateral or bilateral donors

(Bebbington 1998, Fowler *et al*. 2000).[151] However, CORDES has also demonstrated an important capability of leveraging resources from internationally funded territorial development programs and government agencies to strengthen the GBL's economic initiatives without, as Emilio states, sacrificing their principles (Interview 2004).

External networking capabilities have been crucial for obtaining specialized knowledge as well as financial resources necessary to enable their innovative practice in the SAMO and other GBL initiatives (Carlsson and Jaccobsson 1997; Van Geenhuizen and Nijkamp 1999). At least four distinct types of networking relationships have been key for obtaining these external knowledge inputs; each demanding somewhat different networking capabilities to establish and maintain (see Box 13).

Box 13
External Knowledge Sources and Related Networking Capabilities

One type is long term "voluntary" technical assistance that has generally been provided in direct coordination with CORDES' agricultural and business development programs. This has implied establishing a long term relationship with the agencies that support these external experts, but also establishing a local working environment in which they can effectively make a significant contribution to the development of producer and business capabilities as well as strengthening CORDES' implementation capabilities through interactive learning.

Another type of relationship relevant for exogenous knowledge acquisition, are those being established between CORDES and the GBL with other NGDOs and universities that provide complementary specialized services. The relatively long term relationship between CORDES and the NGDO research center FUNDE, now a member of the GBL, is one example. Establishing and defining the terms of this mutually beneficial relationship has required significant negotiating ability and obtaining the concrete results that the GBL leadership and CORDES management desire will demand significant continued effort to orient and coordinate actions.

Additional types of external knowledge inputs have been obtained from a diversity of expert consultants contracted to analyze and offer recommendations for strengthening of different aspects of these initiatives. When these experts are contracted direct the task of specifying exactly what results are desired and monitoring the process seems especially important for obtaining beneficial outcomes. In all cases, the personal relationships established with these people, such as the representatives of the organic and fair trade certification agencies, to elicit their knowledgeable contributions to solving priority problems has been of crucial importance.

A final source of external expert knowledge that the GBL task-networks have exploited in their innovative practice are people involved in relevant experiences elsewhere, such as those involved in the production of granulated *panela* in Honduras, Costa Rica and Colombia. Here the key capability is to understand the know-how and why knowledge behind the functioning of these exogenous technological systems, to be able to apply relevant aspects to local productive practice.

[151] This is especially true in El Salvador that the UNDP ranks as having a medium level of human development and which projects an external image as a country as a successful model for democratization, reconstruction, poverty reduction, etc.

The recognition of these different types of exogenous networking relationships, stresses the complexity of the networking capabilities involved in mobilizing the necessary knowledge and financial resources from such a diversity of sources. Networking practice requires the development of specialized, mainly context contingent and tacit, knowledge but cannot be reduced to its knowledge components alone. Networking requires building specialized organic linkages that span the spatial and organizational boundaries and somewhat institutionalized spaces in which interactive learning can more easily take place. In other words, networking capabilities are expressed through tangible relationships and in organizational contexts that must be constructed and maintained.

Analysis of the functioning of the GBL's initiative task-networks reveals that while the component skills of the people involved are important, what is fundamental for the initiative's overall innovative practice is the quality of interaction between them (Orozco 2003) and the way in which the dynamics of their relationships are enhanced or limited by the initiative's organizational set-up. The particular nature of the interconnections between people within and across organizational boundaries in each task-network and with key exogenous actors, defines to a large extent how their individual capabilities can be oriented towards collective innovative practice or not (Loasby 2002).

In conclusion, the evolving web of internal and exogenous inter-personal and inter-organizational network connections provides the organizational conduits through which the diverse resources needed for implementing technological innovations in the GBL's economic initiatives flow. Establishing and maintaining these dynamic networking connections, as well as effectively mobilizing innovative resources through them, are key aspects of the task-networks' collective innovative capabilities.

Coordination of innovative practice in the GBL

The emphasis placed by Schmitz (1997) and Schmitz and Nadvi (1999) on cooperation and joint action as keys to innovative practice among agglomerated firms in the South, is mirrored in the intentions behind the ongoing effort by CORDES Bajo Lempa and the GBL's leadership to integrate the different associative economic initiatives in the business working group. The logic behind the formation of the GBL's economic working group is to exploit the potential synergies between the different geographically proximate business initiatives, stimulating greater cooperation between them.

This, however, has proven to be rather complicated for reasons that defy economic rationality. Analysis of the initial efforts to stimulate greater cooperation among the GBL's economic initiatives reveals the difficulties intrinsic in motivating firms with particular interests in solving their individualized problems, to dedicate resources to complicated processes of external co-operation to solve what might seem to be objective but are frequently difficult to perceive collective problems. Even more complicated might be getting them to take collective, co-dependent innovative steps to take advantage of business opportunities where the final results of the process and their firm level significance are not evident to all.

For example, one of the potential areas of collaboration between BIOLACT, SAAO and SAMO is the joint contracting of the organic certification agency. Another would be to motivate the buyers of the SAMO's products to also purchase from the SAAO, possibly reducing shipping and administrative costs implied in the export process. It is also interesting that BIOTEC is currently developing a product for the biological control of one of the principal diseases affecting sugar cane that could prove to make a significant contribution to the consolidation of the organic sugar cane trajectory.

As this suggests, one potential area identified for greater collaboration between business initiatives is in relation to their commercialization operations, both in the national and international markets. However, there are no market actors promoting greater cooperation between these initiatives, which is one of the key mechanisms identified by Schmitz and Nadvi (1999) as fostering active collective efficiency among small-manufacturing firms in the South. A second major limitation to further

cooperation identified by these authors is the currently low level of trust perceived between people involved in decision-making roles in the different business initiatives, based in part on earlier failed attempts at cooperation.

CORDES Bajo Lempa as catalyst for achieving collective efficiency within the GBL

The role of CORDES as catalyst for the integration of the GBL's economic initiatives reflects the general recognition of the importance of similar catalysts in promoting horizontal co-operation and mediating processes for conflict resolution between clustered firms (Schmitz 1999; Schmitz and Nadvi 1999; Helmsing 2003). Analysis of CORDES' role within the GBL further supports the argument that the integration of divergent but potentially complementary specializations within the different economic initiatives and between them in the GBL is in itself a specialized activity (Loasby 2001, 2002).

Playing this coordinating role among the GBL's economic initiatives has, however, become increasingly problematic for CORDES as its ability to do so is limited by an atmosphere of limited trust between business management and CORDES' regional administration that question its legitimacy to do so. In part, it is for this reason that CORDES has promoted the formation of the GBL and increasingly expects the GBL's directive council and the business working group to take responsibility for this coordinating role. However, it remains to be seen if the GBL's actors can construct the individual and collective capabilities to effectively do so. The same could be said for the need for the cooperatives' directive councils to assume greater responsibility for the overall coordination of learning processes and other activities between producers within their respective initiatives.

As Loasby states, taking advantage of the potentials for synergy between the GBL's economic initiatives, in terms of the co-development of their specialized knowledge bases and the coordination of concrete activities, "depends on willingness to rely on both the skills and goodwill of one's collaborators. Trust is a means to the creation of options, sometimes of great value, because it is a means to distinctive new combinations of capabilities" (2002: 16, citing Richardson, 1972).

Quality of interaction in the GBL

The quality of the relationships between the actors involved in the GBL's economic initiatives and between these initiatives can be characterized in terms of the features that Cooke identifies (1999: 10-11).

Trust on behalf of the donor agencies, in the *integrity* of CORDES Bajo Lempa to adequately manage their resources through the implementation of project initiatives that effectively improve the livelihoods of local families, is fundamental for their long term enrolment in the development of the GBL's economic initiatives. A fundamental basis on which CORDES is able to establish new relationships, with government agencies for example, is its *reputation* as an innovative and trustworthy project implementer with a specific territorial identity as founding member of the GBL.

A crucial basis for the relationship between the administration of the business initiatives and the producers involved as suppliers is the establishment of clear conventions or rules for their transactions that reflect *reciprocal relations of exchange* between partners. Problems that have surfaced in several initiatives (SAMO, AGROLEMPA and BIOLACT) with respect to these conditions of exchange, suggest their importance for maintaining positive relationships within these social interface situations. The problems inherent in transforming the conventions on which certain relationships are based is evident in the difficulties of making the transition between CORDES basically giving away subsidized "credit" to local producers through projects and El Roble providing sustainable financing for their productive activities based on new, more rigorous, rules of the game.

Between CORDES and these initiatives one area that is questioned by different actors (like the SAMO's manager) is the *reliability* of CORDES to provide quality supporting services (technical assistance and

training). There is, however, an increasing realization that this responsibility must be progressively assumed by the initiatives themselves. El Roble, for example, is studying the possibility of hiring technicians to support the producers they are financing and the same is true for the SAMO and AGROLEMPA.

The problematic relationships between CORDES, the management and directive councils of several initiatives reflect a lack of mutual trust in the reliability and integrity of the others as partners. At this point the conventions concerning CORDES' changing role in relation to the strengthening of these autonomous business initiatives and the role of these initiatives as members of the GBL are under negotiation.

CORDES' involvement of the producers as cooperative owners of different business initiatives implies "a political disposition that is empowering, not elitist." However, the translation of this disposition into practice to enable them to effectively participate in the associative governance of their initiatives is a recognized weakness in most of these initiatives. "Understanding of the need for *openness* and willingness to learn a social disposition that is *inclusive* not exclusive," seems to be an especially important trait, somewhat lacking in the current relationship between the management, elected leadership and cooperative members of these initiatives (Cooke 1999).

In general, the point is that greater horizontality and equality in power relations between the task-network partners would favour innovative practice and thus improved business performance (Cooke 1999; Van Geenhuizen and Nijkamp 1999).

6.7 The Dynamic Assimilation of Exogenous Technological Novelty

The construction of capabilities associated with the acquisition and dynamic assimilation of exogenous knowledge and other technological resources has been the basis for implementing many of the technological transformations in the GBL's economic initiatives. From the analysis in the previous two sections it is evident that dynamic assimilation of exogenous technological novelty requires the co-development of complex organizational, networking, motivational and learning capabilities. As discussed in Section 5.4, within the GBL's different economic initiatives there is evident diversity in terms of the innovativeness with which they carry out different functional tasks required for effective implementation of innovative technological alternatives (Lall 1992).

Analyzing the emergence and initial business consolidation of the GBL's economic initiatives suggests that progressively increasing the sustainability of their business performance depends on establishing a continual process of upgrading their capability to innovatively manage the combined endogenous and exogenous elements of their technological systems (Van Dijk and Sandee 2002; Knorringa 2002). This process of accumulating capabilities, under way at different rates and in variable forms in the different initiatives, is proceeding from simple to more complex "design, engineering and managerial competences" within the realm of primary production, processing and commercialization operations (Bell 1997).

As Bell (1997) further suggests, these emerging capabilities for dynamic assimilation are expressed through transformations that enable the task-networks to capture a greater share of the overall potential value of their products: granualization of *panela*, processing and organic and fair trade certification of cashews, processing and gourmet presentation of milk production and the organized commercialization of vegetables in select national markets. The most important initiatives have vertically integrated cultivation, processing and commercialization operations and there is an emerging capability for horizontal and vertical diversification within the technological trajectories in which the initiatives are embedded. The development of options for the diversification of the SAMO's processing operations is one example of this.

Within the GBL context there is also a strong dynamic of horizontal diversification reflected in the development of initiatives such as BIOTEC that complements the overall focus on organic agriculture, as well as the development of business initiatives for the provision of machinery and transport services and also conventional and organic agricultural inputs.

One area of limited development at this time within the GBL is the development of mechanical engineering capabilities necessary for repair, adaptation or more innovative transformation of the exogenously developed machinery they employ in their processing operations. An urgent unsatisfied need is to develop relations with a national or regional firm capable of repairing BIOLACT's imported dairy processing machines, without having to depend on international expertise they are currently unable to pay for.[152] Examples of incipient capabilities in this area are reflected in SAMO's work with their machinery provider to adapt the fryers and ovens to the requirements of the cashew processing technological system, as well as the LEMPAMAR initiative related to the construction of artisanal irrigation systems and importation of more complex small-scale systems from Italy.

The dynamic assimilation of exogenous elements has been related to building the endogenous organizational capabilities that support the continuation of the innovation processes over time within the GBL's initiatives. These organizational capabilities are associated with productive and commercial operations, but also associative governance. They are especially important for the mid to long term sustainability of these complex initiatives and their contribution to improving the livelihoods of the families involved. Dynamic technological assimilation is thus an interactive process directly related to the development of associational or networking as well as learning capabilities (Bell 1997; Helmsing 2001; Cooke and Morgan 1998).

The generation of new knowledge can only be translated into options if the new knowledge can be connected to its existing knowledge base in a synergistic may, as Loasby (2000, 2002) suggests. This is especially true in relation to the dynamic assimilation of exogenous knowledge and other elements into their technological systems, which leads us to the mechanisms explaining the GBL's "cluster absorptive capacity" (Guiliani and Bell 2004).

The concept of knowledge/technology gatekeepers can be applied to analyze the role played by CORDES mediating the flow of externally acquired knowledge and other resources into the task-network context and supporting their application in innovative practice. CORDES is directly mediating flows of exogenous knowledge to be applied in the renewed efforts to produce organic *panela* in the SAAO initiative and the infusion and diffusion of knowledge concerning the production and use of biological pesticides through the BIOTEC initiative.

In terms of knowledge inputs what CORDES frequently mediates is not the actual capture and internalization of knowledge, rather the enrollment of knowledgeable individuals that then play this role and "transfer" this knowledge through different interactive situations to the producers, business managers, workers, etc. Examples include the enrollment of the international marketing expert (linked to CORDES' central office) who played a central role in expanding SAMO's connection to the international market and to international financing under favorable conditions, as well as the expert from one of the international NGOs financing the SAMO plant (Oxfam GB) to strengthen SAMO's initial management capabilities. This is also the case with the succession of two Dutch experts who supported CORDES Bajo Lempa's agricultural program in adopting a progressively more agro-ecological focus and developing its participatory working methodologies and also the Basque business consultant working to strengthen the BIOLACT initiative.

CORDES' capabilities to play this role are directly related to the accumulation of specialized knowledge bases of the key people who are directly responsible for this organizational function (either mediating

[152] Possibly from a firm from the national Metal Mechanical "cluster" that has received support from the National Competitiveness Program to upgrade their technological capabilities to be able to fulfill this type of role (MINEC no date).

knowledge flows directly or enrolling knowledgeable actors). In this case, the proximity of these people's knowledge bases to those of the exogenous actors with whom they are interacting is a basic condition enabling the learning process, explaining their absorptive capability (Giuliani and Bell 2004).

However, it is clear that the exercise of the capabilities for the assimilation and internal diffusion of exogenous knowledge by specific people depends greatly on their personal networking skills, as well as the organizational set-ups in which they are embedded in CORDES, the initiative task-networks and the GBL. The external and internal networking relationships which are the conduits for the dynamic assimilation of exogenous knowledge have both a personal and a more institutionalized organizational dimension. For example, it is not only the manager's interaction with researchers from Cuba, CENTA MAG and the national university that is important for innovation, but the organizational relations that BIOTEC and CORDES have established with the organizations where these researchers work.

This discussion demonstrates the necessity to recognize the importance of inter-personal diversity in terms of knowledge, networking skills, etc. when analyzing inter-organizational interactions related to the dynamic assimilation of exogenous technological components, as Ettlinger (2001) suggests. It also reflects the fundamental importance of understanding how these individuals are positioned within different organizational contexts and how these set-ups enable or constrain their innovative practice, as stressed by Spender (1996) and Loasby (2002).

6.8 Emergence of Innovative Capabilities in the GBL's Task-Networks

This concluding section makes specific reference to my conception of *innovative technological capabilities* and as such represents a conceptual synthesis and integration of the key aspects of the GBL's economic initiatives analyzed in the preceding sections.

Based on this analysis, the innovative capabilities of the task-networks involved in the GBL's economic initiatives can be understood as the synergistic combination of the specific networking and learning capabilities that have enabled the creation and implementation of innovative technological alternatives. The initial processes of technological transformation in the GBL's economic initiatives have required the combination of the task-networks capabilities to:

- Establish and maintain external networking connections, enrolling relevant actors in the mobilization of the necessary financial and knowledge resources, to complement those possessed by the task network members;
- Make synergistic connections between exogenously assimilated knowledge bases and those generated internally through reflexive interaction between the members of the task-networks; and
- Construct an internal organizational and institutional set-up that facilitates interactive learning and motivates the actors involved in the task-networks to take the risk-able steps necessary for innovative practice.

The emergence of innovation capabilities of the GBL's task networks has depended on the development of learning mechanisms to accumulate different types of knowledge from experience and reflection on productive and commercial practice, searching for exogenous knowledge sources, including actors involved in scientific exploration. Especially important has been the ability to recognize and make connections between the knowledge bases being accumulated through these mechanisms, thus generating new options and developing them in innovative practice.

In essence, the task-networks' innovative capabilities are emerging through an incremental process of learning through participating in and reflecting on innovative practice in the context of the different economic initiatives. Innovative capabilities can be considered as emergent properties of social interaction in the concrete processes by which discrete technological systems are transformed, as well as, (still limited) interaction between initiatives in the context of the GBL and with exogenous actors.

The analysis of interaction between the actors involved in the implementation of technological innovations in the diverse GBL initiatives emphasizes that innovative capabilities frequently have important collective aspects. Interaction between the actors involved is a necessary characteristic of innovative practice which in turn is embedded in specific organizational or network contexts or structures. However, the analysis of these initiatives as social interface situations also highlights the frequently determinant individual contributions to collective innovative practice.

The overall innovative performance of these initiatives has proven to depend on the quality of interaction between the knowledgeable actors involved and the way in which the initiative's organizational set-up enhances or limits their collective innovative efforts. How their individual capabilities can be oriented towards collective innovative practice or not, is contingent on the particular nature of the interconnections between people within and across organizational boundaries in each task-network and with key exogenous actors.

The innovative capabilities of the GBL initiative task-networks integrate a multiplicity of characteristics which they are able to apply in innovative practice. Especially important are the contextually specialized and frequently tacit knowledge bases related to the understanding of the relatively complex technological problems they face and the construction of innovative alternatives as solutions. Also fundamental, is learning why, how and from whom to mobilize the diversity of endogenous and exogenous resources necessary for the implementation these alternatives.

It is also clear from this analysis that the capability of dynamically integrating the diverse endogenous and exogenous resources necessary for innovative practice cannot be understood adequately *only* as an interactive learning process. The importance of establishing external networking connections, generating motivation and the enrollment of key actors, the articulating expectations and the coordination of complementary actor capabilities, the construction of internal organizational configurations, etc. reveal the complexity of the actions involved in this key innovative process.

The development of concrete organizational conduits and ordered work processes are necessary to bridge the gap between the innovative conceptualization and design of options, and innovative practice. The organizational conduits are the relationships between key people in task-network organizations and between these organizations. The innovative outcomes of a determined group of knowledgeable actors, organized in a certain way, also depend on the way in which these actors bring the diverse resources they have mobilized to bear in the ordered problem solving process. This suggests the importance of work or process methodology for innovative practice and also the formation of increasingly horizontal power relations between the actors involved.

Catalytic agents have been the key to enrolling and facilitating the coordinated expression of the complementary capabilities of diverse endogenous and exogenous actors in the implementation of innovative technological alternatives within the GBL's economic initiatives.

CHAPTER 7

Tecoluca's Emerging Regional System of Innovation

This chapter applies the conceptual framework concerning local economic development and regional innovation systems developed in Chapter 4 to the analysis of key elements of what will be referred to as Tecoluca's emerging regional innovation system (RIS). Tecoluca's emerging RIS is constituted by a diversity of public and private, firm and non-firm actors, involved directly or indirectly in the creation, diffusion and use of technological innovations, the nature of the relationships existing between them and the relevant aspects of the localized institutional fabric which enables and constrains their innovative practice. The analysis of Tecoluca's emerging RIS focuses on the enabling and constraining influences of its three constituent sub-systems on innovative performance in the GBL's economic initiatives. Section 7.1 analyzes the regional production structure or system as I will refer to it, 7.2 the localized system of enterprise support services and 7.3 the RIS' associational governance sub-system.

The chapters' analytical focus on the dynamics of Tecoluca's emerging RIS is complemented by a comparative analysis of how specific aspects of the national and international institutional set-ups, as well as the relations between regional actors and diverse external actors from the national and international innovation systems enable or constrain the innovative processes being implemented. Each section, thus, deals in slightly different ways with the historical emergence and current configuration of RIS' sub-systems, as well the relevance of their dynamics for innovative performance in the GBL's economic initiatives, as compared to similar national and international factors.

Section 7.4 deals specifically with the relevance of specific aspects of the formal and informal institutional set-ups of the regional, national and international innovation systems as enabling and constraining factors for innovative practice in the GBL's and other regional economic initiatives. The chapter concludes with the presentation (in Section 7.5) of an integral characterization of Tecoluca's emerging regional innovation system in comparison and contrast to the conceptualization of RIS presented in Chapter 4, and finally a synthetic analysis of the formation of regional social capital and the integral innovation capacity of this system (in Section 7.6).

7.1 Territorial Production System

This section analyzes the development of Tecoluca's regional production system and especially the emergence of innovative business enterprises within regional agglomerations of small-scale agricultural and agro-industrial enterprises. The regional production system is characterized in terms of its historical emergence, its overall composition, the density and interconnectedness of the co-localized enterprises involved in diverse economic activities, as well as the demonstrated innovative capabilities of these productive actors.

Historical trajectories of rural productive activities[153]

The historical dynamics of economic development in Tecoluca reflect the general processes in rural El Salvador that created the conditions that led to the civil war. Without attempting to reconstruct these historical dynamics in detail, it is important to highlight key characteristics that are relevant to understand the local economic development processes that have emerged since the Peace Accords in 1992.

Until the mid 1900s Tecoluca's coastal plain was dominated by forests and was scarcely inhabited principally due to a lack of basic infrastructure, the propagation of malaria and periodic flooding. However, from the 1950s onward, there was a combined public and private effort to bring these fertile lands under progressively more intensive agricultural and cattle production. The state supported the "development" of the area through malaria eradication campaigns, as well as the construction of the

[153] This section synthesizes historical accounts based on interviews with local residents and bibliographical material provided by Cummings (1995), Blandon de Grajeda et al. (1997); PRISMA (2003) and McElhinny (forthcoming PhD thesis).

coastal highway and a system of dykes and internal drainage canals needed to control the frequent flooding by the Lempa River (PRISMA 2003).

Among the production efforts initiated, the rapid expansion of cotton cultivation was of special relevance for the dynamics of the regional production system. The high international prices of cotton and the availability of subsidized public and private financing motivated many new agricultural entrepreneurs to cut down the forests to open new land and bring extensive areas into cotton cultivation.

The large estate-based agricultural (cotton, sugar-cane and coffee on the San Vicente volcano) and cattle production systems did generate employment opportunities for significant numbers of local and migratory workers. However, the expansion and progressive technological intensification of cotton and other production systems on these estates through the 1970´s, forced local *campesino* families off of the small plots of land that they had traditionally rented for subsistence production and reduced the need for local labor, especially of a more permanent kind.

There was also an important problem with the excessive use of agrochemicals on the extensive cotton estates which dominated the agricultural landscape, especially in the coastal plain. There is extensive anecdotal evidence of chemical poisoning of workers in the fields and their families living in nearby settlements, as indiscriminant aerial applications spread chemicals over their living areas and subsistence crops.[154] The phenomenon known as the "pesticide treadmill" led to increasing use of progressively larger quantities of more toxic chemical mixes that raised production costs to an unsustainable level.

The combination of these socio-economic and ecological dynamics made the livelihoods of local landless and land poor families untenable. Partly for this reason, Tecoluca was fertile ground for the emergence of progressively more radical Christian base communities influenced by the teachings of Liberation Theology within the Catholic church, as well as the birth place of the Rural Workers Union of San Vicente (UTCSV) which was expanded to other areas of the country and became one of the most important national peasant organizations struggling for changes in the country's social and economic situation towards the end of the 1970´s. When these essentially peaceful progressive social movements were met with repression by the Salvadoran Government's armed forces, much of the organized population from Tecoluca was integrated in one way or another into the FMLN guerrilla movement or displaced internally, as refugees in other Central American countries or as migrants to the United States and other Northern countries. The municipality of Tecoluca was a highly conflictive zone and an important guerilla stronghold during the war.

As a parallel development, by the early 1980's the cotton boom was quickly going bust. The increasing costs of an ever deepening dependency on lethal pesticides, the reduction in the international cotton prices and a diversity of problems related to the civil unrest leading up to outright civil war, including the burning of cotton fields, made further cultivation unviable.

Current relevance of the historical production dynamics

The abandonment of these lands during the civil war led to the regeneration of significant areas of secondary forests and soil fertility. Although there was also a natural process of de-contamination from the overuse of agrochemical mixes on the cotton plantations, there remain areas where the soil and groundwater are still contaminated and the resistance of many pests to agrochemicals is a continuing problem for local farmers in communities now integrated in the GBL's micro-regions.

Towards the end of the war (1987-1991), some of these fertile and much coveted lands were occupied by organized groups of returned Salvadoran refugees and internally displaced people. These occupied

[154] Although there have been no systematic documentation of these poisonings and the related health effects in the families of migratory workers as well as of local residents, there are anecdotal accounts of high rates of certain types of cancer and other severe health problems in people that lived near and worked in the cotton fields.

lands were later transferred to these people and additional ex-combatants from the FMLN under the Land Transfer Program (PTT) related to the Peace Accords signed in 1992.[155] While the concentration of lands prior to the conflict was problematic, it did create a relatively favorable situation that facilitated the distribution of these large properties through this program.[156]

Due to the large size of the properties and the relatively reduced number of people that decided to stay in these communities under the inhospitable conditions of the initial years, including the first flood in 1992, families were able to accumulate several plots of a significant size (3-4 *manzanas* each). Especially significant were the number of women (37%+10% jointly titled) and young adults (over 18, ND) that became landholders for the first time (Moreno 2001). In comparison with many other areas covered by the PTT, the lands transferred to the returning population were of relatively good quality and many families received significant amounts of quality land.

In addition to these dynamics which explain the current access to relatively good quality land by many of the families involved in the GBL's initiatives, there are some concrete vestiges of historical production structures that have provided opportunities gradually being productively exploited today.

The most significant of these for the GBL's initiatives was the established cashew plantation on Montecristo Island in the Lempa River Delta originally owned by a foreign national. Changes in the configuration of the river delta estuary, as well as high powered explosives and fires during the war significantly reduced the size of the original plantation. What was left, however, provided the initial productive base for what is now the SAMO / APRAINORES organic cashew initiative (Cummings 1995).

Besides the large-scale cotton, sugar cane and cattle estates, there was a significant group of small to medium sized vegetable producers that supplied what was reportedly a dynamic fresh vegetable market in Tecoluca. Many of the lands where irrigation systems were located have now been transferred to re-settled communities. The deteriorated remains of these systems are the basis for the gradual dynamization of groups of irrigated vegetable producers. They, however, have not been able to reproduce the productive capabilities and market dynamics that historically characterized vegetable production in Tecoluca.

Finally, one economic activity which survived, and has formed the basis for the basic survival of many families living in the coastal communities of the Lempa River Delta, is artisan fishing. Currently, CORDES and the Lempa Mar initiative are trying to upgrade artisan fishing capabilities and complement them through organized commercialization of fresh fish and other seafood products. An integral part of the strategy to make the new municipal roadside market in southern Tecoluca economically viable is to provide an outlet for fresh fish and other seafood caught in this area, as well as the coastal communities of neighboring municipality of Jiquilisco.

Characterization of rural economic initiatives in Tecoluca

Although limited recent data exists, piecing together the relevant fragments gives us the basic idea that, as in other parts of rural El Salvador, Tecoluca's economy is one in transition towards greater reliance on non-farm income.

The national population census in 1992 registered that 75% of the economically occupied people in Tecoluca were working in agricultural activities (not discriminating between on farm and off-farm

[155] See Moreno (2001) for a detailed (Spanish language) historical account of the conditions that forced the depopulation of Tecoluca as well as the process of repopulation by the internally displaced, refugees and ex-combatants from the FMLN and the conditions under which they formed the first communities that are now integrated into the SES and the GBL.

[156] Many of these large properties ended up in the hands of the State, having been bought from their original owners during the USAID supported Agrarian Reform in the 1980s, but never transferred due to the increasingly conflictive conditions. These State lands were particularly targeted by the groups from one of the 5 FMLN factions that made the strategic decision to repopulate Tecoluca, even before the war ended.

agricultural labor). In comparison 6% were working in commercial enterprises, 4% in manufacturing industries and all other occupations registered less than 3% (DIGESTYC 1992).

However, more recent, but less representative data, from the San Vicente Productivo territorial development program's base line study suggests a tendency towards greater importance of non-agricultural employment and income sources (S.V.P. 2001). Of the people surveyed that provide income for their households, from a supposedly representative sample of communities in Tecoluca, 32% reported that their principal occupation was their own agricultural enterprise, as compared with 52% in the total sample of 5 municipalities including San Vicente. Sixteen percent reported earning income from off farm agricultural work, as compared to 11% in the total sample, suggesting perhaps a more dynamic agricultural sector generating more employment opportunities. On the other hand, there were relatively more people in Tecoluca occupied in non-agricultural economic activities than in the total sample: 43% as compared to 27% in the total sample. These people were employed in formal sector businesses, in diverse services (making clothing, carpentry, mechanics, etc.), informal sector workers (domestic workers, literacy workers, peons, etc.) and in commercial enterprises (from mobile venders to owners of small stores and boutiques).

Apart from this general statistical information there is no more recent data available to further characterize the general distribution of economic activities, the specific dynamics of different productive sectors (types of agricultural and cattle production, as well as agro-industrial, manufacturing and commercial) or family income and income sources.[157]

Personal knowledge of the structure of production in Tecoluca suggests the following:

- Most rural and many sub-urban and urban families, are involved in some kind of agricultural and/or cattle production, but also salaried labor and/or small scale commercial operations.
- Local opportunities for salaried labor are scarce. These are limited to day-laboring or some semi-permanent positions in the cattle and agricultural sectors, working at the Jiboa industrial sugar factory (on the border with San Vicente), several dairy processing operations, the SAMO or other GBL business initiatives, working in the limited commercial operations that hire beyond family labor. There are also further limited positions available in the public sector from the municipality, the public school system, the public health services, and various dependencies of the Ministry of Agriculture (CENDEPESCA or CENTA), as well as local NGDOs like CORDES.
- Other people from Tecoluca are forced to emigrate to find employment within the regional or national context. Some of the opportunities available are the *maquila* assembly factories located approximately an hour from most communities along the highway to San Salvador, different types of formal and informal commercial enterprises in the intermediate sized cities of Zacatecoluca, San Vicente or Usulutan and domestic servant work in these cities or the capital city of San Salvador.
- International migration is a further alternative. A relatively recent study (Moreno 2001) suggests that Tecoluca, in general, is attracting population rather than expelling it. The study also demonstrates that the number of migrants from the repopulated communities in the south of the municipality is significantly less than from communities in other rural municipalities. However, there is an increasing anecdotal evidence of a tendency for young people to migrate to the North given the lack of economic perspectives for their future rural livelihoods in Tecoluca, especially related to agriculture.[158]

The majority of families own some land transferred through different phases of the Agrarian Reform (1980s) or the Land Transfer Program (1992). These producers focus most of their activities on growing

[157] The last agricultural census is from 1971, although another one is being planned and the yearly household surveys, including income data, are not statistically representative on a municipal level. A population census was concluded in Tecoluca in 2004 that should provide relevant information concerning family economic activities; however, the results are not yet available.

[158] This was a priority problem identified in a recent workshop with people in leadership positions at different levels within Tecoluca, to be addressed by local economic development initiatives (FUNDE 2005).

corn, beans where possible, sorghum as an input to cattle production, and some other crops. Many also own several heads of cattle and other farm animals (pigs, chickens, etc.). These production activities are generally for subsistence, although different products are sold on the market to access needed cash to pay for production inputs, as well as, increasingly costly food and other household needs (water, electricity, telephone, education and health services, etc.).

This group of small to medium family based producers is not homogeneous. While some are struggling just to survive, others have achieved a very basic level of livelihood reproduction and a relatively small group has achieved a combination of activities, including non-farm employment and commercial activities that has allowed them a minimum level of economic accumulation.

There are also a more limited but significant number of medium to larger producers, generally involved in cattle ranching and sugar cane production, but also some note-worthy examples of producers using irrigation to produce vegetables, banana and plantains, papayas, etc. Discussions with municipal authorities and others concerning how to get these larger producers more involved in local development processes in Tecoluca, reveal that many of them live in the nearby intermediate cities and many times only rent productive land in Tecoluca.

Researchers from PRISMA (2003) argue that, the development of family livelihood capabilities has been un-equal and many families still live in deplorable conditions. The majority of the population in Tecoluca, especially in the PTT communities, is organized. However, the capabilities of the "local vanguard organizations" [including CORDES Bajo Lempa] has not been sufficient to guarantee that all this population has been able to directly benefit from their successful mobilization of exogenous resources for local development projects.

These arguments are reflected in municipal level data available from an official household survey in 2001 that show that 58% of the families live in poverty with 31% of these living in extreme poverty. The average family income is $192 per month, which comes out to $42/month per capita (FISDL and DIGESTYC 2001).[159] This suggests that the population of Tecoluca, in terms of income poverty fares slightly worse than the families in all of rural El Salvador, of whom 56% live in poverty and 30% in absolute poverty (UNDP 2003 citing DIGESTYC 2002). The difficulties faced by many families in piecing together a viable economic livelihood strategy serves as the main justification for the Grupo Bajo Lempa's advocacy campaign to attract external investment to create opportunities for dignified rural employment.

Notably, an estimated 85% of the population that repopulated the communities integrated in the GBL have decided to remain, while on a national level, in other rural land transfer communities it is estimated that only 30% still live on and work their land. There has also been a significant in-migration of other members of these families from other rural and urban areas of the country. Around the communities integrated into the GBL there has also been an important return of original families to occupy the properties they were forced to leave and make productive investments. These combined phenomenon have resulted in a net-population increase for this area, which contrasts highly with other rural areas characterized by significant flows of out-migration (Espin 2004, see also Moreno 2001). This suggests the importance of the significant infrastructural improvements and that many families still perceive opportunities for improving their local livelihoods.

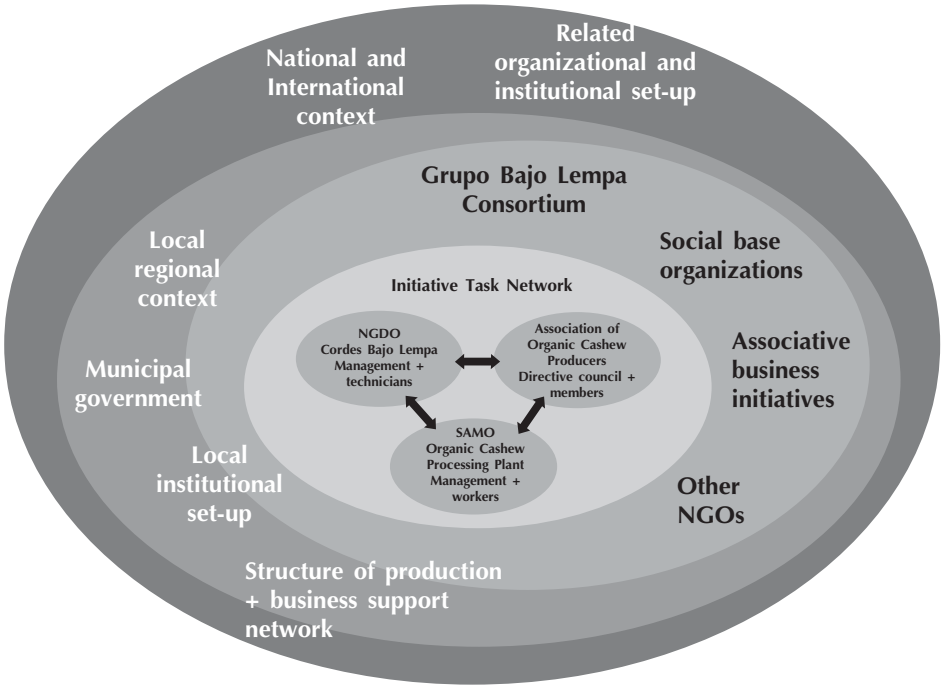
Relative novelty of the GBL initiatives in the regional context

As Figure 2 suggests for the SAMO initiative, the GBL's initiatives are embedded in a regional context which can be seen as intermediary level of interaction, between their most immediate relations within this consortium and those they maintain with national and international actors.

[159] Tecoluca was included in a national sample of municipalities for which the normal household survey was made representative to measure poverty after the earthquakes in 2001. Unfortunately a more complete reporting of this survey data, conducted using the normal DIGESTYC household survey questionnaire and methodology, had not been made publicly available as of the date of this research.

Figure 2

The Territorial Embedding of the SAMO Initiative



One strong argument for the innovativeness of the GBL economic initiatives, in addition to those presented in Chapter 5 and 6 is their differentiation from the other economic activities that characterize the local and regional production structure.

The GBL's principal initiatives have emerged in relation to economic activities in determined sectors in Tecoluca such as: the previous cultivation of cashews on the Montecristo plantation, the importance of multi-purpose cattle production as an economic complement to agricultural production, the small-scale efforts to produce vegetables also as a means of diversifying *milpa* (corn, beans, sorghum) agriculture, etc. However, the GBL's economic initiatives are novel constructions as they seek to add value to these existing activities through a diversity of complementary activities that had not been practiced, at least in the same way, within the regional context.

If the GBL's initiatives are compared to different types of economic initiatives in the surrounding municipalities, there are again striking differences. An exploratory study of small and medium-scale rural economic initiatives, in selected sectors, located in the 15 municipalities of the Nonualcos Region, including Tecoluca, suggest that the GBL initiatives can be clearly differentiated as having a higher demonstrated "development potential" than the great majority of other initiatives identified in the region. Of the forty five rural SMEs with greatest demonstrated development potential in the micro-region, 36% (16) are from Tecoluca; including the four highest ranking initiatives and eight of the first ten. Among these initiatives the most important are from the GBL; in order they are the SAMO, BIOLACT, AGROLEMPA and the agricultural machinery and transport business Maquilishuat. In addition to these initiatives, the survey also ranked a number of agricultural producers from Tecoluca among those with most potential, including various providers of material inputs for AGROLEMPA, SAMO and BIOLACT (FORTALECE 2003).

There are important and relatively consolidated medium to large firms, located in the Nonualcos regional context that were intentionally excluded from this study, but that should be taken into account for the present discussion, for example, dairy processing by one of the most important national firms in this area *Petacones* and another medium sized firm *Puebla*.

Potential integration of the GBL in emerging regional "clusters"

It is important to observe that the economic activities being implemented in the GBL's initiatives are related to several emerging agglomerations of similar types of economic activities. In this sense, there are important opportunities for the GBL initiatives to develop synergistic linkages with the agricultural producers and small to medium scale agro-industrial enterprises co-located in these agglomerations. The currently existing linkages are fragile, primarily buyer / seller relations.

Dairy production

The Nonualcos study identifies a significant regional agglomeration of relatively consolidated dairy cattle producers and a number of cooperatives and firms involved in dairy processing. In the department of San Vicente, there are organized groups of milk cattle producers and also some dairy processing operations (FORGAES/SVP 2003).

In terms of possible linkage with the BIOLAC initiative, there are some associative producer groups that are of special interest. For example, the cooperatives Nilos I and II are providers for the Petacones dairy plant, as well as part owners of their own small-scale processing plant. There are some tentative linkages between this initiative and BIOLAC in relation to possible exportation of traditional (non-organic) style cheeses, using milk from these cooperatives, to the "nostalgic" market of Salvadorans in the United States and Canada. Once legalized as a business, BIOLAC's technology would enable them to more easily comply with the strict regulations for exporting this type of product to these North American markets.

Other potential partners in synergistic cooperative initiatives could be the women's cooperative involved in cattle production (for milk and animal sale) in the municipality of Jiqulisco, on the eastern side of the lower Lempa River Valley and the cattle producers related to the *Campesino* Development Association from the North of the San Vicente Department (ACDSNV). Both groups of associative cattle producers have received significant external support to upgrade their production capabilities in terms of quality and quantity. They are thus potential suppliers and could possibly be enrolled in some sort of associative effort with BIOLAC in the future.[160]

Irrigated fruits and vegetables

Both in Tecoluca and the surrounding municipalities of the San Vicente Department and the Nonualcos region, there are significant groups of relatively organized, as well as individual producers of irrigated fruits and vegetables.

In Tecoluca, there are groups of small producers that are organizing themselves into legalized associations in order to be able to better manage their gravity fed irrigation systems, facilitating payment of water use permits and strengthen their negotiating position in disputes over water use with other larger producers. There are, however, only a small number of these small producers cultivating vegetables due to limiting technical, financial and market factors. Most small producers cultivate corn and beans instead and also irrigate pasture for their cattle. Larger producers use significant amounts of water for cattle pasture and sugar cane, as well as some others that irrigate fruits and vegetables.

[160] These types of linkages are recommended in recent diagnostic and marketing studies for dairy production and processing in San Vicente (Rosales 2003; FEDARES / S.V.P. 2003).

One of the country's five publicly owned irrigation systems (Lempa Acahuapa) is located in San Vicente. Recently there has been a concerted, although somewhat disorganized, effort by different actors to stimulate irrigated vegetable and plantain production in this area.[161]

In neighboring Zacatecoluca and other coastal municipalities of the Nonualcos Region there are significant production areas integrated into privately held gravity fed irrigation systems, and others drawing water directly from the easily accessible coastal aquifer to irrigate small plots. Again, many of these producers are currently not engaged in producing vegetables for the reasons already cited, but there are groups actively engaged in producing quality mangos, limes, *maracuya* (a type of passion fruit) and *lorroco* (a flower considered to be a Salvadoran culinary delicacy), all of which have significant market potential.

There are, thus, a significant number of local groups of increasingly organized producers with access to irrigation, of which there is a significant number involved in small-scale vegetable and fruit production for the market. There are almost no linkages among the producers from these different systems, but AGROLEMPA has initiated relationships with individual producers in all the cases cited as eventual suppliers. There is thus significant room for strengthening the relationships between AGROLEMPA and these groups.

One possibility would be the coordination of efforts to strengthen the productive capabilities of these producers as providers to AGROLEMPA. As with the producers already associated with AGROLEMPA, many of these producers need to upgrade their irrigation and productive techniques, organization for production, relevant knowledge bases and the resulting quantity and quality of their products. This could be facilitated by joint negotiations with different types of public and private service providers, especially the territorial development programs already operating in the region.

Coordinated efforts to plan the types of products to grow, as well as harvesting schedules in relation to market demand, could represent a further step towards achieving collective efficiency (Schmitz and Nadvi 1999) within this emerging productive cluster. Another would be the organization of packaging operations and the establishment of a regionally recognized brand, in conjunction with AGROLEMPA. While this could be done through the deepening of supplier / buyer relationships, it could also take on the form of an umbrella consortium, which would involve these additional producer groups in the governance structure of AGROLEMPA.

Panela cluster

Sugar cane produced by medium and large producers is the principal export crop grown in the coastal areas of the Nonualcos Region as well as the Jiboa Valley in San Vicente. Much of the sugar cane is processed at the Jiboa industrial processing plant in Tecoluca on the road to San Vicente. This plant is the largest agro-industrial enterprise in the region. In the municipalities of the Jiboa River valley (to the north of Tecoluca in the department of San Vicente) there is also a long-standing tradition of cultivating sugar cane and transforming it into solid *panela* and other derivative products.

In this area, the combined production of sugar cane and *panela* is the most significant source of local income generation and employment. Income opportunities are generated from sugar cane production and harvesting, as well as for workers and owners of the *trapiches* or *moliendas* where the *panela* and other byproducts are produced. Participation in these economic activities complements the subsistence agriculture of many local families. There has, however, been a steady decline in *panela* production over the last decades due to increasing competition from industrialized (centrifuged) white sugar, the civil war and more recently the 2001earthquakes, which destroyed many of the *trapiches* made of *adobe* (unfired earthen bricks).

[161] Recent initiatives to stimulate and upgrade plantain production are discussed further in Section 7.2 as evidence of the regional enterprise support system at work.

While the potential synergies between the SAAO initiatives and these *panela* producers, related to interactive learning, technological upgrading, product standardization, coordination of marketing efforts, joint public policy advocacy, etc., are evident, the current relationships are tainted with mutual distrust and cooperation is minimal.[162]

Analysis of production system dynamics

Ashiem and Coenen (2004) argue that regional production structures can be characterized by convergence around a certain pattern of industrial specialization or by greater sectorial diversity. In the past, Tecoluca's regional production structure was highly concentrated around the dynamics of cotton production, especially along the coastal plains, complemented by cattle-raising, sugar cane and coffee production and processing and vegetable in specific zones. Currently there is no such dominant productive activity. As suggested, there are several emerging clusters of economic activities, with the presence of some producers seeking to introduce technological innovations. Within this context, the GBL's diverse economic initiatives represent the most important agglomeration of innovative activities and the emergence of a possible technological specialization pattern focused on cleaner and organic production and agro-industrial systems.

Development of the regional potential for adopting a progressively greater agricultural and agro-industrial specialization using cleaner and organic technologies forms a central part of the proposed Territorial Actions for the National Development Plan (CND 2000). This agro-industrial potential, based in part on the existence of the GBL's initiatives and the Poligono de Solidaridad, was a central reason for GTZ selecting the Nonualcos Region as their long term area of territorial focus for development cooperation in El Salvador (FORTALECE 2003).

As Loasby (2001) argues, the emergence and consolidation of the diverse GBL initiatives may stimulate greater specialization in the dynamics of the regional production structure. They represent novelty in the environment, which may provide the basis for new interpretations and perceptions as to alternatives to the solution of localized economic problems. The existing evidence suggests there are some progressive "spill over" effects, but the extent to which this is true needs clarification.

Following the arguments made by Barquero (2000) and Rodriguez (1999), the current configuration of economic activities within the emerging clusters identified in the Tecoluca region are fragmented, but there is potential to generate economies of scale through coordinated production and commercialization efforts that could generate increasing returns on complementary investments. Including the GBL, there is limited, but progressively greater horizontal and vertical integration between the region's large, medium, small and micro enterprises.

Most primary products are still sold without processing in the region and many of the small-scale agro-industries present demonstrate low production and marketing capabilities, let alone those required to introduce significant technological innovations There is a tendency towards adding value, increasing the quality of processed products and focusing on improving marketing (FORTALECE 2003). These dynamics suggest incremental improvements in the resilience of the local production networks and are reflected in their slowly increasing competitiveness in the national and potentially regional/ international markets. This process of increasing the coordinated mobilization of localized resources and their effective use in the consolidation of innovative economic initiatives, necessary for collective efficiency, is only just beginning in the region (Schmitz (1995, 1999, Schmitz and Nadvi 1999).

[162] Efforts to upgrade panela production and especially recent efforts to produce granulated panela in the Jiboa Valley are discussed below as a second example of the regional enterprise support system at work.

Relevance for innovative practice in the GBL's economic initiatives

The local territorial context is the most immediate physical environment in which the task-network acts, attempting to solve problems or take advantage of opportunities through innovation.

One especially relevant characteristic of the local territorial context is the particular combination of environmental conditions which enable or constrain productive processes being implemented. The recurrent floods are an example of an environmental condition that has severely constrained productive activities in the past. The loss of significant investments in new cashew plantations and the destruction of irrigation systems in southern Tecoluca due to the floods from Mitch, diminished the primary production volumes of producers related to SAMO and AGOLEMPA respectively.

The local structure of production and technological trajectories are reflected in the knowledge and productive capabilities accumulated by local producers, the relationships established between producers and other agents, the form in which the property rights over productive resources are distributed in localized productive chains, etc. The problems experienced by the re-populated families living from production of "traditional" crops and agricultural practices, helps explain their motivation to diversify their productive activities and, in some cases, integrate themselves into the GBL's economic initiatives.

The distribution of land to small producers through the Land Transfer Program represented a change in the historical structure of production in Tecoluca that has enabled the emergence of the GBL's economic initiatives. These lands were initially transferred to groups of individuals within the local communities (sometimes several members of each family) under a regime known as *pro-indiviso*, which meant that every beneficiary had a certain amount of land but its location within the larger property was not determined. Initially this was seen as a condition favoring the associative production groups of up to 40 producers which were promoted by CORDES to collectively produce cashews, irrigated vegetables, multi-purpose cattle, etc. This form for organizing production, however, proved to be untenable due to organizational and managerial weaknesses, as well as the individual aspirations of the producers involved.

This ill-defined form of land tenancy proved to be a significant problem for the consolidation of family based economic activities. This obstacle was, however, overcome through a democratic process of decision-making concerning tenancy in each community which ended up individualizing ownership of land for productive and housing purposes, while maintaining collective areas for social use and forest reserves. In this process, the members of the associative groups growing cashews, with the support of CORDES, were able to negotiate rights to the land where their cashew trees were planted.

Local history and the history of the producers involved in the GBL's initiative are important, not only in relation to production efforts, but also in terms of the marketing of the fruits of these efforts. The fact that these lands in Tecoluca were once large cotton, sugar cane and cattle estates, that the small-producers are mostly ex-refugees or ex-combatants from the country's civil war and that they are involved in the larger effort of the Grupo Bajo Lempa in this FMLN municipality are all characteristics that potentially appeal to politically progressive organic and fair trade consumers. Further re-discovery of the past, especially in terms of the strength of the people's own organizational capabilities and ingenuity to deal with complicated situations, seems to me to be a potential source of as yet under utilized local knowledge.

Interactive learning and coordination with national producers

Along with the SAMO, there are two other associative producer groups involved in similar cashew production and processing operations in the Eastern Region of El Salvador. Over time there have been a series of unsuccessful attempts to form linkages between these three groups, including a process facilitated by the USAID program CRECER in the late 1990s to create a national association of cashew producers and processors. Although this process stimulated increased discussion of the

problems and opportunities of this sector, it did not achieve the expected result of consolidating a national organizational entity. One of the ex-managers of the SAMO plant participated in this process. Another attempt proposed linking the three initiatives in a pilot project to process cashew false fruit. This process was aborted as the initiative was not financed by the Japanese development agency JICA.[163]

The SAMO manager, Vicente Carranza, suggests that the internal problems facing each of these cashew initiatives have demanded priority attention, thus making greater cooperation between them more difficult. For example, the ex-CORALAMA cooperative (now ACOPASMA de R.L.) has had to face the serious continuing problem of paying off their significant debt to the organization UCRAPROBEX that provided financing for the renovation of their processing and export operations in the mid-1990s. Currently UCRAPROBEX, which holds the mortgage to their land, guarantees just enough financing (through the savings and loan cooperative FIDECOOP) for the cooperative to harvest their cashews so that these can be sold by UCRAPROBEX to make installments on their debt. The cooperative has the additional problem of dealing with a group of ex-members of the cooperative that have taken over 500 Mz of cashew plantation and are involved in a legal battle over property rights. These problems make it difficult for them to focus on anything else. The SAMO has tried unsuccessfully to buy raw cashews from the ACOPASMA cooperative, but are unable to meet the price paid by the intermediary that processes them in India for final sale in Japan.

Carranza argues that cooperation between the SAMO and the Cooperative Society for Cashew from San Ramón (SCPM) has been impossible due to the attitude of this association's ex-manager. He saw the SAMO as a competitor even though they sell their cashews in fundamentally different markets. He denied SAMO representatives access to their plant, arguing that their intention was to copy the Association's productive technology, which is similar to the SAMO's. One of the cooperatives in the Association also faced a land occupation during this time. Currently, with the departure of the Costa Rican manager and the solution of this land problem, there seem to be improved possibilities for collaboration. In order to increase production volume, the SAMO has forged relations with a group of producers that separated from CORALAMA but are still producing certified organic cashews. They are selling their cashews to the SAMO in return for limited financing to cover production and harvesting costs. SAMO also buys non-organic cashews from a group in the coastal region of the neighboring municipality of Jiquilisco, also part of the larger Bajo Lempa region.

The SAMO management had begun working with representatives of the IICA *FRUTALES* program to establish a process to create closer ties between the country's cashew producers. The proposal is to initiate a participatory process to characterize and analyze the strengths and weaknesses of the different groups and types of cashew producers. This information would then be used as the basis for discussion of future projections for the individual strengthening and further integration and cooperation between the disperse groups. One possible result of a jointly planned workshop would be the development of a project proposal for the Inter-american Development Bank (IDB) to support the development of cashew growing and processing in the three initiatives. Along these lines, Carranza is developing a relationship with the IDB country representative who he met at an event concerning innovation in rural agro-industry in El Salvador sponsored by the FUNDE.[164]

Carranza sees the possibility of obtaining long term financing under favorable conditions from the IDB as a fundamental basis for greater integration between these producer groups. Their principal need for such financing is to introduce improved varieties and production techniques for the renovation of existing

[163] The proposal for this pilot project was developed by the FUNDE as part of a consultancy for the JICA Study Team, a Japanese consultancy group working on the Master Plan for Development of the Eastern Region of El Salvador (Cummings 2004).

[164] The SCPM cooperative association had proposed a multi-year project designed principally to strengthen primary production and begin processing of cashew false fruit. However, the representative of the IDB suggested that it would be more feasible for the Bank to support a sector wide project involving a wider group of cashew producers in the country.

areas where the productivity of many of the trees is declining due to old age and the establishment of new plantations. Other areas of potential cooperation that could be supported by such a program, identified by Carranza, are: the establishment of a joint facility for processing the currently massive quantities of unused false-fruit and also collective commercialization efforts to be able to better meet the increasing demand of their buyers and strengthen their negotiating position.

In conclusion, there is potential for cooperation between SAMO and the other national cashew growing and processing initiatives; however their current relationship has never gotten beyond failed attempts and has been characterized by significant mistrust. Strengthening SAMO's relationship with other cashew producers in the Central American region could also provide a platform for improved performance through greater technological cooperation and joint marketing.

Positioning in national and international commodity networks and innovation

Market niche development and exploitation is a key element of the commercial strategy of the GBL's economic initiatives. For example, the SAMO's external connections within the network of actors that form the organic and fair trade cashew commodity network have had an important influence on their innovative performance. The requirements for marketing its certified cashews in international organic and fair-trade markets have stimulated learning and innovation and enabled the economic consolidation of the initiative.

The SAMO is, thus, a case where linkages with actors in their exogenous commodity network have provided important opportunities for learning and have stimulated technological efforts to innovate. This is a theme that emerges both in the literature on the more "developed" clusters in the North and on the emergence of industrial clusters in the South. Also relevant for their innovative practice are the differential product prices inherent in the different potential market channels for cashews. Significantly higher prices in the organic and fair trade niches motivated innovations to achieve certification and have provided the extra-resources to compensate paying their producer members higher than conventional market prices and slowly upgrading working conditions at the plant. The motivation and pressures involved in SAMO's connection to this dynamic exogenous market is one mechanism explaining divergent capabilities for technological upgrading between SAMO and other of the GBL's economic initiatives (Schmitz and Nadvi 1999).[165]

The quality of interaction (Orozco 2003) between the firms and their consumers or market intermediaries, is a crucial point differentiating the learning potential offered by the different market channels, and possibly their potential for economic return as well. For example, the key characteristic of the SAMO's relationship with their international market intermediaries is their disposition to pay premium prices, sharing those paid by the customers they serve directly.

As Raynolds (2004) argues, the SAMO's innovative practice and business performance are strongly influenced by the specialized international institutional and organizational framework that is developing in the form of organic and fair trade certification regimes and the actors whose function it is to apply them in contexts such as Tecoluca. This framework acts as a governance mechanism within this part of the cashew commodity network to regulate access to these market niches, as well as the local producer-international buyer relationship in relation to the commercialization of certified products. This institutional and organizational set-up provides the room for maneuver needed for novel local initiatives like the SAMO to be created, strengthened and labeled as organic or fair trade, within a larger competitive market arena (selection environment), which is generally inhospitable for them.

In contrast, the entrance into niches within the national market that recognize the quality of BIOLAC's novel dairy products, BIOTEC's bio-pesticides or eventually the SAAO's organic granulated *panela*

[165] The general importance of demanding clients stimulating technological upgrading can also be seen in the case of the Nilos I and II cooperatives working to meet the demands of the Petacones milk processing plant.

have been problematic and a major obstacle for economic consolidation. These initiatives seem less able to construct more than arms length relationships that would enable interactive learning with their buyers within the national market. In contrast, for the SAMO, people related to the international certification agencies have played a key role in sharing knowledge and stimulating innovation in order that the initiative, and especially the processing operations, could be become certified as organic.

Analysis of the marketing problems many of these initiatives are facing highlights the complexities of innovation in linked systems of production, processing and commercialization to meet the heightened demands of niche marketing on a national and international level. It also reveals the difficulties and the limited capabilities of a these initiatives to create room for maneuver within established market structures, to effectively carve out a niche in the national selection environment for their novel products. It is evident that the establishment of national market niches implies a concerted effort between the economic initiatives, their market intermediaries and organized consumers that is only just beginning to evolve in El Salvador. This again stresses the importance of understanding the quality of interaction that is established between regional producers and other national and international actors within commodity networks these producers are linked to.

Technological regimes and trajectories as frames for innovative practice

Beyond the immediate territorial context of relations with similar producers and relevant actors within immediate commodity networks, analysis of the GBL´s initiatives suggests that the national and international technological trajectories and more general regimes and frames in which they are embedded exert important constraining or enabling effects on their innovative performance (Dosi 1988; Bjiker 1995; McLoughlin 1999). More specifically, their innovative practice is enabled and/or constrained by the dynamics of the particular sectorial or technological systems of innovation; their interrelations with the groups of competing firms and supporting organizations involved in these systems and the way they relate to the sector specific institutional set-ups (Breschi and Malerba 1997). In general, analysis of the GBL's economic initiatives also reflects the complexity of the process of niche creation in relation to the co-evolutionary processes of technological variation and selection within certain technological trajectories and regimes (Schot 1992, 1998).

For example, the Green Revolution's technological regime's dependency on agro-chemicals has proved to be a formidable initial obstacle to establishing cleaner and eventually organically certified production routines in several of the GBL's initiatives. This is not only due to the immediate influence of this regime on the productive practices of those families involved, but also to the long lasting environmental effects of production regimes that dominated this territory in the past (for example cotton) and in the present (for example sugar cane). The use of extreme amounts and mixes of agrochemicals for cotton production caused chemical resistance in pests that infest vegetable crops, driving up production costs in the AGOLEMPA initiative. The aerial application of agrochemicals for sugar cane also causes problems for nearby vegetable producers (damaging their crops) and putting the organic certification of cashew crops at risk.

The fact that there is an increasing number of market oriented agricultural initiatives in El Salvador interested in reducing agro-chemical inputs and implementing organic production systems, provides the BIOTEC initiative with a dynamic and growing market opportunity. However, it is also clear that the market potential of BIOTEC's products depends largely on the future development of cleaner or fully organic production and the corresponding national and regional markets for their products. The viability of BIOTEC's individual contribution to the wider process of transforming the "green revolution" agro-chemical based technological regime that still dominates Salvadoran agriculture, depends highly on complementary activities of a diversity of national and international actors.

From a producer's perspective, the technological transition towards cleaner and eventually organically certifiable production requires important incremental changes over time in their production systems.

These may imply short term economic losses in favor of *projected* longer term productivity gains. There is, thus, a need for external public and/or private support to motivate and make this process economically viable for families unable to unilaterally absorb the risks implied. This is especially true do to the current lack of recognition by intermediate buyers and final consumers in the Salvadoran market of the increased value of cleaner or organic products. In addition there is the generalized lack of recognition of the environmental costs of the current technological trajectory versus the environmental services that a cleaner trajectory would provide, which should be taken into account in comparing the societal benefits and public support for these alternatives.

The globalized process of developing a technological regime related to cleaner, agro-ecological and organic agricultural and agro-industrial production is an important source of support for the GBL's initiatives. One key example is the development of organic and fair trade certification regimes that are an important source of innovative stimulus and knowledge for the SAMO, and the future export projection of several other initiatives, as mentioned above.

People involved in developing similar agricultural and agro-industrial enterprises, frequently in other countries, have provided important knowledge inputs to these local efforts. This has been true over time in the case of the SAAO *panela* initiative, in the case of the significant Cuban input to the BIOTEC case, and in the recent contribution of Brazilian experts to the future development of the SAMO initiative. In this way, the BIOLACT initiative has also benefited from the recent development and transfer of dairy production technology from Spanish based firms. This places them in the vanguard of dairy production in El Salvador and Central America in terms of the machinery they are using.

7.2 Dynamics of the Regional Enterprise Support Network

Understanding the emergence and consolidation of innovative economic initiatives within Tecoluca's regional production structure requires analysis of the integration and capabilities of the specific network of public and private actors providing enterprise support services. The emergence of a configuration of actors specialized in diverse tasks that directly support local enterprise development and relevant human capital formation is crucial to the overall capacity of the RIS to enable the implementation of innovative initiatives in regional economic initiatives. Tecoluca's emerging enterprise support network includes a limited number of universities and research centers focused on knowledge generation and diffusion, but it is mostly comprised of actors like NGDOs, territorial development programs and financial intermediaries that provide financing, technical assistance and training, marketing support, etc. directly to local enterprises.

Vestiges of Tecoluca's past regional enterprise support system

The civil war and the Peace Accords mark a definite break with the past in terms of the development of Tecoluca's regional enterprise support system, although, there are some important vestiges of the past that are relevant or potentially relevant for its current functioning.

I will not attempt a historical analysis of the elements of the regional enterprise support system that must have existed to support the development of the capital intensive technological systems related to cotton, sugar cane and cattle production, the introduction of the so called "Green Revolution" agrochemical technologies into the traditionally diversified corn and beans *milpa* cropping systems, as well as the construction and operation of a diversity of gravity fed irrigation systems and the corresponding vegetable production, etc. There is, unfortunately, no accessible "institutional memory" within the Agricultural Ministry that must have played an important part in these developments that would allow an exploration of what certainly would be a fascinating and relevant story.

It is worth mentioning that MAG-CENTA established an important regional center in Tecoluca for the generation and diffusion of technology to small and medium scale producers in this area. At the

end of the war, this center still had a significant full time staff of researchers working on problems relevant for the small-scale producers, especially focused on the introduction of higher yielding corn varieties and similar Green Revolution technologies. It also housed a significant group of agricultural engineers responsible for the diffusion of the technology generated on the experimental station to the groups of farmers they attended through demonstration plots and field visits. This regional center also housed the regional office of the MAG in charge of managing the public gravity fed irrigation systems in the area. In addition to this center in Santa Cruz Porrillo, near the Poligono de Solidaridad, there was an extension office in the town of Tecoluca which undoubtedly attended the dynamic group of small-scale vegetable producers located on nearby lands.

During the 1990s this situation changed, under various restructuring projects including a major one funded by a World Bank loan (Blandon de Grajeda *et al*. 1995). There are now many fewer technicians and scientists involved in technological experimentation, validation and extension although some activities remain at this regional station. The office in Tecoluca was closed towards the end of the 1990s.

The MAG also established the country's only center for the development and extension of fresh water aquiculture technology and coastal fishing management in the same town of Santa Cruz Porillo in Tecoluca. Currently there are efforts, with support principally from Taiwan and Japan, to stimulate aquiculture which has led to the renovation of the little used fish ponds on the site. However, the two professionals in charge of management and extension activities in an extensive regional area have a seriously restricted budget even to pay for transportation costs.

The National University of El Salvador also established a significant experimental station in one of the coastal municipalities located within the Nonualcos Region. It is not clear if there was ever any direct interaction between researchers and students working at this facility and producers in the region, but currently there is no such relationship. There is a smaller such facility that has been recently established at the regional branch of the University of El Salvador outside the city of San Vicente.

The existence of these four public experimentation and teaching facilities, implies significant established potential for research and interactive learning relevant for the development of innovative agricultural and aquiculture initiatives in this region.

Another vestige of the earlier innovation system is the rather extensive network of *agroservicios*, commercial operations supplying a diversity of chemical inputs to agricultural and cattle producers, but also advice (technological knowledge) concerning what products to use to solve certain problems and how to use them most effectively. This network is the backbone infrastructure linking the transnational companies, national importers and wholesale marketers of these products, to the local producers continuing along trajectories within the "Green Revolution" technological regime.

The powerful local, national and transnational commercial interests committed to the perpetuation of this regime and the strengths of the linkages producers have with their local chemical input suppliers, represent structural rigidities intrinsically opposed to the development of organic, cleaner production technologies (Schot 1992).[166]

One option emerging within the context of the GBL initiatives to deal with this problematic situation is the development of alternative producers and suppliers of organic inputs. BIOTEC is planning to commercialize its products through one or more national and/or regional distributors. Depending on demand dynamics, these products may end up competing in local *agroservicios* with chemical based "incumbent" products. However, at least for the time being, commercialization of Bio-Tric in the region will continue to be targeted to organized groups of vegetable producers through NGDOs or public organizations supporting them.

[166] Schot (1992: 179) identifies "coalitions of actors who have a vested interest in sustaining the dominant technology" as one of the key clusters of factors hindering the development of alternative technologies.

Also relevant, is the Agroservicio "San Carlos Lempa" (member of the GBL) which buys wholesale chemical based products, to offer them locally at competitive rates but also high quality imported organic inputs not available nationally. These products are imported from an Italian business man that has long supported CORDES' efforts in Tecoluca in different ways through a national company AGROCOMER, related to CORDES.[167]

The emergence of NGDOs as key players in the regional innovation system

With the Peace Accords, a fundamental change from the past is the emergence of NGDOs as key players supporting "traditional" economic activities, but also promoting a diversity of innovative economic initiatives in Tecoluca and the surrounding region.

As in the case of CORDES, the earliest NGDO work related to local economic development in the region was in support of the productive efforts of families repopulating local communities. In addition to CORDES there was a diversity of other NGDOs implementing international donor supported projects in land transfer communities in Tecoluca and throughout San Vicente and some of the municipalities in the Nonulacos Region.

Although an important share of the earliest NGDO projects were designed to support the initial subsistence efforts of re-populated families, these organizations have generally been committed to a medium-term strategy of diversification towards more profitable agricultural, cattle and small business enterprises. The consensus between the NGDOs on the strategy of diversification towards more marketable products was expressed in the earliest municipal development plans for Tecoluca, which were elaborated with a high degree of NGDO participation.

However, many of the earliest, and especially the most ambitious projects aimed at implementing these types of economic activities, failed to achieve their expected results. Especially important examples of failure were related to large scale projects financing aspersion irrigation systems and for the production of vegetables, as well as new more specialized crops like *jalapeño* peppers or marigold flowers,[168] both of which were to be sold under contract to national agro-industries. Problems arose with the associational governance of these projects by the producers supported by the NGDOs, the production techniques and the organization for production and commercialization of these relatively new crops. Other notable project "failures" were cooperatively owned cattle herds that ended up being mismanaged (distributed among community families, sold at a loss and/or just eaten at community festivities) and the credit never repaid to the NGDO's informal revolving loan funds.[169]

The point of this account is that neither the producers nor the NGDOs were capable of managing this type of large scale market oriented, associatively organized production initiatives, especially when these involved using rather complex techniques to produce more specialized novel products for market niches.

A major problem identified had to do with the complexity of managing the associative business aspects of these types of initiatives that ended up being controlled by a reduced directive committee of producers that used project funds to employ other members of the local families involved in the production processes. Different NGDOs had different proposals for how to best organize production, ranging from collective production under a formal cooperative structure (FEDECOOPADES), to smaller associative groups within a larger cooperative structure (FUNPROCOOP), to associative groups formed without any overall institutionalized structure (CORDES). Over time, production activities have tended

[167] This is also the source of the imported small-scale irrigation systems being sold to local producers.

[168] A yellowish orange flower used as input to chicken feed to increase the intensity of the yellow colored egg yolks.

[169] Further systematic research is needed to back up these assertions based on participant observation and a limited number of interviews by the author with NGDO personnel and producers in Tecoluca, synthesized in Blandon et al. (1995).

towards individual or extended family management and responsibility for financial obligations, etc. This tendency is clearly related to the above mentioned individualization of property rights concerning ownership of the productive land transferred to the re-populated communities.

A specific type of NGDO that is playing a significant role in Tecoluca's regional enterprise support network is service providers contracted by international funded projects and territorial development programs. Examples discussed below, include the NGDOs that worked for the USAID funded CRECER project that supported an initial attempt to upgrade *panela* production in the Jiboa valley and diverse NGDOs that have worked for the San Vicente Productivo and Prodap I and II territorial development programs in different capacities.

The enrollment of the Salvadoran state in supporting LED in Tecoluca

As stated in Chapter 2, the regional contributions of potentially important actors such as the National University of El Salvador and MAG-CENTA are especially weak. The educational functions of the regional branch of the University of El Salvador are severely limited and the university has no established programs for research, development and application of new technologies that could be applied to rural development initiatives like those being developed in Tecoluca regional context. There are no established mechanisms for the application of the limited agricultural research being conducted by students finishing as Agricultural Engineers. The limited technical assistance provided by CENTA has been focused on upgrading traditional subsistence grain crops, introducing high yielding seed varieties, etc. and its research functions have been severely curtailed.

The Salvadoran state no longer directly provides vocational technical training, but has granted a concession to a private entity to manage this subsidized public service. There are two technological institutes in the two intermediate cities in Tecoluca's regional context. However, one offers little more than basic courses in computer operation and programming, and the other is closed and the building is being used as a storage space for the ministry of education. There are, thus, not regionally available post-secondary non-university technical educational services directly relevant for technological innovation in agro-industrial or small scale manufacturing industries.

It is significant to note that relations between CORDES and the GBL task-networks, and representatives of the different executive branch line ministries have been improving. This is principally due to a systematic strategy to cultivate positive relations on behalf of these local actors, but also an increasing state awareness and interest in what the GBL is doing. Improved relations have been expressed locally through the GBL's progressively greater capability to leverage resources from different state agencies for different purposes directly or indirectly supporting economic development initiatives in Tecoluca. The enrollment of state cooperation in the construction of basic infrastructure is one indicator of this (as discussed in Section 7.3). Although this work has generally been financed by international aid agencies, the central government significantly influences the priorities established.

CORDES has also directly engaged some of these public sector actors as potentially important members of the regional business support network, to motivate and facilitate greater involvement on their part in supporting local economic development. The most relevant examples involve engagement with different dependencies and externally funded development projects associated with the Ministry of Agriculture to prioritize support for the GBL initiatives. This strategy involves advocacy with key decision-makers in the Ministry and the national government, but also building mutually supportive relationships with the local representatives from the branch offices of CENDEPESCA and CENTA in Tecoluca.

Other examples include the developing partnership between CORDES Bajo Lempa and the regional branch of the National University in San Vicente, where CORDES has enrolled a Spanish university to support its local counterpart to upgrade teacher qualifications and provide opportunities for further study by recent graduates. Another important collaborative effort is the pilot experience that the

Ministry of Education is implementing with local civil society actors, including CORDES, and the local government. This is aimed at improving educational services in the Bajo Lempa region which would be favorable for the viability of local economic development initiatives, such as the SAMO. CORDES has also advocated for the establishment of an agricultural program at a local high school and is negotiating the re-opening of San Vicente's post secondary vocational technical training school in the Poligono de Solidaridad complex, in order to improve the relevance of the technical training received by the students in relation to the GBL's rural development strategy.

The GBL's task-networks have been improving their relations with actors from the national system of knowledge creation and distribution, such as universities and research centers. For example, there is a relatively long term relationship between CORDES and a Salvadoran NGO specialized in applied development research (FUNDE). The FUNDE is a member of the Grupo Bajo Lempa and participates in the consortia's economic working group. It offers complementary competences to CORDES in the GBL, focusing on systematization and facilitating reflection on innovative practice in the economic and social initiatives. CORDES has also been developing increasingly important relationships with departments at several public and private universities, cooperating with their students to do research for their B.A. thesis, etc. Although, these relations have yielded only marginal impacts on the business performance of GBL initiatives in the short term, they could contribute to further reflexivity, providing specific knowledge inputs to the development of the innovative strategies of these initiatives and the GBL's overall economic strategy.

Territorial development programs' support for rural business initiatives

As suggested in Chapter 1, the Salvadoran state has largely withdrawn from direct support for economic development initiatives in rural areas. What support it does provide, is generally made in collaboration with international development agencies through the implementation of a diversity of territorial development programs. The principal programs being implemented in Tecoluca's regional context during the time of this study are described in terms of their objectives, principal action strategies and focus groups in Annex 3. Details concerning some of their work are provided through two examples of the regional enterprise support system at work supporting agglomerations of regional producers, potentially related to the GBL's initiatives. This discussion focuses on the capabilities (strengths and weaknesses) of the emerging regional enterprise support system to promote processes of technological transformation.

Agricultural diversification in the Lempa Acahuapa irrigation district

As a part of a larger effort to increase agricultural productivity in El Salvador through the use of irrigation technology[170], the Legislative Assembly created the Lempa Acahuapa irrigation district in 1986 (covering 1,480 hectares of land in 4 municipalities in the Departments of San Vicente and Usulutan on either side of the Lempa River). The stated purpose of this publicly administered system was to "substantially improve the livelihoods of the *campesino* population in the region, fomenting small rural property-holding, through improved land distribution, accompanied by opportune technical assistance and credit." A related purpose was to increase national agricultural production and thus the availability of basic foods to the population and material inputs for agro-industries.[171]

In 2003, under the provisions of MAG's Agricultural Reconversion Program (PRA) funded by a loan from the Inter-American Development Bank, the subsidized public administration of the irrigation system has been formally transferred to the newly legalized association of irrigation producers. Under

[170] See the general national proposals for increasing irrigated agriculture in CONAPLAN/ OEA, 1974.

[171] Asamblea Legislativa De El Salvador, "Ley De Creación Del Distrito De Riego Y Avenamiento Nº 3 Lempa Acahuapa" Decreto Nº 396, 1986.

the conditions of the transfer the state's subsidy of electricity and other costs are eliminated and full payment is now the producer's responsibility (*La Prensa Grafica* 15/11/04).

In order to provide opportune public technical assistance to the Lempa Acahuapa producers, CENTA founded a branch office in situ. Currently, although this branch office remains open, the maintenance of the technical staff depends highly on territorial development programs such as Prodap II which is currently covering the salaries for part of CENTA's technical team. In addition, Prodap II and San Vicente Productivo (SVP) have contracted several NGDOs to provide technical assistance and financing in order to strengthen the capabilities of these producers to compete in the national market against imported vegetables and plantains from other Central American countries.

Of special concern is the under-utilization of the systems productive capacity, both in terms of cultivated areas and its use for subsistence crop and cattle production.[172] As a result, in recent years there has been a renewed promotion of agricultural diversification towards more risky and capital intensive, but potentially profitable crops, including a diversity of vegetables and now plantains.

San Vicente Productivo financed a feasibility study for the program's investments in plantain production. This study identified a number of potential areas within the department of San Vicente for plantain production, focusing on the irrigated fields of Lempa Acahuapa and also several other irrigation systems located in north and central Tecoluca. This study concluded that there was a significant market opportunity for plantains, especially in higher paying niches like super markets. It further recommended that the potential profitability of different scale productive operations (1-5 Mz) based on data from plantain producers in Lempa Acahuapa area, justified the implementation of a project to finance a significant extension of plantain production in the areas of greatest potential (FEDARES 2002). This study was shared with members of San Vicente's Committee on Technological Innovation (CIT).[173]

Based on this study, the San Vicente Productivo program elaborated and implemented a plan to increase plantain production areas and upgrade production technology. One significant activity to support innovation in plantain production was financing support from expert agricultural engineers from the FHIA in Honduras which is one of the world's leading centers for technological knowledge related to plantain and banana production.

The financing for plantain production, however, remains a significant problem. San Vicente Productivo has placed special fiduciary funds in several public and private banks with branches in San Vicente. However, many producers do not have access to these funds due to previous debts, their inability to present production proposals that meet the banks' approval or their reluctance to place their most important productive asset (their land) as collateral for such a loan.

Discussion within the CIT of the efforts to promote technological innovation in plantain production, also suggest that there is a significant lack of coordination between technical service providers contracted by the different territorial development programs implementing projects in Lempa Acahuapa (especially San Vicente Productivo and PRODAP II). This situation has led to the duplication of efforts and the concentration of technical assistance on a few leading producers. There is no immediate incentive to coordinate action which diverts time and resources from the primary goal of achieving expected results in the contracted times. There is also an incentive to enroll the best producers that will facilitate this process, thus the concentration of the effort on those that can most easily absorb and implement the knowledge being provided. This lack of coordination was identified as the first priority to be solved by the CIT's plantain working group (formed in May 2004). However it seems that little or no concrete actions have been taken (personal communication Emilio Espin 2004).

[172] Fabio Mejía from SVP stated that only 20% of the total 3 thousand manzanas integrated in the Lempa Acahuapa district was being fully utilized (http://archive.laprensa.com.sv/20030210/departamentos/departamentos.asp).

[173] This regional body and its action are described in more detail in Section 7.3.

Reconversion of traditional panela production in San Vicente

An initial attempt in the mid 1990s to strengthen the collective productive and marketing capacity of the small and medium scale *panela* producers in San Vicente was made by the MAG/USAID funded project, CRECER. Through CRECER's promotional efforts a group of 29 producers, possessing 18 trapiches and producing a total of 140 *manzanas* of sugar cane were integrated into a legalized Cooperative Association, ACOPADES. The cooperative was formed with the vision of taking greater advantage of the producers' productive resources, improving the quantity and quality of *panela* production. The project was also looking to improve the producers' negotiating power with commercial intermediaries, upon whom they depended and by whom they were being exploited; eventually achieving direct market access and a more just price for their *panela* and other sugar cane by-products (Contreras 1999). The cooperative received additional logistical support from the MAG-IFAD program PRODAP I to establish a functioning business office (Castro, personal communication, Nov. 2004).

Through improved access to training, technical assistance and financing for investments, the producers significantly improved their collective production and marketing capabilities. However, when CRECER´s project was phased out, the instability of the organizational structure was revealed. Significant problems arose with the non-transparent leadership style and inexperienced administration of the cooperative business, as well as the payment of an unsustainable debt load, caused the cooperative to break up in practice, although it still exists legally.[174]

Currently many of these *panela* producers are involved in the formation of a new associative effort that has been legalized as a cooperative under the name ACOPANELA. Beginning in 2003, PRODAP II began supporting this organizational effort. However, as the technician in charge states, the initial emphasis has been on identifying mutual interests for working together and thus building the basis for a viable associative business venture.

PRODAP II´s initial support for the group has been channeled through a series of NGDO consultancies. The tangible products of these consultancies are two planning documents related to production and marketing. Some initial conflicts arose as to these results, as the producers expected more hands on support for the implementation of these professionally produced and presented plans. This seems to have been taken advantage of to strengthen the Cooperative's relationship with the PRODAP II project team in preparing terms of reference for contracting future service providers to support the implementation of these plans.

While most of these producers are working to improve their capabilities to produce and market traditional solid *panela*, several lead producers are now involved in experimenting with the production of granulated *panela*. The initial motivation of these producers to produce granulated *panela* arose from a discussion of the potential advantages with the CORDES regional manager and a visit to the non-functioning SAAO plant. Based on this visit and his significant tacit knowledge base related to the process of producing solid *panela*, one of the ACOPANELA members was able to adjust his production process to produce granulated *panela* and begin marketing it. Market acceptance of his product has, in turn, stimulated the interest of the cooperative's president and other lead producers to move in this direction.

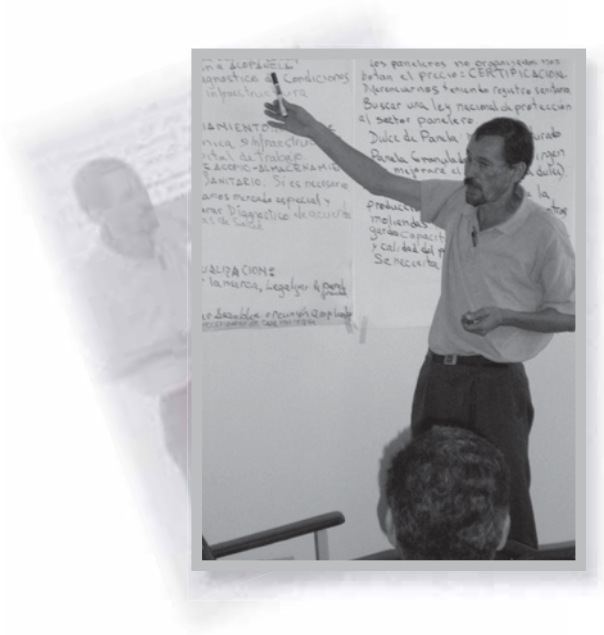
Members of this newly integrated cooperative have been collaborating with a group of NGDOs, territorial development programs and public organizations to elaborate a basic strategy to strengthen the competitiveness and sustainability of their productive operations. The proposal is to introduce a process of incremental innovations related to the production and marketing of granulated *panela*. Special emphasis is being placed on the immediate goal of upgrading a significant number of producers

[174] Appreciations based on personal correspondence with Cesar Emilio Castro, in charge of the Marketing and Rural Micro-enterprise program at PRODAP II, and informal interviews with ex-members of ACOPADES, who were leading the effort to form ACOPANELA, 2004.

to produce granulated *panela* that meets the requirements for sale in formal national market segments. This group, called the *Panela* Working Group was formed as a CIT initiative.

Within the context of this strategy, PRODAP II supported a group of *panela* producers to travel to Honduras to visit several producers of both granulated and solid *panela*. This visit served to further increase the group's motivation to improve their production facilities and begin production of granulated *panela* on a larger scale.[175]

As the ACOPANELA initiative has developed, it has drawn the attention of other *panela* producers from the same region and also a medium sized producer from another part of the country. Parallel to the emergence of this cooperative, another group of small scale producers was also emerging in nearby municipalities. This group is receiving technical support from another NGDO (FADEMYPE) in its efforts to rebuild its productive operations after the earthquakes and improve market access, still dominated by local commercial intermediaries. This group is now in the process of joining ACOPANELA after meeting at the first regional Panela Forum organized by the CIT. This integration of efforts will increase the collective productive potential of the cooperative although possibly implying more organizational challenges due to greater diversity.



Producer presenting proposal of "steps to follow" at the first CIT *Panela* Forum in San Vicente, 2004.

The importance of the integration of the (non-local) medium sized sugar cane producer is his innovative business sense, in addition to a significant production volume from over 150 mz. of sugar cane. This is already impacting the initiative as he is proactively establishing contacts with sources of expert technological knowledge in Colombia and Honduras, in order to better inform the process of selecting future technology for the production of granulated *panela*. Although this process has not been easy he now has detailed information on a Colombian developed machine that finalizes the granulization process, guaranteeing more uniform results [176]

Prodap II's support for the group is now being coordinated with a project being implemented by a Canadian NGDO (the Canadian Hunger Foundation CHF/Partners in Rural Development). Through a partnership between CHF/Partners and Centromype, ACOPANELA entered into a program to prepare

[175] One of these groups producing granulated panela was the COMAL community commercialization network to which CORDES is related and which provided support for its building several trapiches, including the one in La Sabana in Tecoluca (SAAO).

[176] Personal communication with Juan Jose Ortuño, 10 November 2004 and March 2005.

them as potential exporters; strengthening their production and commercialization capabilities through technical assistance and financial support (El Diario de Hoy 07/04/2004).[177]

As an indicator of its increasing marketing capability ACOPANELA recently participated as one of 14 Salvadoran agro-businesses in the 2003 exposition of Latin American Foods and Beverages in Dallas Texas and is offering granulated *panela* under the new registered trade mark "La Molienda" through the web page of CENTROMYPE.[178]

In relation to the SAAO initiative, the relevant members of CORDES technical staff were invited to join the *Panela* Working Group and attended the first workshop held with wider participation of the *panela* producers and the support organizations. They have, however, chosen not to pursue further collaboration with ACOPANELA at this time. As discussed in Chapter 5, CORDES is involved in its own systematic process of trial and error experimentation to learn how to produce granulated *panela*. However, further collaboration, after the initial visit by ACOPANELA to the SAAO, has not been possible due to a climate of mutual distrust the exact causes of which are unclear.

These two examples of the regional enterprise support system at work supporting the emergence of innovative practice in these two agglomerations of regional producers are analyzed in comparison to CORDES' support for the GBL's economic initiatives in the extended conclusion to this section. First it is important to discuss the relevance of extra-regional connections mediated by the regional enterprise support network.

Relevant connections to international innovation systems

Relations with actors from the national innovation system are only now emerging as important factors favoring the innovative practice of regional economic initiatives. In contrast, regionally mediated linkages with actors from systems of innovation in the international context have been directly relevant, even determinant, for the implementation of innovative alternatives in the GBL's and other regional economic initiatives.

CORDES and the GBL's initiative task-networks have established significant relations with different public and private organizations for international cooperation. Without their support it would have been difficult or impossible to implement the innovative processes that have defined these initiatives' development trajectories. Complementarity with these actors is based on shared priorities in terms of combating poverty and promoting sustainable rural development in El Salvador in the context of the transition from armed conflict to peace and development after the destruction from Mitch and the earthquakes in 2001.

Analysis of the two additional examples of innovative initiatives emerging in Tecoluca's regional context, further demonstrates the importance of international funding for territorial development projects without which there would likely be no such efforts or they would be significantly more limited.

Regionally mediated flows of expert knowledge have been key for innovative efforts in relation to the production of granulated *panela*, irrigated plantains, organic cashews and gourmet cheeses in diverse regional initiatives. In relation to the SAMO initiative, it is especially important to recognize the contributions made by the organizations and people involved as organic and fair trade certifiers and commercial intermediaries, supporting local understanding of these requirements and motivating innovative changes in local production systems to meet them.

Other relevant connections to actors embedded within the same sectorial technological systems, trajectories and regimes and the external commodity networks in which localized economic initiatives

[177] http://www.elsalvador.com/noticias/2004/07/04/negocios/neg1.asp

[178] http://www.centromype.com.sv/

are embedded (discussed in Section 7.2) could also be considered as part of the national and international innovation systems.

Analyzing the work of the regional enterprise support network

As Anderson and Lundvall (1997) and Cooke (1999) argue, the flow of knowledge and other resources from actors from the regional business support system has been a fundamental contributing factor in the attempts to introduce technological innovations in the principal agglomerations of economic activities within Tecoluca's regional context. However, analysis of the practice of the different types of business supporting actors that Helmsing (2001) identifies reveals the weaknesses of this system in terms of its capabilities to provide economic actors with access to specialized services designed to meet their business needs, especially related to the incipient technological transformations they are implementing.

For example, the localized contribution of public and private universities and technical training centers is especially weak, being basically limited to the formation of young professionals that *could* eventually become involved in the innovative processes under way, in business management or through the provision of services for technical assistance or training. The national and regional universities do represent a potential source of knowledge to support innovative developments in areas like biological pest control and the production of granulated *panela,* through the production of student investigations and work on their experimental stations. However, their practical relevance seems to depend highly on the proactive capabilities of local actors to enroll and support their services, as their extension capabilities are exceptionally weak.

The regional producer associations that exist have not taken an active role in providing technical and financial support services directly to their members. Instead they have served as conduits facilitating the provision of services to their members by external organizations, principally NGDOs. There is a tendency for regional producer associations to assume greater responsibilities in this area as they consolidate. Within the GBL, several of the economic initiatives are providing or projecting the future need to provide services of technical assistance and training as well as limited financing directly to their producers and workers. This is a role that groups like ACOPANELA or the cattle producers associated to ACDSNV may take on in the future. The cattle cooperatives Nilos I and II have established a more endogenous process of upgrading their production capabilities through interaction with the *Petacones* milk processing plant, in order to qualify as regular providers. Although they have have a small-scale processing plant, they were experiencing difficulties making these operations viable, with only sporadic external technical and financial support.

The most important actors contributing to the process of technological transformation in regional agglomerations of economic initiatives have been different types of NGDOs involved in technology transfer and enterprise promotion activities; operating with greater autonomy as implementers of internationally funded development projects or under more restrictive terms of reference as service providers for internationally funded territorial development programs. In some cases their actions are being complemented by the state through MAG-CENTA and CENDEPESCA.

One key distinction between these two types of NGDO actors is the extent to which they are able to establish and maintain the intimate contact needed to build up the mutual understanding and trust required to facilitate the dynamic assimilation of the exogenous technological components they are transferring, especially their more tacit components (Morgan 2004). It seems like CORDES' territorial roots and localized identity serve as a more stable platform on which to establish the reciprocal knowledge and complementary resources flows required for the co-evolution of service and productive specializations.

For example, the Jiboa valley *panela* producers have received technical support from a series of NGDO service providers working under contract with first USAID and then the Prodap I and II projects. The

weakness this mode of support for the implementation of transformations in organizational, productive and marketing aspects of their technological systems, is reflected in the disintegration of the initial cooperative formed.

It seems as if the producers and some of the same people within the PRODAP II organization have, however, learned lessons from this initial effort. These are enabling them to improve their working relationship in the renewed effort to promote integration among the producers, technological upgrading in their production operations and improved marketing practice. The producers involved in this new effort are building a seemingly more solid organizational base for their efforts, based on greater reflection as to their needs for cooperation and less on motivations to access resources through the cooperative. While their associative effort will provide greater access to resources, these are being directed towards the individual producers based on an analysis of their specific needs for production upgrading. ACOPANELA is also being supported by a greater diversity of external actors, including another larger sugar cane producer interested in *panela* production, which should provide greater and more continual access to relevant knowledge and capital resources for their innovative efforts.

As discussed in Chapters 5 and 6, CORDES has also encountered problems with the consolidation of several of the economic initiatives it has promoted, most notably the SAAO *panela* initiative. However, this experience also seems to have motivated them to improve their internal research and development process in combination with a more directed search for external knowledge inputs.

In both cases, these efforts have extended over significant periods of time and have involved the same producers and support personnel in interactive learning efforts and the co-evolution of producer capabilities and interests and the provision of support services. In the case of Prodap I and II's support of the Jiboa *panela* producers, these qualities are embedded in the relationship between the head of the business support program and the producers. The relationships between the NGDO service providers they hire and the producers are decidedly more temporary and fragile. The NGDOs involved in the initial USAID supported project that formed the first cooperative are no longer part of the story, for example. On the contrary, CORDES is assuming an ever more proactive role in the region (as discussed further in section 7.3).

In general, the Tecoluca region seems to be a good example of the innovation paradox discussed by Oughton *et al*. (2002) in reference to the apparent contradiction between the need to make investments to support innovation in the EU's "less favored regions," as well as their capabilities to absorb public funds earmarked for this and to mobilize complementary private funds. As they suggest, in Tecoluca's regional context a central problem that seems to explain this paradox is the unarticulated demand on behalf of the producers; i.e. the inability to clearly specify their needs for support to develop and implement innovative technological alternatives to their production and marketing problems. This negative dynamic forms a vicious circle when combined with inability of the actors from the enterprise support network to design and deliver services adequate for the development of the innovative capabilities of local producers and small scale agro-industrial business initiatives over the time required.

As Morgan (1997) suggests, solving the problem of "receptivity on the demand side," is particularly difficult as this requires building technological and entrepreneurial competences, as well as the organizational learning abilities that enable a continuation of the transformation process; i.e. the capability to dynamically assimilate exogenous technological elements. There seems to be insufficient differentiation of strategies for service provision and technological proposals in relation to the diversity of productive and marketing capabilities and the interests of producers (Schmitz and Nadvi 1999). This was clearly identified by the members of the GBL Economic Working Group, as a weakness in CORDES' implementation strategy. Correspondingly, the development of differentiated, step by step strategies for supporting family production capabilities was incorporated into their proposal for strengthening the GBL's economic development initiatives (ETM 2004).

In relation to the examples of external support for plantain production in Lempa Acahuapa and *panela* production in central San Vicente, the focus has been on upgrading the technological competences related to production. They have also looked to improve the entrepreneurial competences related to business planning and making adjustments in marketing activities to commercialize greater quantities of improved quality products. As Nadvi and Schmitz also suggest, these efforts have been directed at collectives of actors in a way that has encouraged mutual cooperation and learning, and have been oriented towards meeting clearly identified market demands for quantities and qualities of plantains and granulated *panela*.

However, there seems to be a continued dependence on the external agents to search for improved product, organizational and market options. The marketing studies and business planning processes designed to improved entrepreneurial capabilities are facilitated by externally financed agents. This is not really unusual, considering the types of associative economic initiatives being discussed and the early stage of their business consolidation. However, the endogenization of these capabilities within the producers' association should be an explicit goal of the external support actors. This is crucial if they are to be able to manage a process of continual upgrading and thus reduce dependence on frequently fragile dynamics of external support, as argued by Morgan (1997) and Schmitz and Nadvi (1999). The integration of the medium sized producer with more business experience and search capabilities in ACOPANELA may prove to be an important step in this direction, depending on how his relations with the local producers evolve.

Similar issues have been identified as crucial in relation to the GBL's economic initiatives where these types of innovative capabilities are developing at different speeds in the diverse initiatives. The transfer of ownership and management power from CORDES to the producer cooperatives and business management seems to be marking a crucial inflection point in the development of these capabilities as they are necessary for the consolidation of business activities.

As a final comment, there is an identified demand for greater understanding of the motivations and capabilities of regional producers in terms of their needs for support for the implementation of innovative alternatives in their production systems, and the apparent opportunities for integration into innovative economic initiatives being promoted by actors from the regional enterprise support network. This type of anthropological study of innovative motivations and capabilities of producers integrated and not integrated into different regional initiatives was proposed by the CIT and designed by the FUNDE, but its implementation was never financed.

7.3 Territorial Governance System and Capabilities

This section characterizes the emerging system of territorial governance within Tecoluca's regional context and the capabilities of actors engaged in territorial governance practice to facilitate the emergence and consolidation of local innovative economic initiatives.

The emerging role of the municipal government in promoting LED

The municipal governments in Tecoluca and the rest of the regional context have only recently begun to actively promote local economic development, and in many cases this is more a desire than a reality. The municipalities are under increasing pressure to become more active in this area, especially from below, as the local population and some producers and local firms have turned to their locally elected officials to try to resolve problems related to un-employment and the profitability of their productive activities. Processes of municipal and regional development planning, being promoted by municipalities in cooperation with territorial development programs, NGDOs and other actors, are increasingly focused on local economic development and ascribe an increasingly active role to the municipalities in this area as the entities responsible for coordinating implementation.

In a Northern context, basic education, health, housing, water and sewage, etc. service provision and related physical infrastructure are taken for granted as local conditions for local economic development. It is, thus, important to emphasize that in many Southern contexts, these are not. For example, the ability of local actors to communicate internally with each other and externally with other actors, which is fundamental for many economic activities as well as coordinated action, is dependent on adequate roads, transport services, electrical and telephone infrastructure. Securing these basic socio-economic conditions is important to give families support in establishing a localized livelihood and a sense of territorial belonging on which they can build; taking advantage of opportunities to integrate themselves into more innovative and risky economic initiatives.

Tecoluca is now at a transition stage, wanting to focus more attention on LED, after important efforts to overcome the historical infrastructure deficit, rebuilding the municipality after the damages caused by the civil war (1979-1992) multiple floods (e.g Mitch in 1998) and earthquakes in 2001. In the past, both the local people's and the government's priorities for public investments were focused almost exclusively on completing this task, and pressures to continue this focus continue as the expanding municipal population demands services not provided by private companies providing land for urbanizations, for example.

Tecoluca's municipal government has demonstrated a propensity to actively enroll community representatives in participatory planning of municipal investments and has established mechanisms for the transparent communication of relevant information concerning the municipality's investments and other actions. However, they have been only partially successful in incorporating economic development considerations into their yearly participatory planning process, which continues to be focused on the construction of basic infrastructure projects. Especially lacking has been the participation or economic agents directly in this process.

It is therefore significant that the promotion of local economic development is at the center of the proposals integrated in Tecoluca's Territorial Development Plan. The attraction of external investments to create jobs, building relevant infrastructure and promoting local tourism, crop diversification through the use of irrigation, adding value through processing and packaging and in general, promoting greater commercial orientation to current economic activities, are some of the proposals made to the deal with the municipality's economic problems (Municipality of Tecoluca, 2001).

Within this context, the municipality has increasingly promoted local economic development by focusing efforts to mobilize external financing on building infrastructure designed to facilitate local enterprise activity. This has resulted in the construction of two substantial municipal market spaces, the basic infrastructure for a public/private venture to establish an ecological/ archeological park and complementary infrastructure to stimulate private tourist enterprise activity, all contemplated in their development plan. A significant reason for this is that these fundraising efforts have been closely coordinated with CORDES.

The municipality does animate the enrollment of different actors relevant for local economic development in the Municipal Development Committee (CDM) and frequently stresses the need for greater coordination of activities to promote economic development initiatives, as Cooke (2002) suggests. However, the principal actors promoting greater municipal involvement in this area are the NGDOs ,CORDES and FUNDE. It seems that until the municipality has integrated at least one professional with adequate experience in the field of local economic development into its technical team, the municipality will be unable to make qualitative advances playing its role as promoter and coordinator of LED practice in Tecoluca.[179]

This represents a severe limitation in the LED process, as without greater municipal involvement it is unlikely that economic actors not integrated into the GBL will become motivated to participate.

[179] This is the informal consensus among the key people from CORDES, the FUNDE and the municipality involved in this process, including myself.

NGDOs may be legitimate participants in this process but not as coordinators of a municipal process to promote greater integration and synergy between economic actors. The powers of NGDOs to mobilize other actors is frequently derived from their management of project resources, which in the case of CORDES are currently insufficient to cover identified needs in the GBL context, much less in the municipality as a whole. The nature of the process itself demands stability over time for work on this specific task. NGDOs would have trouble financing this type of presence through projects, without the decided long term support of the municipal government (with increased resources), some permanent central government program, or an international agency such as the GTZ, committed to development efforts in the Nonualcos region in the medium term.

As Oughton *et al*. (2002) suggest, the potential role of the municipalities as catalysts for "articulating and dynamising" Tecoluca's emerging regional innovation system, would be facilitated by their political legitimacy, especially if there was cross-party diversity among those involved. However, they currently lack the access to the kinds of resources that the EU's Less Favored Regions have at their disposal. They also lack human capital resources capable of playing the proposed role of facilitating linkages between diverse actors, articulating demands among firms for support in innovative ventures and the complementary capabilities of business service providers, universities, etc. This is not only a problem of capital resources, but also of finding people with adequate professional training and concrete experience, not already committed to better paying jobs. This suggests the need for associational mechanisms between municipalities and other key actors to form regional technical teams to promote territorial economic development.

On a regional level in both San Vicente and Los Nonualcos the municipalities are being asked to play a progressively more proactive role in promoting local economic development. For example, the Mayor's Council of San Vicente along with the national association of municipalities (COMURES), mobilized resources for the elaboration of a strategic development plan for San Vicente, and they must take a central role in promoting its implementation. The associational efforts between municipalities in the Nonualcos region will also be increasingly focused on economic issues as FORTALECE steps up is efforts in this area. In both cases, Tecoluca's municipal government has assumed a leadership role and is perceived as an example of a municipality increasingly involved and capable of promoting local economic development.

Associational governance mechanisms related to LED in the Tecoluca region

On a municipal level as well as in the region surrounding Tecoluca, there are several articulated spaces integrated by public and private actors concerned with local economic development activities. As suggested in Chapter 4, the formation of these mechanisms has facilitated interaction between a diversity of local and external actors in relation to developing joint strategies, mobilizing resources and coordinating actions necessary for their implementation. Two examples are discussed below, one on a municipal level in Tecoluca and the other on a departmental level in San Vicente.

Tecoluca's Municipal Development Committee

In Tecoluca, promoting coordination between the multiple NGOs working in a diversity of local development fields started as early as 1993 when several coordination spaces were established. One significant early attempt to promote collective development planning and the coordination of NGDO activities occurred in the context of the formation and initial development of the GBL's first micro-regional organization, the Social and Economic System (SES), inaugurated in 1994. This micro-regional organization initially integrated the base organizations from the 15 repopulated communities in the coast of Tecoluca, together with CORDES, CRIPDES and the remaining diversity of NGDOs working with these communities. As with the subsequent attempts to promote coordination there were some significant advances made but also many joint activities planned but not implemented.

After the FMLN won the municipal elections in 1994, there was an effort led by the new government, CORDES Bajo Lempa and the FUNDE to form a municipal development committee (CDM). The CDM was designed as a mechanism to facilitate *concertación* or concensus building around a shared local development strategy and coordinated actions to implement it. The initial focus was to promote coordinated efforts between NGDOs, different community base organizations, the municipality and the local representatives of the Central Government's line ministries. Along these lines, working groups were formed to address economic problems, health and educational issues. Later the CDM became much more a municipal level organization of elected community representatives from Tecoluca's 7 different geographical sectors, and its focus was more on the promotion of citizen participation in local governance and especially the decisions concerning priorities for municipal investments.

As of 2004, the Municipal Development Committee further developed its territorial dimension, promoting coordination between the different community base organizations in each geographical sector and representing each sector on the municipal level. The Municipal Development Committee also integrated a municipal level committee of the most important public and private local development actors including the Municipality, to coordinate the implementation of the strategic municipal development plan.

Given the increasing emphasis on economic issues, a specific working group was formed to consolidate a municipal economic development strategy in relation to the general development plan and to coordinate efforts for its implementation. However, this group was disbanded due to the inconsistency in the municipality's participation. As the majority of the other organized economic actors were part of the GBL, the decision was later made to instead invite the municipality and other municipal level economic actors to participate in the GBL's economic working group (Espin, personal communication 2004).

Out of this effort arose a municipal level committee specifically oriented towards coordinating the promotion of tourism activities. This group has remained active and is making some modest gains. The most proactive actors are those related to the GBL. However, the municipality is implementing a project to create an ecological park in the north of the municipality that will be related to the future development of a significant pre-Colombian archeological site on adjacent lands. The municipal market in San Nicolas is also part of a planned tourist complex on the banks of the Lempa River for which the municipality has already purchased land. The development of these efforts will force them to increase their involvement in tourism.

San Vicente's Technological Innovation Committee

San Vicente's Technological Innovation Committee (CIT) integrates representatives from NGDO service providers including CORDES and FUNDE, CENTA and internationally supported development programs active in this area. The results of the internal evaluation for 2003 suggested that there had been significant advances in areas like development planning, the facilitation of interchanges between producers and technicians involved in similar activities, as well as the diffusion of technological packages through "popular" style handbooks. However, it concluded that the actual level of coordinated activities related to the promotion of technological innovation and the implementation of the CIT's Agricultural Development Proposal for the department was deficient (CIT 2003).

Several of the more relevant actions made by the CIT are further discussed in the following sub-sections.

Engagement of economic actors in associational governance practice

In the Tecoluca region, there has been a notable absence of economic actors participating in associational governance practice. In part, this seems to be a problem with the ways in which the associational governance mechanisms are set up and function.

For example, in Tecoluca, the Municipal Development Committee does not promote the election of producer representatives to participate along with those from community directive councils and other social base organizations in the informational assemblies and participatory planning processes in the municipality's 7 geographical zones.

In 2004, the FUNDE facilitated a coordinated effort between the CDM and the municipality to engage the small-scale producers using gravity fed irrigation systems in a process to identify problems and alternatives for solutions related to the functioning and management of their irrigation systems, as well as their production capabilities. This was a priority set in an initial meeting between these actors to discuss their roles in local economic development and the implementation of the municipal development plan.

The initial phase of this process involved several workshops with the participation of significant numbers of producer representatives, the CDM sectorial representatives and the municipal staff member in charge of managing the gravity fed water systems in Tecoluca. As a result, several priority problem areas were identified and actions agreed upon to deal with them. However, as reflection and planning passed into action to implement the agreements, the insufficient capabilities of the CDM, the municipality and the FUNDE to continue this process with their existing resources became apparent and the coordinated effort was eventually abandoned.

Beyond the greater understanding of the problems faced by these producers and the generation of ideas for potential solutions generated through this process, the most important result was getting the San Vicente Productivo program to support the legalization of several of the producer organizations, so that they could collectively engage the authorities from the Agricultural Ministry and the municipality in negotiating water use permits and the fees to be paid, as well as confront larger water users in disputes over water rights.

Another problem for the engagement of economic actors, is that there are no municipal level organizations of small-scale producers, owners of small-scale commercial or manufacturing enterprises, etc. This would be an indispensable condition for their participation in associational governance, exerting influence on the municipal government investments, as well as participating in the elaboration of local economic development strategy and its implementation through enrollment in concrete initiatives. With the exception of several associations of irrigation system users, the only associations of small-scale producers in Tecoluca are those integrated in the GBL's economic initiatives.

There have also been no concerted efforts to engage the larger sugar cane and cattle producers that use municipal lands for production, although they frequently reside outside the municipality. These producers are loosely organized in function of their interests in terms of promoting security from the national civil police and road maintenance from the municipality and/or public works vice-ministry. However, they frequently cause problems for smaller scale producers and local families; monopolizing scare water resources to irrigate their sugar cane fields and pasture lands, using airplanes to apply agricultural chemicals to sugar cane fields, and deteriorating the local roads through the use of heavy transport vehicles, without making any direct contribution to their repair. Beyond possible negotiations with respect to solving these problems, these types of producers are also not engaged in any way in the elaboration or implementation of the municipal strategy for economic development. Although they important players given their capital resources, varied networking contacts, etc., it is not clear what their interests or possible contributions might be in practice.

There is also little contact between the municipality and other local actors, such as CORDES, with the two main agro-industries located in or on the border of Tecoluca: the Petacones cheese processing plant and the Jiboa sugar mill. In the past, this relationship has been antagonistic, as the municipality and CORDES have worked with local producers and communities to resolve problems caused by inadequate wastewater treatment at these plants. In both cases, these local actors were able to engage

national environmental authorities and demand that Petacones construct improved wastewater treatment facilities and that Jiboa pay for economic losses to cattle and crops after poisoning a local water source. No attempts to construct more positive relationships with these industries have been made.

On a regional level, the CIT's configuration and functioning have been intentionally designed to accommodate the integration of different types of actors related to the regional enterprise support system, not representatives from producer or business associations.

During 2004, the CIT made initial attempts to develop more direct relationships with producers involved in several regional agglomerations and other relevant actors from the value chains in which these producers are integrated. The CIT prioritized six value chains and formed working groups among organizations already supporting producers involved in these agglomerations. These groups were to coordinate actions with these producers to develop and implement specific strategies to strengthen their competitive positioning in the value chains, upgrading their organizational, managerial, productive and marketing capabilities. The only one of these groups that was able to obtain any concrete results was the *Panela* Working Group. Although it ceased to exist as such, the dynamics it set in motion continue. Future perspectives for the CIT clearly identify the need for it to play a proactive role in promoting the implementation of rural economic development strategies in direct relation to producer groups and other economic actors (CIT 2004). If it will be capable of doing this is yet to be seen.

Finally, taking SAMO as an example, the coordinated groups of actors participating in these associational mechanisms, at different levels within Tecoluca's RIS have been largely unable to initiate processes directly relevant for its innovative practice. One important exception was the recent visit of Brazilian cashew experts which was coordinated through the CIT. In general, however, the *quality of interaction* (Orozco 2004) between the agents in this localized system has been insufficient to represent more than future opportunities for strengthening their innovative practice. There is also a lack of motivation by the SAMO to take advantage of the potentiality these spaces offer in terms of connections to sources of knowledge, capital and other resources that could be employed to strengthen their innovative practice.

The interaction that does exist between the GBL economic initiatives and the actors from the enterprise support network and the associational governance mechanisms of Tecoluca's emerging RIS are almost entirely mediated by CORDES Bajo Lempa. The NGDO through its networking activities (participation in associational governance mechanisms and bilateral relationships) identifies opportunities to enroll local business support actors in supporting the GBL's economic initiatives. The best example is the significant support leveraged from the program San Vicente Productivo for several GBL initiatives, which also allowed the program to invest resources it was having difficulties spending in achieving its projected goals. CORDES also offers further direct linkages where it seems these could be beneficial, for example with the MAG PRA program which manages significant resources to support the upgrading of irrigation systems. However, the direct responsibility for consolidating these types of relationships is that of the business managers and the relevant technical staff from CORDES directly involved with the initiatives, with the CORDES regional manager stepping back to a monitoring role.

Associational governance mechanisms at work

As a conclusion to the previous sections it can be argued that, the integration and functioning of Tecoluca's *territorial governance system,* is a potentially significant factor for enabling or constraining the innovative practice of localized producers and their task-network partners from the localized enterprise support network. This depends on the relevant actions of local public authorities to facilitate innovative practice directly and indirectly through establishing associational governance mechanisms where relevant actors can negotiate and coordinate actions in favor of innovative economic initiatives and LED more generally. The functioning of these mechanisms depends on the development of specific capabilities by different local actors to play their respective roles, engaging in associational governance

practices. In the Tecoluca region, the most important actors involved include municipal authorities, NGDOs, territorial development programs and national government agencies from the business support network, as well as social base organizations expressing the concerns of their constituents. Largely absent from associational governance practice are the limited number of regional producer associations and established firms

The CIT's capability as an emerging mediator of knowledge and capital resources relevant for technological transformation in local economic initiatives is directly related to its complementary degree of internal and external connectedness. Its functioning is facilitated by its organizational configuration, including entities with a diversity of roles in the regionalized business support network, differing degrees of relations with local producer groups and also with other actors from the national and international innovation systems. It is, thus, a type of *meso* level regional node, mediating connections between agglomerations of local economic agents and sources of external resources needed if they are to implement innovative technological alternatives in their productive systems. This is precisely one of the key reasons cited by Oughton *et al*. (2002) for the emerging relevance of regional innovation systems.

With reference to Oughton *et al*.'s arguments on breaking out of the negative spiral of cumulative causalities reflected in Tecoluca's *regional innovation paradox*, the economic working groups within the GBL and the CDM in Tecoluca, as well as the CIT in San Vicente, are designed to increase the coherence of the policies and strategies promoted by the actors involved in these mechanisms and facilitate cooperation among them in the implementation of concrete economic development initiatives. The construction of the capabilities needed to effectively play this role, within the context of Tecoluca's RIS, has only just begun, and the expected results are largely dependent on future dynamics for strengthening the functioning of these mechanisms.

The participatory processes to engage small-scale irrigation producers in Tecoluca and the GBL's business initiatives in reflection to identify common problems, strategies and concrete alternatives for solving them, can be understood as part of the process of articulating producer demands as Oughton *et al*. (2002) and Morgan (2004) argue is necessary. Also, one of the key roles of the CIT's working groups would be to work with producers to articulate proposals to access recently established competitive regional funds for implementing technological innovations in their production systems (CIT 2004). Increasingly, this role of articulating demand is identified as a necessary complement to the strategy of demand oriented territorial development cooperation being pushed in the Tecoluca region.

The CIT's *proposed* central role, as a meso level organization within the emerging regional innovation system could be understood as coordinating the articulated demands from producers, with an increasingly consolidated regional supply of innovation support services, complemented by the mobilization of specialized external actors to complement endogenous regional capabilities. This is central to the conceptualization of the ETM within the GBL context, as well. The difficulties revealed in translating elaborated strategies into effective coordinated actions, demonstrate the limited nature of the capabilities of the actors involved in these mechanisms to play these roles.

To a limited extent, the demonstrated capabilities of the CIT's membership have included playing a mediating function to identify problems with current technological trajectories within regional producer agglomerations and exogenous information and knowledge sources relevant for the design of innovative alternatives. This capability has been most clearly expressed in the initial actions identifying problems with the fragmented production and marketing of solid *panela*, proposing the associated production of granulated *panela* as a more viable alternative and developing the specifications for the actions necessary to achieve the medium term goal of upgrading capabilities to be able to produce a granulated *panela* product that is competitive in formal national market segments. As Cooke (1999) suggests, this seems to be a key process feature associated with what I call *regional innovation capacity*.[180]

[180] See discussion in the concluding section to this chapter.

Further development of this capability will be needed if the CIT is to play its proposed role in elaborating technological proposals for the upgrading of the production activities in key agricultural sectors needed to avoid becoming locked into non-competitive, un-sustainable trajectories (Cooke 1999). These proposals will be especially important as they are to be used as guidelines in evaluating proposals for the investment of competitive funds for technological innovations, presented to the recently established regional committee of the National System of Technological Alliances (SINALIT).

Transforming institutionalized negative inertia like non-cooperation between service providers and the exploitation of fragmented producers within regional commodity networks requires creating what Oughton *et al*. (2002) call "capacities for action." A first step in this direction is collective reflection on common problems and elaboration of joint action strategies to implement innovative alternatives. If this initial step taken in all of the associative governance mechanisms analyzed, is not followed by increasingly dynamic processes to "develop and coordinate the necessary resources" to implement these strategies, these experiences may in fact feed back to reinforce the vicious circles they were designed to break. The frustrated participants will be less likely to participate in similar associative ventures in the future and will more than likely share their frustration with others. This type of negative dynamic is clearly at work within the ETM, due to unsuccessful attempts to increase coordination between CORDES and the GBL's economic initiatives.

As Oughton *et al*. (2002) argue, innovating in the periphery of rural El Salvador, in Tecoluca implies "working with what exists" in terms of the collective innovation capabilities of the economic actors and the relevant business support network. With respect to the GBL's economic initiatives, this is reflected in the analysis of the problems caused by overly ambitious project planning based on unrealistic assumptions as to the production and management capabilities of the families to be involved and CORDES' capability to support them. A critical assessment of some of the development plans that have been elaborated within the context of the associational governance mechanisms in Tecoluca's regional context, suggests insufficient analysis of the capabilities of the actors to implement the proposals. However, within each of these spaces there are also learning dynamics at work to reduce these ambitious proposals to more implementable steps.

As suggested in Chapter 4, the integration and functioning of the Tecoluca's associational regional governance mechanisms are clearly influenced by the centralized nature of the Salvadoran state, the limited demonstrated capabilities of the municipalities to play an active role in promoting local economic development and the absence of regional governments or institutionalized associational governance bodies.[181]

The current situation severely limits the availability of adequate financial and human capital resources to be dedicated to initiatives derived directly from decisions taken in the associational governance mechanisms. The CIT has been totally dependent on San Vicente Productivo for its coordination and basic functioning and any concrete initiatives have depended on the bureaucratic decision making processes of this program, PRODAP II or other external sources of financing. Thus, autonomous action depends on the mobilization of resources that members already possess, which are frequently already committed to certain types of activities under existing cooperation agreements.

In addition, the efforts within the context of Tecoluca's Municipal Development Committee to coordinate the implementation of the economic aspects of the strategic territorial development plan are dependent on the mobilization of external resources, beyond those that the municipality or other actors already have available. The implementation of the economic aspects of the Departmental Development Plan for San Vicente is similarly constrained.

[181] The authors of the National Territorial Development and Land Use Plan propose the creation of regional organisms to coordinate territorial development planning and actions. As currently proposed, these would be dominated by representatives of the central government line ministries (PNODT 2004), in apparent detriment to the emerging protagonism of municipal governments in this area. However, it is not at all clear if and how this proposal will be actually implemented.

The excessive centralization of the Salvadoran state, also constrains the participation of local line ministry representatives from participating in associational governance mechanisms when this is not explicitly part of their work responsibilities. This is especially true in Tecoluca, due to the political antagonism that the departmental directors of these types of institutions seem to have with the FMLN controlled municipal government.[182] These factors explain, in part, the persistently low rates of local participation by representatives from certain ministries.

An ingredient that seems to be lacking for different actors is sufficient trust in the outcomes of the proposed coordinated implementation of these planned initiatives, to risk their limited capital and human resources. As Foray (1997) suggests, the construction of conventions facilitating interactive learning and cooperation is a complicated and fragile process. Another factor, as suggested earlier and also by Oughton et al. (2002), is the empowerment of regional governance structures to provide actors with the needed capital and human resources to play their roles in the implementation of the regionally specific development strategies they have designed. Only through actually working together on the implementation of joint initiatives, facilitated by having the necessary funding and competent people involved, can inter-organizational trust be built up and the potential synergies of cooperation or *collective efficiency* (Schmitz and Nadvi 1999) be realized and thus institutionalized in the regional innovation system.

The endogenous innovation capabilities being built up by the actors from the regional production structure and initiative support network, as well their capabilities to play associational governance roles in coordination with municipal governmental authorities, must be complemented by the type of complementary top-down initiatives that Oughton *et al.* identify. The existing national model of promoting territorial development through a succession of largely unarticulated internationally funded development programs, that then must be coordinated, by brute force if you will, from the ground up, as has been attempted through the CIT, is an unsatisfactory solution. As Oughton *et al.* (2002) state, there is a need for greater coherence in the national governmental support for local innovative economic initiatives in terms of access to investment funds for different purposes within the innovation process, an educational system and specialized technical training responsive to local development strategies, technology development and transfer designed to meet specific articulated innovation demands by local agglomerations of producers, etc.

The consolidation of some sort of regional development corporation that can act as a meso level coordinator of the regional innovation system and a connecting link to mediate relations with relevant actors from the national and international innovation systems is necessary. A proposal along these lines is articulated in the projections for the CIT (2004) and in the Departmental Development Plan for San Vicente (Clerix *et. al*. 2004).

7.4 Relevance of Regional and Exogenous Institutional Set-ups

This section provides a holistic analysis of the emergence and key characteristics of the regional institutional set-up that exert an enabling or constraining influence on the implementation of innovative alternatives within economic initiatives and the coordination of actions between actors within Tecoluca's emerging RIS. It also discusses the interactive dynamics through which this set-up has been socially constructed, especially in Tecoluca. This analysis of the internal formal and informal regional institutional framework is complemented by an analysis of the capabilities of regional actors to mediate the effects of exogenously created institutional frameworks.

[182] After participating in the CDM's educational working group for some time, one of the district supervisors for the Ministry of Education ceased his participation (late 1990s). When asked about this within an informal context, he explained that people from the departmental office had asked him directly what he was doing working with the communists in Tecoluca. He ceased participating, in part at least, to protect his job.

The historical emergence of key localized institutions

The idea that consensus building and coordinated action are central elements in local development practice, has been a defining element in the discourse that has emerged in the post-war period in Tecoluca, even though in practice this is not always the way things are done. This conceptualization of local development practice seems to be related to the accumulated experiences of many of its re-populated residents, including its FMLN mayors (1994-2005) and leaders within the GBL, during the processes of political consciousness raising and radical collective action before the war and during the war as internally displaced, external refugees or FMLN combatants (Marin, 1999; Moreno, 2001; McElhinny, forthcoming).

Coordinated action was seen as the only way of making the structural changes they saw necessary to improve their livelihoods. In many cases their personal survival and that of the people they were working with also depended on closely coordinated action. Accounts of the workings of the Christian base communities stress the importance of collective reflection on reality as the basis for joint action to change it. In the same way, the early actions by the UTCSV frequently involved collective discussions as the basis for coordinated actions, although at the end of the day clever improvisation was also required. During the war, the refugee groups were governed by associative directive councils, engaged in collective agricultural and handicraft production efforts for subsistence, etc. Also, the Popular Liberation Forces (FPL)—the fraction of the FMLN which has dominated Tecoluca during and after the war—was characterized by its more decentralized collective command structure. Tecoluca's first mayor participated in the FPL as a mid-level field commander in the San Vicente region, as did its current mayor as a combatant.

These historical tendencies towards collective decision-making and the conventions concerning the importance of coordinated action for achieving desired results, are reflected in the establishment of associative governance mechanisms at the community and municipal level, the emergence of a diversity of social base organizations representing communities, women, youth, wounded war veterans, etc. and the municipalities coordination and enrollment of a diversity of actors in municipal development activities. These tendencies are also reflected in the formation and dynamics of the Grupo Bajo Lempa. Thus, the population's historical, personal and collective trajectories have had an important impact on local development dynamics that emerged in the municipality in the decade after the civil war.

The advances and problems of translating these general conventions for behavior into coordinated action between economic initiatives, business support actors and local authorities in order to facilitate the emergence and consolidation of innovative economic initiatives, have been mentioned in the previous sections of this chapter, and are explored in greater depth in what follows of Section 7.4. The historical trajectories experienced by the population in other areas of San Vicente and the Nonualcos region are some times radically different, and this undoubtedly helps explain some of the differences in local development practice in these territories as compared to Tecoluca. However, this discussion is beyond the scope of the research presented here.[183]

Regional development plans as formal institutional framework for LED

In terms of the formal institutional set-up, the GBL's strategic plan (2003), Tecoluca's territorial development plan (2001), the CIT's strategy for rural development in San Vicente (2002) the strategic development plan for San Vicente (Clerix, *et al*. 2004) and elements of a regional development strategy being elaborated for the Nonualcos region together represent an important advance in the social construction of a multi-layered and faceted regional development vision, as well as concrete strategies to facilitate coordinated action to translate it into practice.

[183] See McElhinny (forthcoming) for a comparative analysis of the relevance of historical trajectories for current local development practice between Tecoluca and two other areas in San Vicente, including the municipalities that form the Jiboa Valley Region.

The elaboration of these territorial development plans reflect an emerging regional convention favoring systematic reflection on the region's development problems and potentialities and the projection of strategies that require coordinated actions between all relevant local development actors. With the exception of the GBL's strategic plan, the rest have been elaborated by external facilitators enrolling relevant local actors in systematic ways.

An overview of the content of these plans, in relation to the individual actions of the central actors that have promoted their elaboration (territorial development programs, NGDOs like CORDES and FUNDE, municipal governments and social base organizations) suggests a general correspondence of proposed and real action trajectories. These plans, thus, tend to reflect the specification of general guidelines and action strategies that are accepted by most local actors, for example the need to add value to local production through the promotion of small and medium scale agro-industries. Also, the collective practice of elaborating these plans may have served to consolidate general consensus and the plans have served as tools to mobilize resources to implement some of the specific actions that are proposed, like the construction of municipal markets and the eco-tourism park in Tecoluca.

What is largely absent are mechanisms enabling systematic collective action to implement these plans in a reflexive way based on periodic analysis of advances and difficulties in this process. As stated, in Tecoluca a specific mechanism was formed in 2003, integrating the most important local development actors to play this role, focusing on the implementation of the economic aspects of the Plan. They have, however, not been capable of taking the concrete steps necessary to do so in a systematic way, in part, due to lack of funds to implement any decisions taken.

Another step towards implementation, relevant for local economic development in Tecoluca, has been the elaboration of municipal *ordenanzas* or local legislation to regulate a generally disorderly process of private companies "urbanizing" agricultural land for housing. These companies buy land and sell it for significant profits to relatively large groups of families migrating to sectors of the municipality with ready access to the *maquila* factories along the coastal highway. These families then demand basic services like electricity, potable water, road reparation, etc. from the municipality. The proposed legislation would place greater restrictions on this process, based on the land use proposals contained in their strategic plan. It would also require the urbanization companies to invest in the provision of these services, thus freeing municipal funds for investment in their current priority: local economic development. To what extent this will be possible is yet to be seen, due to discrepancies between municipal and central government agency responsibilities in this areas and the relative power of the urbanization firms.

Informal institutions relevant for localized innovative practice

One of the most important informal institutional factors that directly affect innovative practice in the GBL's economic initiatives and the other emerging agglomerations of economic activities with Tecoluca's regional context is the openness of the small-scale producers to take the risks involved in implementing innovations in their technological systems.

For example, the initial consolidation of the SAMO initiative depended on the openness demonstrated by producers, especially those "inland," to innovative through the introduction of cashews and other novel crops, as well as organic production practices, in their production systems. The same is true for the initial openness demonstrated through the consolidation of agro-ecological milk production among the producer base of the BIOLACT initiative, in search of eventual organic certification. A significant number of producers were initially open to establishing irrigated vegetable production under both associative and family based production models. This is important in the face of generalized skepticism in relation to "development" projects promoted by CORDES and other "development agents," generated through experiences with projects that have failed to achieve their expected results.

It should be noted that in these three cases, there were significant risks involved for the producers, especially given their fragile resource bases. While most of the financing for the "inland" cashew producers, especially that to associative groups, was made under the more lax rules of CORDES' financial system, the risks involved have to do with opportunity costs of occupying scarce land with cashews as a permanent crop. More recent financing of cattle production, as well as, for the purchasing of irrigation systems and the costs of vegetable production, has been provided by El Roble against these families's most valuable production asset, their land.

In all cases, attempts have been made to make these investments more risk-able steps for the producers. In the BIOTEC example, the initially proposed mechanism of the plant buying their production has not worked as anticipated. However, the producers themselves have created the conditions for initial profitability and thus motivated others. Efforts were also made to make cashew production a more risk-able step through the introduction of additional crops and cattle activities to make the initial years more profitable. This process and SAMO's capability to purchase their production at above local market prices, seems to have provided the conditions for those initially enrolled in this initiative to continue their participation. However, local areas of cashew production have not been increasing in correspondence to the plant's demand, leading them to search for providers outside Tecoluca. In the case of AGROLEMPA, efforts were made to make irrigation technology more affordable for families. However, there are a significant number of producers that are indebted to El Roble and to the Association itself and production volumes are weak, suggesting that this alternative has only been viable for a limited number of producers.

In general, the promotion of irrigated vegetable production in the region has met with limited success. Programs such as San Vicente Productivo and Prodap I and II have provided credit lines, under the terms of formal financing systems, offered subsidized technical service, and mobilized financing for demonstration plots managed by expert producers that have shown positive results. However, there are many producers with irrigable land that are still producing corn and irrigating cattle pastures, when they could be involved in more profitable vegetable production. For diverse reasons it seems they are not willing to take the significant risks involved, or are unable to meet the requirements to access financing.

The promotion of irrigated plantain production seems to be having greater success in terms of motivating producers to plant initial areas and gradually expand them. Although there remain significant problems with their access to financing through the FINAPRO program with local banks, the producers that do have access were successful in increasing the amounts allotted for production costs suggesting their motivation to fully implement the more capital intensive production techniques being promoted by San Vicente Productivo.

The initial efforts to upgrade *panela* production and marketing in San Vicente, integrated the producers in the ACOPADES Cooperative and these producers seemed more than willing to join this effort and thus gain access to the credit, technical assistance, etc. offered by the NGDO through the cooperative. As the NGDO project finished and the debt burden increased at the same time that administrative problems surfaced, the effort was abandoned. It seems that the financing was provided with little risk to the individual sugar cane producers and *trapiche* owners, much like in the case of CORDES' financing of the associative producer groups in Tecoluca, and the results are similar.

The currently reactivated efforts to transform *panela* production through technological upgrading necessary for producing granulated *panela* seems more promising, in terms of the organizational and step by step innovation approach being adopted. It is too early to tell to what extent the group of sugar cane producers and *trapiche* owners will be willing to take risks accepting formal credits for at least some of the investments necessary (others may be covered by project subsidies).

In all cases, although initial openness and motivation is important, dynamic assimilation of these novel technological alternatives depends on effectively creating the conditions necessary for the

consolidation of production capabilities and market access, making these investments risk-able steps for those initially involved and motivating examples for other potential integrants.

Local discussion of the institutional factors related to innovative economic initiatives supported through different types of development projects, leads inevitably to discussion of another prevalent attitude described as *asistentialismo* by CORDES and other development agents working in this area. This general attitude frames "development projects" as opportunities to be taken advantage of by producers with little risk or co-responsibility on their part for achieving the proposed results. It is argued that the families feel that the funds were donated for their use and that, therefore, there is no need to pay credits, etc. This would seem to explain, in part, why CORDES' financial system was unsustainable. This could also be used as an argument as to why not all producers in APRAINORES and AGROLEMPA, as well as the first *panela* cooperative (ACOPADES) did not or have not yet taken greater ownership responsibility, fully appropriating these NGDO supported initiatives as their own.

However, it has always seemed to me that this argument is a rather "easy" explanation for a situation that is considerably more complex. For example, this argument ignores the specific mechanisms that perpetuate weak co-responsibility of producers in obtaining the results set out in the projects being implemented and ownership over the resulting "autonomous" economic initiatives. Possible mechanisms are related to the way projects are designed and implemented without active producer participation as co-responsible actors, the ways in which producers are enrolled in these project initiatives and motivated to take risks that are not always planned based on sound assumptions, as well as the short term expectations of results within the frame of project implementation that require longer periods of time to be consolidated.

This argument also seems to reflect a lack of understanding on the part of NGDOs like CORDES and FUNDE, as well as those working for territorial development programs of the underlying logic of the diverse economic livelihood strategies among the producers they are looking to enroll. As suggested, earlier, this is reflected in an insufficient diversification of service "delivery" strategies to more closely meet the differentiated (frequently unarticulated) needs of producer families in relation to their interests and accumulated capabilities.

Closer analysis of several of the GBL's economic initiatives as well as others in Tecoluca's regional context suggest that greater attention to these types of aspects can indeed create greater co-responsibility among the producers integrated in them. An especially interesting example of this is reflected in the high rate of repayment of micro-credits to members of the rural women's group ASMUR through El Roble. These credits seem to be meeting an especially felt need as a means for some (limited) economic independence on their part, which it is important for them to maintain through repayment. The added attention given to the organization of the BIOLACT cooperative, actively engaging them in learning about the processing operations seems to be an important step towards greater appropriation on their part. Learning to place greater emphasis on associative organizations as a confluence of mutual interests in solving common problems and not essentially a means to obtain access to external resources in the recent process to form ACOPANELA, also seems to be a positive step.

The informal conventions concerning the distribution of wealth and the quality of jobs created through economic activities represent another fundamentally important aspect of the localized institutional set-up, directly related to innovative practice in economic initiatives. The same can be said for those conventions concerning the relationship between economic activities and the ecosystems on which they depend.

There is an explicitly stated convention within CORDES and the GBL economic initiatives that values the creation of horizontal, more equal, power relations and the improvement of living conditions for producers and workers. This is reflected in the integration of the producers and some workers as owners of the business operations in several of the GBL's economic initiatives and the incremental

improvements being made in working conditions at the SAMO plant.[184] It is also reflected in the GBL's advocacy campaign and concrete efforts to encourage responsible external investments for the creation of dignified rural employment, especially to provide alternatives to immigration for an increasingly unsatisfied group of better educated young people. These conventions are also key elements of the GBL's public image, and an integral part of their strategy for product commercialization, especially in fair trade markets, and future fundraising with international development agencies.

This is contrasted starkly with the previous, technologically complex and capital intensive, production of cotton on these same lands before the war. It based its (spurious) competitiveness (Vargas 2002) strategy in part on suppressing labor expenses to the extent possible and voraciously occupying lands upon which local producers were dependent for subsistence production. This strategy was initially dependent on the state security forces to suppress the UTC's demands for better working conditions (including, "Beans without rats and cockroaches!") and land occupations.[185] However, the ultimate social and political un-sustainability of this strategy in Tecoluca was reflected in the targeting of cotton plantations by the emerging insurgent forces and the end of cotton production.

The same type of extreme contrast exists between the negative ecological, social and economic consequences of the toxic cocktails of agrochemicals applied to combat ever more resistant plagues on the cotton plantations, and the present increasing ecological, social and economic returns to the strategy of organic or at least cleaner agricultural and processing operations in the GBL's economic initiatives. The cultural conventions prioritizing a capital intensive technological fix for the increasing ecological problems faced by cotton production, ignoring the local ecological and social consequences, are diametrically opposed to the ecologically sound production practices as central to the economic strategy of several of the GBL's economic initiatives, as well as, the GBL's image and vision of sustainable rural development.

Within the wider territorial context of San Vicente there is less clarity as to the depth of the social and ecological components of the development strategies being promoted through the territorial development programs. Elements of these programs are focused on poverty reduction as is reflected in San Vicente Productivo's subsidized financing of micro-projects for women promoted through women's organizations in the municipalities covered by the project and administered by El Roble and another NGDO. This focus is also reflected in subsidized financial support for subsistence cattle production in the north of San Vicente.

However, the bulk of its money destined for productive investments is placed in bank administered funds to promote more capital intensive "competitive agriculture," including irrigated plantain and vegetable production. In general, the technological packages promoted for competitive agriculture are solidly within the agro-chemical intensive "Green Revolution" technological regime. This is evidenced by the support of a major commercial seed and agro-chemical company for establishing the demonstration plots for vegetable production; also in the CIT's popular technical instruction manual for several crops financed by SVP.

The support for the upgrading of *panela* production through the ACOPANELA initiative will be important for increasing employment options for many families in the central San Vicente area, historically dependent on work related to sugar cane and *panela* production. However, it is not clear what focus, if any, will be placed on improving often harsh working conditions and low wages

[184] The APRAINORES website emphasize their social commitment: "Within its possibilities, APRAINORES is permanently making efforts to improve working conditions in its processing plant. The importance of gender equity is demonstrated through, among other things, paying equal salaries to men and women for equal work. Furthermore, we preserve the environment, transfer knowledge to local workers and practice a transparent administration. These aspects are periodically evaluated by international fair-trade market organizations." http://perso.wanadoo.es/gbajolempa/aprainores.htm

[185] Marin (1999) reports this eloquent statement of a modest yet radical demand within the extreme conditions of subjugation present among landless or near landless workers on cotton plantations in Tecoluca. This is also reported by McElhinny (forthcoming) in his extended historical account of this period in Tecoluca.

for workers related to these two activities. For example, how would the *trapiche* owners involved in ACOPANELA react to the promotion of rural labor unions among these workers? How will the differences between the micro and small *trapiche* owners and those with greater capital resources and production capabilities be mediated within ACOPANELA? These issues are yet to be dealt with.

In ecological terms, the type of sugar cane produced in small areas is relatively low in chemical inputs and could be converted to organically certifiable techniques relatively easily. *Panela* production is also chemical free, opening the possibility to pursue organic certification for the granulated *panela*. This is not the immediate goal, however, and it is doubtful if the initial export market targeted of Salvadoran's in the USA would pay extra for organic certification, although other markets such as those explored by CORDES might.

Previous discussion in this chapter and chapter 6, suggest the importance for innovative performance of cultural conventions, facilitating or hindering cooperation between economic actors and between them and actors from the regional enterprise support network, local authorities, and other external agents. It has also been suggested that conventions concerning the participation and interaction of firm and non-firm actors in associational governance mechanisms, define to a large extent their relevance for stimulating the emergence and consolidation of innovative economic activities within Tecoluca's regional context.

The limits of the exploratory analysis offered here are apparent in termas of the questions left unanswered and conjectures about what *seems* to be the reality of things. This section is, thus, intended as the basis for further analysis of how these types of informal cultural conventions emerge and are transformed in relation to the interactive innovative practice of initiative task-networks, the business support network and associational governance mechanisms. This requires a more in depth anthropological research effort, as is proposed in Chapter 9.

Relevance of national and international institutional set-ups for local innovation

The formal and informal institutional frameworks that govern market transactions in the main national and sub-national regional markets as well as the configuration of the key actors involved, are becoming increasingly important factors enabling and constraining innovative practice in the GBL's and other regional economic initiatives.

The severe limitations placed on producers selling primary products through local market intermediaries, under the generally exploitative conventions that govern these transactions, has motivated technological innovations related to adding value through processing and re-organizing commercialization practices to gain more direct market access in diverse regional economic initiatives.

Direct access into the national market has implied significant challenges and thus the implementation (or projection) of incremental innovations in their marketing practices; placing greater emphasis on product presentation, understanding the dynamics of customer demands and competition, networking to establish advantageous market connections, etc. The institutionalized expectations of customers demands for quality and quantity has also fed back into the initiatives as motivation for further innovations in their production systems and for making connections with additional input providers and similar producers in order to increase marketable volumes and supply consistency.

The emphasis placed on the external market in the analysis of the SAMO initiative, should not be taken as an indication that the national and regional markets are not also important. The lack of value ascribed to consuming "organic" or "fair-trade" products in the Salvadoran market limits the possibilities of the SAMO initiative to compete with similar non-organic cashew products. Larger national or transnational companies competing for the national market easily outweigh SAMO's volume, marketing and distribution capacity. Access to a demanding local market would expand the possibilities for profitable sale of their products and the accumulation of marketing knowledge,

before adventuring onto the international market, especially with the new cashew false fruit products under development.

There are niches within the Salvadoran and especially the Central American market willing to pay for better quality organic cashews, granulated *panela*, gourmet cheeses, etc. but the exploration of these markets is only just beginning. The development of niches within the national and Central American markets for these types of products is a challenge for the task-network, especially for their networking capabilities to influence actors capable of developing the institutional incentives for such a market to develop.

On a national scale, meeting the regulations concerning business establishment, sanitary codes food products and environmental permits represents a basic hurdle that BIOLACT. SAMO and also ACOPANELA must surpass in order to realize their strategy of marketing their quality products in select formal national markets.

An additional hurdle will then be meeting the diversity of regulations necessary for export within the Central American region and the more complicated controls imposed on food products exported to the United States or Europe. In addition to these regulatory barriers, high tariffs on sugar importation into the EU to protect subsidized local sugar agri-businesses would make exporting *panela* to this market more complicated. It is unclear if the possible CAFTA agreement will facilitate or further complicate access by small-scale agro-industries to the potentially important North American market. SAMO's cashews are not benefited under the existing free trade agreement between El Salvador and Mexico which maintains its tariff barriers to this type of product.

In order to motivate the exportation of non-traditional (including organic) products, the Salvadoran state offers an incentive to return 6% of the FOB value to the seller. However, the SAMO is not able to take advantage of the export incentives for organic products because of its ill defined legal status. Using the APRAINORES legal status as a non-profit producer organization, SAMO is able to export directly but cannot retain the 6% FOB value for its exports which would be significant given its currently low profit margin. It has chosen not to take advantage of a possible alliance with the AGROLEMPA initiative, which is a legal registered exporter. The current process to legalize APRAINORES as a cooperative business organization is designed to resolve this problem.

As stated earlier, the regulations and standards established for organic and now "fair-trade" certification are one of the formal institutional factors that have most affected the innovative process in the SAMO initiative. The need for certification has been a financial burden to the SAMO as it has covered this cost for the producers. However, the SAMO/APRAINORES initiative actively presents itself as being organically and socially "fair trade" certified and compliance with these standards has been an important stimulus to innovation.

The demand for the creation of these certification regimes for entrance into the organic and fair trade markets is based on the ecological and social consciousness that exists in an important segment of the population in some of the wealthy Northern countries, especially in Europe and the United States. This consciousness opens opportunities in terms of product demand and payment of premium prices for the consumption of organic and fair trade products, especially when produced by an association of poor rural families, as in this case. This generalized consciousness has also been a key factor reflected in the prioritization of international cooperation from these countries, especially through international NGDOs, for the creation of more sustainable livelihoods for the families involved in agricultural and agro-industrial initiatives like those integrated in the GBL.

Additional formal national regulations of relevance for innovative efforts in the regional economic initiatives discussed here are those imposed by the banking industry for access to financing for productive activities; even the fiduciary funds contributed by the from the San Vicente Productivo and Prodap I and II programs. Although, El Roble offers more favorable terms of access for producers

linked to the GBL, its formal regulations place limits on the motivation of some producers to enter into innovative initiatives. In this case, however, it is clear that for a certain level of financing reasonable guarantees are necessary if El Roble is to provide sustainable financing for those producers with greater capabilities, willing to take greater risks.

As mentioned earlier, the absence of national or local regulations limiting or prohibiting aerial fumigation of chemical products is a serious problem. The organic certification of SAMO's cashew plantations is severely threatened by aerial spraying of chemicals over sugar cane fields. Without certification the SAMO's basic commercial export strategy would have to change or would not be viable. They could not compete on the non-organic cashew market due to significantly lower prices and the demand for higher production volumes and it is not clear if they would be able to focus exclusively on fair trade markets, but the prices would be lower for non-organic cashews. They would also have to invest time and scarce resources on the process of re-certification and re-connection to intermediaries in order to regain access to these markets.

Another example of the difficulties of enforcing existing regulations relevant for innovative economic practice, is the way in which larger commercial producers in Tecoluca are able to circumvent national and municipal regulations on water use in order to access disproportionate amounts for irrigation. The municipality is coordinating efforts with the environmental arm of the national police and justice departments to try to deal with this problem. However, they have had difficulties in overcoming the attitudes of these larger producers who exploit their relative power positions with respect to the smaller-scale users of the irrigation systems.

In conclusion, aspects of the national and international, formal and informal institutional set-up work to expand and restrict the maneuver for the GBL's economic in these contexts. These initiatives have very little influence over the formation and evolution of these institutional configurations. However, what has developed locally has been the capability of the task-network to understand these regulations and begin to negotiate their impact on their initiatives, taking advantage of opportunities and mitigating risks to the extent possible.

7.5 Collective Capabilities to Create Room for Innovative Maneuver

This section analyzes the collective capabilities of regional actors to contribute to the transformation of external structural conditions that constrain the implementation of innovative alternatives and work to open greater room for maneuver for innovative practice in regional economic initiatives. This analysis focuses almost exclusively on the actors involved in the GBL.

One of the most important collective capabilities of the GBL consortium is its increasing ability to exert influence on key policy making and development organizations from the national and international contexts, in favor of improving local family livelihoods in general and, specifically, the room for maneuver for innovative economic initiatives. The task-networks of actors involved, especially CORDES, have demonstrated a significant capability to relate to national and international actors and persuade them to cooperate in the solution of external problems that limit their innovative practice.

In coordination with other local actors, they have mobilized support from national and international actors to mitigate the problem of regular flooding of major portions of coastal Tecoluca. The national and international attention focused on the region after the floods caused by MITCH provided the conditions necessary to leverage support for the re-construction of the system of dykes and internal drains that minimize flood risks.

CORDES and other actors related to the Grupo Bajo Lempa have also worked with the local government to mobilize resources to solve basic problems faced by the local communities such as the lack of access roads. For example, in 1992 the main access road to the communities in southern Tecoluca was a major problem, becoming intransitable in the rainy season. CORDES was part of an alliance between

local actors, an international NGO (SHARE) and its organizational base in different cities throughout the U.S. that was able to put enough pressure on USAID in El Salvador and Washington D.C. for them to build the first stage of this crucial access road.[186] Through further national and international lobbying work this road is now partially paved and negotiations are under way to complete it.

Other important joint project negotiations have been related to the introduction of drinking water, electrical power, basic housing and improved schools and clinics which have contributed to improving livelihoods of local families and also the cashew production processes. More recent collaborative projects have been more directly related to the local economic development such as the construction of two municipal markets and the promotion of public/private ventures related to eco-tourism.

Also significant for creating room for innovative maneuver is how regional actor coalitions interact with others to advocate for changes in formal national and even international institutional set-ups in order to facilitate their local economic development strategies, an area where the GBL has been active in the past and the present.

In the past, actors currently in the GBL were influential in negotiations with USAID the EU and the Salvadoran government to achieve a 100% forgiveness of the land debt accumulated by many local families through the Land Transfer Program. The same was true for the forgiveness of additional loans to ex-combatants and resettling population that were supposed to be the basis for their productive re-insertion, but came at a time when many families had other priorities and limited capabilities to make profitable investments. These were remarkable achievements which resolved a problem that would have been highly problematic for the families as they were still struggling to survive and begin accumulation and would not have been able to pay in most cases. Any attempt to re-take these lands or force payment of loans, made with no guarantees, would have surely faced militant opposition, thus being problematic for the government as well.

More recently the GBL's campaign to change government economic policy towards greater promotion of dignified rural employment and an earlier campaign to stop aerial spraying of pesticides, demonstrate their continued activism in this area. The GBL is also part of the national movement against the CAFTA agreement with the United States and the continental movement against the ALCA, proclaiming that another America is possible. Their actual contribution to changes of these institutional frameworks they are challenging is yet to be seen.

An important part of the GBL's local political power is based on the strategic relationship established with the municipal government of the FMLN. Reciprocally the actors of the southern part of the municipality, especially CORDES, have supported the FMLN municipal government from the beginning of its administration. This is a relationship with a long trajectory and an important level of confidence.

This collective capability to promote transformations in external structural factors that limit their innovative processes is based fundamentally on the GBL's networking capabilities and established relationships with a diversity of public and private actors on a local, national and international level. The widespread recognition of the GBL's work among these actors stimulates the external cooperation that CORDES has been able to leverage.

These achievements are all the more remarkable due to the extreme nature of the political polarization between the FMLN, which governs Tecoluca and other municipalities in this region, and ARENA, the right wing party in power nationally, which influences the actions of line ministries, territorial development programs and other such agents that have nevertheless been enrolled in supporting local economic development in this area.

[186] An anecdotal account from sources near to USAID suggested that this was perhaps the most famous road in the entire world for USAID for a while, due to the pressure it was receiving to build it (Personal communication with Nelson Escobar from SHARE c.a. 2001).

As a final comment, it is significant to note that beyond the GBL and Tecoluca, in the regional context of reference here, there have been few if any organized attempts to change such institutional frameworks in order to create greater room for innovative practice. Why this is so, is beyond the scope of the present work.

7.6 Integral Conceptualization and Analysis of Tecoluca's RIS

This section builds off of the more specific discussions of dynamics within different territorial agglomerations of producers, between these economic actors and the region's enterprise support network, and the functioning of associational governance mechanisms, to present a more integral conceptualization of Tecoluca's emerging regional innovation system. This analysis applies the conceptual framework developed in section 4.2 providing a general delimitation of the concept of RIS, section 4.6 concerning the regional mechanisms that facilitate interactive learning to innovate and 4.7 discussing the importance of the systems external linkages.

Delimitation of Tecoluca's emerging regional innovation system

The GBL is characterized by a significant degree of inward coherence in terms of shared technological trajectories, networking relationships and knowledge spillovers relevant for innovation processes, as Edquist (2001) argues, although none of these aspects is unproblematic. Within Tecoluca's regional context, the systemic internal connections between actors in relation to innovation are considerably less dense and dynamic and there are relatively few innovative firms. However, there is a definite process of regional agglomeration of agricultural producers and small and medium scale agro-industries involved in certain activities. Also, embedded in each of these agglomerations are innovative initiatives being consolidated through interactive processes within what can be considered as the initial configuration of Tecoluca's regional innovation system.

Following Morgan's (2004) arguments, this region is characterized, on the one hand, by the presence of a consolidating group of enterprise support actors that have the express individual and collective task of supporting the emergence and consolidation of innovative economic initiatives. On the other, over time their activities have indeed supported the emergence of what can be argued to be "genuine innovation processes that have assumed a territorial form," although probably understood in a broader sense than Morgan uses. I thus argue that there are indeed innovation dynamics emerging in Tecoluca's regional context through cumulative processes and that, as a relatively peripheral rural region poor in capital resources and specific productive knowledge and business experience, this emergence requires systematic support and access to exogenous knowledge and capital.

Especially within the GBL, but also in the larger regional context, there are emerging localized patterns of communication between a diversity of actors involved in searching for innovative solutions to common problems experienced by diversity of productive agglomerations. This search process has led to progressively increasing levels of interactive learning and resource sharing leading to the dynamic assimilation of exogenous technological elements and the transformation of local systems related to agricultural production, agro-industrial processing and organized commercialization of finished products.

Within Tecoluca's regional context there is an emerging configuration of actors that are mediating innovative connections between exogenous actors and local economic initiatives and facilitating an initial dynamic of interactive learning between regional actors in relation to their innovative efforts. This configuration of actors within the emerging regional innovation system is playing the type of *meso* structural role suggested by Oughton *et al*. 2002

The spatial delimitation of Tecoluca's emerging innovation system is rather amorphous, however, taking the municipality of Tecoluca as a pivotal point, the most important relations with other co-

localized actors related directly to the development of innovative economic initiatives are being formed with actors from the department of San Vicente and some of the municipalities included with Tecoluca in the Nonualcos' Region. The types of regional connections being formed are of basically three types:

- Relations between municipal governments and other local actors through the formation of the micro-regions of Los Nonualcos which connects Tecoluca to 14 municipalities form the Department of La Paz and the "Anastacio Aquino" which integrates Tecoluca with 4 other municipalities from San Vicente and Zacatecoluca, the departmental capital of La Paz. These micro-regional structures are projected in relation to common development goals and the co-management of specific projects.
- The integration of actors from Tecoluca's business support network (NGDOs like CORDES and FUNDE as well as the local offices of CENTA/MAG and CENDEPESCA) into wider networks such as San Vicente's Departmental Committee on Technological Innovation (with its office in Tecoluca) or the regional Committee for managing competitive funds from the National System of Aliances for Technological Innovation (SINALIT). In the Nonualcos's region actors from Tecoluca, especially CORDES are integrated into working groups on tourism, fishing and employment generation, being promoted by the FORTALECE Program (GTZ/MINEC).
- The incipient but potentially important relationships between the GBL's and other economic actors from Tecoluca and emerging regional agglomerations of actors involved in similar economic activities such as *panela* production, dairy cattle production and milk processing, irrigated vegetable production, fruit tree production and tourism.

My conceptualization of the system's territorial boundaries is, thus, heavily mediated by the identification of the GBL's economic initiatives as a core agglomeration in relation to which I have "mapped" the density of relations that are relevant or potentially relevant for the consolidation of these initiatives and/or the diffusion of their innovative practice within the regional context.

The geographical configuration of this emerging regional innovation system is also influenced by Tecoluca being a pivotal point on a road between two important intermediate cities, San Vicente and Zacatecoluca. These cities are important regional commercial centers, and as the capitals of their respective departments they are also the sites of the departmental offices of the different central government line ministries.

With respect to the connections with the municipalities on the eastern border of the Lempa River, this river represents a natural division beyond which the economic dynamics create a tendency for greater confluence towards the Eastern Region's major cities of Usulutan and San Miguel. This is reinforced by the political administrative dynamics of the Usulutan department. However, the opening of a major new Central American port facility in La Union on the La Fonseca Bay bordering Honduras and Nicaragua, may demand progressively stronger relations between Tecoluca and the Eastern Region in order to take advantage of the opportunities this will create.

Since the Peace Accords in 1992, there have been a series of efforts to create greater relations between the municipalities that form the Bajo Lempa region, on both sides of the Lempa River, but effective integration has been elusive. The municipalities of Tecoluca, Zacatecoluca, Jiquilisco and San Augustin that form the core of this larger Bajo Lempa region were united in the (first) Anastacio Aquino Microregion. However, this associational space ceased to function after significant efforts at coordination and joint development planning did not produce tangible results. More recently the IDB / Natural Resources Ministry project has promoted greater integration and formed an inter-organizational Bajo Lempa Development Committee. As the loan funds to implement the regional development plan elaborated by an initial phase of this project are being delayed by the national government, the future of this effort is uncertain. An additional concrete relation is the SAMO's purchasing cashew nuts from producers in Jiquilisco as well as other municipalities in the heart of the Eastern Region.

As a concluding remark to this sub-section, it must again be emphasized that I am not claiming that there is indeed an operational regional innovation system in place around Tecoluca. What is proposed is that the conceptualization of what does exist as a RIS, in terms of the local actors present, their specific strengths and weaknesses, the quality of their internal relationships and external linkages, the formal and informal institutional framework that has emerged from within the regional context, the local mediation of external institutional factors, etc., is useful in explaining innovative practice in localized economic initiatives (Cooke 1999).

Tecoluca as a learning region and/or innovative milieu?

To what extent do the dynamics of Tecoluca's emerging regional innovation system characterize this territory as a *learning region* or an *innovative milieu*? The short answer is that there are dynamics that suggest that the region is headed in this direction, but there is a long way to travel in order to get there.

With respect to Asheim's concept of learning region (1998 cited by Oughton *et al.* 2002) there is an important diversity of what could be called learning organizations and increasing interactive learning dynamics related to the implementation of innovative technological alternatives, within the GBL and in the wider regional context. However, the territorial embeddedness of many of these organizations, especially the territorial development programs and the NGDO service providers they contract, is limited by the duration of their work, total dependence on external funding and the lack of localized influence over their decision making processes. Helmsing (2001) also stresses the importance of relative decision making autonomy as a key characteristic of actors contributing to the dynamics of innovative miluex, as a determinant for their ability to manifest learning modifying their practices, especially in relation to their interdependence on others in innovative initiatives. This is difficult, although not impossible, for NGDOs under contract or those people managing territorial development programs under the terms imposed by the external funding agencies.

NGDOs like CORDES and FUNDE have achieved greater territorial embeddedness through their long term proactive presence in local economic development dynamics. They also have relatively greater decision-making autonomy and possibilities to modify their organizational contribution to milieu dynamics, as the projects that finance their work are generally less restrictive and the organizations are not dependent on any single source of external financing.

The potentially most important actors in the regional innovation system, with the greatest territorial embeddedness and decision making autonomy, such as the municipal governments and the emerging producer associations are, however, those with least proactive engagement in interactive learning with other localized and exogenous actors.

Innovation specific externalities to interaction and the building of increasingly efficient form of jointly managing resources are revealed in the cases of upgrading *panela* and plantain production in the wider regional context, as well as within several of the GBL's economic initiatives. The suggested milieu dynamics of interactive learning through collaboration in implementing innovative alternatives, creating a virtuous circle reinforcing networking ties and innovative linkages within Tecoluca's regional innovation system are also slowly emerging (Helmsing 2001, Maillat 1995). These positive dynamics are counter balanced by negative examples of failed cooperation leading to pessimism among certain actors.

Relevance of specific regional configurations for innovation

The complexity of the configuration of the different sub-systems of Tecoluca's emerging RIS in terms of the mix of a specific diversity of actors (organizations and people) with certain innovation capabilities, knowledge bases and networking connections internal and external to the regional innovation system, suggests that such a configuration would be difficult to replicate in other regions, and as such is

a potential source of competitiveness and sustainability, enabling localized innovative practice in different economic initiatives, as Asheim (2002), Helmsing (2001) and Maskell (2001) suggest. The realization of this potential, however, depends largely on the system's future dynamics, taking what exists as the basis and building on it.

Analysis of these, suggests that progressively increasing learning capabilities are not only necessary for establishing a continual process of technological transformation and performance upgrading within economic initiatives, but also for innovative transformations by actors providing supporting services and/or engaged in associative governance of the RIS' system dynamics. As Oughton et al. (2002) state, learning processes reflected in the transformations that CORDES and other actors from the regional business support network, like Prodap I and II, have improved their abilities to respond to implicit and explicit demands of the economic actors they are working with in innovative initiatives. There are similar learning processes evident in the gradual functional improvements being made in the region's associational governance mechanisms and further implied in their future roles in the RIS. Among the most important of these learning dynamics are those related to improving working methodology and relationships between actors, reflected in improved quality of inter-connections and interaction between them.

The particular nature of the organizational conduits, the existing networking linkages and quality of interaction between the producers and the other actors involved in upgrading their capabilities for the production and marketing of granulated *panela*, for example, provide these producers with access to the knowledge and other resources they need to develop this innovative venture. The same is true for the SAMO initiative, taking the example of the most recent contacts with Brazilian cashew growing and processing experts which were contingent on the IICA's participation along with CORDES in the CIT (Helmsing 2001, Van Geenhuizen and Nijkamp, 1999).

For the plantain producers from Lempa Acahuapa, the opportunities provided by their relationships in the RIS to travel to Guatemala to observe and interact with a similar group of producers more advanced in their process of plantain production, as well as the expert technical assistance received in situ, were certainly key steps in facilitation their decision to integrate themselves in this initiative and the dynamic assimilation of this innovative technological option. As Lawson (1999) argues, this process has contributed to forming a shared knowledge base and shared expectation as to the outcomes of their joint activities, which should facilitate coordination. It should also reduce the dynamic uncertainties related to the complexities of the new knowledge required of them to manage novel production technology, internal organization between them and marketing activities.

Non-traded interdependencies, or the lack thereof, between firms and other local actors have proven to be key characteristics of Tecoluca's RIS as Helmsing (2001), Morgan (1997) and Storper (1992, 1994, 1995) argue. For example, the historical specialization of workers in the Jiboa valley in different tasks related to the production of sugar cane and *panela* is supporting the process to make incremental transformations in these technological systems necessary for producing granulated *panela*, although they may be the source of certain inertial resistances to changes as well. This situation is contrasted with the south of Tecoluca where the lack of skilled workers was a major factor contributing to the initial failure of the SAAO initiative to achieve its expected results, and the lack of experienced vegetable producers is a limiting factor for AGROLEMPA's business performance. Furthermore, as argued in the case of the GBL, the limited local supply of professionals capable of managing innovative rural business initiatives and providing adequate locally based supporting services, is detrimental to the development of this types of initiatives in Tecoluca's regional context.

Previous discussions argue for the similar importance of other non-traded inter-dependencies, also identified by these authors, for innovative practice both with the GBL and in the wider regional context, such as the configuration of different types of business support organizations, relevant conventions, norms, values and codes of conduct arraigned through public and private interest governance, and the development of trust and social embeddedness of networks.

The importance of the regional innovation system's external linkages

The limited endogenous generation of capital and professional human resources, as well as innovative knowledge (beyond that produced through learning by doing, reflection on innovative practice and some internal R&D), accentuates the relevance of the external networking linkages built up by local actors for their innovation capabilities and their importance for building the capacity of the system as a whole to support innovative economic initiatives. These dynamic external networking capabilities to mobilize resources and the openness to learning from external actors are thus defining elements that differentiate Tecoluca's emerging regional innovation system from others in El Salvador (Morgan, 2004; Cooke, 2002; Helmsing, 2001).

Systematic external linkages are relatively scarce among many of the region's localized agglomerations of agricultural and small-scale agro-industrial firms. The progressive construction of such linkages in the agglomerations discussed here has been directly related to the search for innovative options to problems identified with the technological trajectories, production and marketing practices of these economic actors. Motivating local producers to search for alternatives and the mediation of external resource and knowledge flows to be applied in innovative economic initiatives are generally roles assumed by NGDOs like CORDES and/or territorial development programs operating in Tecoluca's regional context. However, as Bell and Albu (1999) stress, the openness of these producers to external knowledge flows, is the determinant factor in their implementing these innovative alternatives.

The importance of linkages with demanding external (national and/or international) markets for stimulating innovative proactive collective efficiency on agglomerated small-scale manufacturing firms, as argued by Schmitz and Nadvi (1999), is also revealed through analysis of the ACOPANELA experience, as well as the SAMO and several other of the GBL's economic initiatives.

It is clear that external forces can severely constrain or provide important opportunities for improving the innovative practice of local economic development initiatives. However, the way these external factors actually come to exert influence over the actions of local different actors in Tecoluca's emerging regional innovation system is increasingly being actively mediated by actors from Tecoluca's regional innovation system and is thus highly contingent on local conditions.

For example, the international institutional set-up governing market access defines opportunities for organically and/or fair trade certified products such as SAMO's cashews, but taking advantage of this opportunity demanded important technological transformations and significant innovative capabilities of the local task-network involved. As suggested in Chapter 6, the application of the international certification regimes is also a locally negotiated process, especially in the case of the SAMO being the first cashew processing operation fair trade certified by FLO.

Similarly, the national and international market demand for quality granulated *panela* offers an opportunity that is motivating CORDES to continue along this trajectory within the SAAO initiative, as well as the efforts of the task-network involved in the ACOPANELA initiative. Taking advantage of this opportunity by both initiatives will require the continued construction of capabilities to meet the institutionalized demands concerning national and international market access, concerning product quantity, quality, innoquity, packaging, legal registrations, etc. This also suggests the possible synergies of cooperation between these initiatives, which is currently problematic.

In general, taking advantage of external opportunities to access markets and acquire the diverse resources necessary for implementing innovative alternatives, is a process mediated by the endogenous, interactive construction of the innovative technological capabilities necessary to do so.

Other more direct external influences are also mediated through the actions of local actors. The regionalized implementation of national policy initiatives and development programs such as the formation of the National System of Alliances for Technological Innovation (SINALIT), depends highly

on the existing configurations of local actors, their interactive dynamics and innovative capabilities, for example. The CIT has played an active role in defining how the SINALIT's regional committee will be integrated and function. In fact, the experience in San Vicente is being used as a pilot initiative, and thus local dynamics in this region will influence the way this national initiative is implemented in other regions.

What is crucial for the innovative performance of local economic initiatives and the functioning of the regional innovation system as a whole to support their emergence and consolidation, is that regional actors are able to combine synergistic local and extra local linkages in order to stay innovative and competitive (Asheim 1995, Asheim and Coenen 2004). Interestingly, in the case of Tecoluca's emerging innovation system, the more problematic connections are those internal to the system, especially cooperation in the creative and reflexive implementation of the innovative initiatives that have been designed to resolve the problems identified with local productive and marketing operations.

7.7 Emerging Regional Social Capital and Innovation Capacity

As a conclusion to the analysis presented in this chapter, this section applies the concepts of regional social capital and innovative capacity to analyze the quality of interaction related to cooperative innovative practice within Tecoluca's emerging innovation system.

Social capital

Tecoluca's regional social capital accumulation, relevant for innovative practice, can be visualized as the room for maneuver provided by the specific combination of the region's formal and informal institutional set-up that governs inter-personal and organizational interactions between actors in the RIS, as well as the un-traded interdependencies and organic networking relations that exist between these actors that facilitate coordinated innovative practice (Putnam 1995; Morgan 1997; Woolcock and Narayan 2000).

Within the GBL and Tecoluca, it can be *generally* argued that the contextually embedded, historically constructed, systematic relations between people and organizations have fostered a significant level of mutual understanding and a shared expectation of cooperation as the primary means of implementing innovative alternatives to resolving common problems. There are shared values as to key issues like the importance of people's participation in the local development process and social justice and ecological sustainability as complementary outcomes to the profitability of economic activities. Reciprocity and solidarity in relations are expected modes of behavior and non-compliance carries significant social consequences. Meaningful trust embedded in historical relationships, based on mutual understanding and inter-dependence, facilitates specific transactions relevant for innovative practice. There are also an increasing number of local producers that are manifesting a collective local will to risk personal investments in innovative ventures (Cooke 1999). These can be seen as key *institutional components of social capital* embedded in relations between actors in these local contexts.

A more tangible characteristic of social capital accumulation in the GBL and Tecoluca is reflected in the *quality* of the networking connections, across horizontal and vertical dimensions, between task-network actors that enable the flows of knowledge and other resources necessary for innovative practice. The quality of inter-connections formed in the associational governance mechanisms that enable collective strategizing and collaborative actions in favor of innovative practice, is also an integral part of social capital accumulation in these contexts. The quality of interaction between the actors involved in the task-networks of the diverse GBL initiatives has enabled their incremental advances towards sustainable business performance through implementation of technological transformations within their interconnected systems of agricultural production, ago-industrial processing and organized commercialization.

The fragility of social capital accumulation is demonstrated by the problematic relationships between key actors that make synergistic linkages difficult to establish between initiatives and threaten to break down internal relationships that are essential for the continued development and even the existence of several. The same can be said for the GBL. *If* some of the most important economic initiatives should continue to distance themselves from active participation in the associational mechanisms through which the GBL is governed, this could lead to an eventual decision to totally disassociate themselves and a significant weakening of the consortium. The breaking down of these organic linkages is related to perceived violations of trust, openness and transparency and reciprocity in the fulfillment of commitments in their relationships.

As Cooke (1999) suggest, localized social capital accumulation also has important implications for the capabilities of the GBL's task-networks to dynamically assimilate exogenous technological elements into their production and marketing operations, and to deal effectively with exogenously created institutional frameworks that directly affect their innovative practice.

A quick comparison between Tecoluca's accumulation of social capital and the accumulation present between the actor networks and the institutional framework that influences collaboration in the wider regional context, suggest significant disparities.

This was recognized by the European co-director of the San Vicente Productivo program. Although our conceptualizations of regional social capital are slightly different, it is worth quoting his analysis of why the Program was able to achieve greater results in Tecoluca as compared to other municipalities.

> "One of the crucial differences constituted the diverse levels of social capital development that [the municipalities] had achieved. In the extremes are San Ildefonso in the lowest point, with little institutional [NGDOs, etc.] presence and organizational levels in its communities, while Tecoluca was located on the highest extreme, with a level of organization, planification of its activities, and high presence of institutions that served to support the implementation of project activities. In addition to this level of organization and planning [the effectiveness of implementation] corresponded with the interest and disposition to [*hechar a andar*] adopt the instruments and the program's development proposal" (SVP 2004: 3).

In general, the linkages between the actors in the wider regional system are less dense and shorter term than those between the GBL's initiatives. There is also a greater divergence between the institutionalized expectations for behavior that tend to reduce uncertainty in interactions and less mutual understanding and established trust. Factors such as these, as well as the more obvious expressions of social capital accumulation cited above, have led to divergent levels of cooperation in innovative practice between task-networks of actors in the GBL and those involved in other regional efforts to create innovative economic initiatives.

Regional social capital, forms the basis for the collective capacity of local actors to exploit endogenous resources in relation to the implementation of collective development strategies such as those embodied in the regions' different territorial development plans. Simply put, territories that have developed this diversity of institutional and organizational characteristics, synthesized through the concept of regional social capital, have much greater innovation capacity and development potential than those that have not (Cooke 1999).

Innovation capacity

Tecoluca's regional innovation capacity can be understood as the inter-dependent capabilities of the region's initiative task-networks, the enterprise support networks and the actors participating in associational governance mechanism to proactively create an enabling context for the emergence and strengthening of localized innovative economic initiatives.

The individual and collective capabilities for transforming the existing organizational and institutional structure of the regional innovation system are especially relevant for enhancing the room for maneuver for innovative practice within Tecoluca's emerging RIS. One important, relatively recent, organizational transformation was the nationally unique configuration of the GBL and *Poligono de Solidaridad,* and the business working group within this context. These transformations demonstrate regional innovation capacity as they create concrete opportunities for greater interaction and synergy between the previously disperse economic initiatives and enhanced their collective image as novel experiences worthy of support and emulation. As argued earlier, the fact that many of these opportunities for consolidating innovative efforts and business performance of the GBL's economic initiatives are not being taken advantage of by initiative management, suggests the deficiencies in the current social capital accumulation within the consortium.

The regional innovation capacity concept takes into account the collective synergies created (intentionally or unintentionally) through the individual and coordinated actions of the system's members to create room for maneuver for projected innovative practice. Thus, the creation of the CIT, has brought together a group of actors, principally from the regional enterprise support network that has created additional opportunities for interactive learning between them, and also between producers with whom they work on an individual basis. The efforts to create working groups to make a greater collective contribution to innovative efforts in prioritized productive agglomerations, demonstrates the potentialities encapsulated in their coordinated efforts, as reflected in their contribution to the ACOPANELA initiative. However, the failure of the CIT's other working groups to consolidate any meaningful results, as well as the lack of coordination in the individual efforts of these actors to support irrigated plantain and vegetable production, suggests continued weakness in the system's overall innovation capacity.

As proposed in the Departmental Development Plan, there is a process of organizational confluence of the enterprise support capabilities of the actors integrated in this mechanism with the San Vicente Productivo Foundation that will manage significant funds left behind by this program and the regional committee of the SINALIT that will also manage funds directly destined to subsidize the implementation of innovative technological alternatives in localized economic initiatives. This emerging organizational configuration of networked capabilities *could* create synergistic innovation opportunities for making investments and financing technical support for innovative economic initiatives in the regional context.

The attempts to promote the implementation of the economic aspects of Tecoluca's territorial development plan through mechanisms associated with the Municipal Development Committee, further demonstrate the comparative strengths and weaknesses of this system's regional capacity to support technological transformations in localized productive and commercialization practices. The collective elaboration of these economic development proposals, have provided opportunities that have been taken advantage of by the municipality and CORDES to mobilize resources to implement some of the specific projects profiled in the plan. The inability to coordinate efforts to implement proposals to upgrade irrigated agricultural production, for example, suggest that there were insufficient capabilities in those actors supporting this effort to offer concrete opportunities that the producers could take advantage of to strengthen their own individual and collective innovative capabilities.

The interaction between a diversity of actors implied in the creation of this relatively dense web of spaces within Tecoluca's regional context, designed to facilitate associative governance of economic development practice, joint elaboration of strategies and the coordination of efforts to implement them, provides opportunities for building additional regional social capital. This relatively recent process of progressive *meso* level interaction in these spaces is involving regional actors in transforming elements of the formal regional institutional set-up (through development planning) but also building up mutual understanding, meaningful trust and behavioral conventions that further favor collective actions to promote innovative economic development initiatives. The creation of networking relations and increasing quality of interaction between some of these actors, also provide organizational conduits for

knowledge and other resources flows. For example, the increasing support by *San Vicente Productivo* for El Roble and AGROLEMPA and also the IICA's support for SAMO through Brazilian cashew experts were facilitated by CORDES' relation with these programs through the CIT.

Following the gist of Lawson's arguments, Tecoluca's emerging regional innovation system can be differentiated in terms of its relative innovative performance from those emerging in other Salvadoran or Central American territories, based on the particular accumulation of social capital and its integral innovation capacity. These particular aspects indeed stretch over spatial and organizational boundaries through the emerging dynamics of inter-connectedness between CORDES and the GBL's economic initiatives located in Tecoluca and other regional enterprise service providers and economic initiatives. Key aspects of the informal institutional set-up such as the emerging consensus as to key elements of the region's economic development strategy focusing on environmental and social sustainability, as well as economic competitiveness, co-evolve with their specific expression in innovative economic initiatives and their products.

These aspects are constructed through development planning processes, reflected in the plans produced and then reconstructed through the social interaction involved in implementing them. The same can be said for crucial factors like meaningful trust, reciprocity and transparency which are built up and/or destroyed through interactions within and across institutional boundaries over time. In this sense, regional social capital and innovation capacity are "real factors which emerge from, and are reproduced through, the interaction of agents, where some systems of interaction are better, more competent, at facilitating some kinds of outcomes than are others" (Lawson 1999: 160).

The accumulation of regional social capital and innovation capacities are long term processes which demand an understanding of the historical dynamics among territorial actors. The analysis of future trajectories reflected in the dynamics of this emerging system are, also, as important as the current outcomes of its functioning in terms of family livelihood sustainability, competitive business performance, ecological resilience or fragility, social cohesion, democratic governance, etc.

As has been suggested throughout this chapter and this concluding section, there are significant weaknesses in the overall capacity of Tecoluca's regional system to provide an enabling environment for the emergence and consolidation of innovative agricultural and agro-industrial initiatives. However, there are also significant advances, which are all the more remarkable in the polarized political context of rural El Salvador at this time. Analysis of both the strengths and weaknesses of this emerging system and the innovation capabilities of the task-networks involved in the GBL's economic initiatives (from Chapter 6) provide the basis for the lessons to strengthen similar practice in this and other emerging regional innovation systems. The development of these lessons is the task of Chapter 8.

PART IV

Conclusions, Lessons and Final Reflections

CHAPTER 8

Conclusions and Lessons for Practice

This concluding chapter synthesizes the analysis presented in Chapters 5, 6 and 7 to present answers to the four central research questions that have guided this investigative effort concerning the GBL's innovative economic initiatives and the emerging regional innovation system in which they are embedded.

Closely related to these analytic conclusions, the chapter also presents lessons derived from the analysis of the innovation capabilities of the task-networks involved in the GBL's economic initiatives and the capacity of the emerging regional innovation system to provide room for maneuver for implementing innovative alternatives in these and other economic initiatives in Tecoluca's regional context. These lessons (*highlighted in italicized text*) are designed as a contribution to the future practice of actors involved in similar local economic development initiatives in Tecoluca's regional context, rural El Salvador and comparable Central American or Southern contexts.

From these relatively general lessons one could formulate focused recommendations for actions in specific economic initiatives. However, just as learning and networking capabilities emerge from and are contingently dependent on a diversity of contextual factors for their translation into innovative practice; the dynamic assimilation of the lessons to be learned from these experiences emerging in Tecoluca into practice in other contexts cannot escape the complications of any knowledge or technology transfer. The effort to extract conclusions and lessons from the case study analysis thus implies a re-conceptualization of the causal mechanisms at work in the generation and application of the innovative capabilities of the task-networks discussed in the thesis. The intent is to make them more accessible for other knowledgeable actors looking to find connections applicable to their particular innovative efforts.

The presentation of conclusions and lessons for practice is structured in four sections around each of the research questions. Section 8.1 focuses on the principal characteristics of the innovative capabilities of the GBL's initiative task-networks, complemented directly by Section 8.2 which goes further in explaining the emergence of these innovative capabilities. Section 8.3 then discusses the question of how and why the configuration and functioning of Tecoluca's regional innovation system enables and constrains innovative practice in local economic initiatives. Section 8.4 widens this focus to discuss the relevance of national and international factors for localized innovative practice. Section 8.5 presents concluding remarks highlighting the relevance of the conclusions and lessons in relation to the rural develop problems identified in Chapter 1.

8.1 Innovative Capabilities of GBL Initiative Task-Networks

The research question addressed in this section is: *What are the most important capabilities that enable task-networks of actors to innovatively transform the technological systems they are managing, related to production and commercialization operations?*

This section builds off of the analysis of the innovative capabilities of the GBL's task-networks presented in Chapter 6. It is introduced through a synthesis of the main arguments concerning the nature of the related functional and "deeper" innovation capabilities. This discussion then highlights aspects of these capabilities as demonstrated through case study analysis that are of broader relevance. The lessons for practice incorporated into this discussion focus on the challenges faced by these task-networks in the development and implementation of innovative technological alternatives.

Functional innovative capabilities

The innovative capabilities of the task-networks involved in the GBL's economic initiatives are defined as their ability to mobilize and creatively apply a diversity of resources to the generation of different kinds of technological transformations. The task-networks must develop certain functional innovative capabilities that enable them to transform established routines related to production and commercialization operations in order to meet established goals for improving the sustainability of business performance, as well as the livelihoods of the rural families involved.

Analysis of the GBL's economic initiatives suggests that for local economic initiatives to be innovative the task-networks involved must be motivated and capable of coordinating their activities to:

- Reflect systematically on their business practice to identify challenges in terms of problems to be overcome, opportunities to be taken advantage of, or exogenous threats that demand action,
- Conceive and progressively refine design specifications for innovative technological alternatives to address the problems and opportunities analyzed, articulating needs for mobilizing internal and exogenous resources,
- Network with relevant exogenous actors to enroll their cooperation providing knowledge, financial, human and technical resources needed for innovation;
- Motivate task-network members to take risk-able steps, applying their individual abilities to innovative practice in complementary ways,
- Develop innovative technological alternatives through dynamic assimilation of exogenous elements and/or endogenous efforts and implement them in transforming the initiative's localized technological systems,
- Reflect critically on the different phases of their innovative practice in order to learn from their advances and difficulties to be able to consolidate their current innovative endeavors and continue with their innovative practice in the future.

The development and implementation of innovative technological alternatives requires the creative combination of processes for the dynamic assimilation of exogenous elements and progressively greater endogenous research and development efforts. In the innovative practice of the GBL's economic initiatives the development and implementation of these alternatives are intimately integrated processes with multiple feedback loops. This combined process of development and implementation of innovative alternatives requires the motivation and functional enrollment of the members of the task-network and their exogenous partners in complementary ways over a significant period of time.

The development of the endogenous knowledge base necessary to dynamically assimilate knowledge leveraged from exogenous sources depends fundamentally on the internal dynamics of reflection on practice and diffusion through interactive learning mechanisms established within the task-network. Learning from interactive reflection on problematic aspects of the internal dynamics and external dynamics of their initiatives is the principal feedback mechanism between the implementation and development processes. It facilitates the adaptation of business strategies and generation of specifications for searches for innovative alternatives to solve the problems and take advantage of the opportunities identified.

Although, these functional innovative capabilities can be conceptually differentiated and analyzed, their expression in practice is necessarily an integral process. In addition, endogenous innovative practice is rarely sufficient to enable significant improvements in performance outcomes. Initiative task-networks must develop their capabilities to work with other actors to create greater room for maneuver for their innovative practice. They must contribute to the transformation of external structural conditions that constrain the implementation of innovative alternatives and open new opportunities to realize the potentials of their novel products in progressively more demanding markets.

Dynamic assimilation and endogenous development of technological alternatives

Among the functional innovation capabilities, those related to the dynamic assimilation of exogenous knowledge and other technological components within the endogenous technological systems is the most important direct mechanism determining the generation and implementation of innovative alternatives in the GBL's economic initiatives. In part, this is due, to the incipient capabilities for endogenous development of technological alternatives within this local context. The recent advances in this area have demonstrated the potential synergies of coordinated endogenous R&D and the search for complementary exogenous knowledge and other resources to be integrated in the innovative process.

The presence of CORDES and key people playing roles mediating the inflow of exogenous resources and facilitating interaction between task-network actors to apply these resources to innovative practice confers particular characteristics on this consortium and its economic initiatives that differentiate it from other regional productive agglomerations around Tecoluca and in rural El Salvador in general. These organizationally specific configurations of complementary personal knowledge bases, networking relationships, etc., constitute key collective capabilities that have enabled relatively unique process of mobilization and integration of exogenous and endogenous resource inputs. However, dependence on specific people to play these roles also confers a marked fragility on the process of continued dynamic assimilation and endogenous generation of innovative alternatives, as dynamism behind these processes would be significantly diminished without their presence.

Along with the upgrading of particular capabilities related to the exogenous search for and the endogenous generation of technological alternatives, a conscious effort must be made to integrate these efforts in a synergistic way. This requires additional specific capabilities of the actors responsible for this integration process at the heart of dynamic technological upgrading. While actors like CORDES may play this key integrating function during the emergence of innovative economic initiatives, this capability must be progressively assimilated by business management in relation to key operative personnel to better guarantee the consolidation of this key innovative function and sustainable performance improvements over time.

Within the context of the broad definition of technology applied here, the dynamic assimilation of exogenous technological elements depends highly on the dynamics of the existing technological systems. Aspects such as the established production techniques, processes and organizational forms related to production, commercialization and management, the existing products, their characteristics and market positioning, as well as related knowledge stocks and learning routines, can be seen as conditioning the dynamic assimilation of exogenous technological elements in the GBL initiatives.

The integration of external elements to implement transformations in one area of the technological system requires envisioning the linkages and making successive transformations in other areas of the system and in the closely linked systems of production, processing and commercialization. This highlights the specific capabilities of the actors involved in mediating this internalization process, as they define how the external elements are brought into play in the endogenous effort to transform technological systems.

Generating and maintaining the motivation to innovate in the task-network

Generating and sustaining the motivation for families of producers to become involved in the different GBL initiatives has proven to be a key innovative capability of CORDES and now business management, with clear implications for business practice and performance.

An increasing number of local producers have demonstrated an openness to integrate themselves in associative producer groups and are taking significant risks in mortgaging land to make investments in innovative ventures with medium to long-term time horizons. The same is true, to a lesser extent, in additional examples cited of technological innovation in regional productive agglomerations. However, persistence towards the dynamic assimilation of novel technological alternatives has depended on effectively creating the conditions necessary for the consolidation of production capabilities and market access, making these investments risk-able steps for those initially involved and motivating examples for other potential integrants.

One important lesson being learned on how to achieve tangible results within the GBL's economic initiatives is to break the investments down into more risk-able steps for producers, especially in the case of the progressive reduction in the size of primary production units promoted and the investment costs of the technologies being implemented. This change in economic strategy is the

result of interactive learning processes between the key actors involved reflecting on their collective practice, what worked and did not.

The diffusion of knowledge that motivates and enables the initiation of innovative practice may be based on direct promotional efforts by the actors, like CORDES, interested in generating interest and enrolling new producers. However, what has been most important for sustaining motivation has been generating realistic expectations and following through to achieve tangible, observable results. In several cases, territorial agglomeration of producers seems to have facilitated this process of intelligent observation between producers.

Developing and maintaining the motivation of poor rural families to integrate themselves into these types of innovative and thus risky initiatives, requires understanding how to complement their economic livelihood strategies, their existing economic activities and resources in terms of knowledge, capital, land, labor, relationships with other actors, etc. Based on this understanding, supporting agents can better provide opportunities that these producers can take advantage of to strengthen their capabilities; opportunities relevant for acquiring new knowledge, investing in alternative production techniques, learning about alternative forms for organizing their productive and commercial activities, etc.

Deeper innovation capabilities

Critical reflection on innovative practice within the GBL's initiatives suggests that effectively engaging in innovative practice related to these functional categories requires a context specific combination of three more fundamental or "deeper" innovative capabilities. These can be conceptually understood as the synergistic combination of specific exogenous and endogenous networking and learning capabilities expressed in the solution of specific problems. Over time the task-networks must also be able to create the organizational and institutional configurations within the task-network that facilitate these processes. These deeper capabilities are:

- Reflective interactive learning through making synergistic connections between different areas of endogenously generated knowledge bases, as well as with exogenous knowledge sources;
- Establishing and upgrading innovation relevant networking connections, enrolling relevant actors within the task-network and relating to exogenous actors in the process of mobilizing diverse resources for innovative practice;
- Constructing an endogenous organizational configuration and institutional set-up that facilitates coordination, interactive learning and joint innovative practice between task-network partners.

The importance of these inter-connected capabilities is revealed through the analysis of the innovative advances of the GBL's economic initiatives and their limitations in consolidating the implementation of their proposed innovative alternatives. The overall accumulation of these three capabilities and the realization of the potential synergies between them, explains to a large degree the effectiveness with which the GBL's task-networks have been able to carry out the innovative functions discussed above. These deeper capabilities cut across the functional categories, being integrated and expressed in different ways in each one.

The following sub-sections highlight the most relevant arguments and lessons for practice derived from analysis of each of these deeper capabilities in the GBL's economic initiatives.

Strengthening internal and external networking capabilities

Networking capabilities are expressed through the dynamic inter-connections between the GBL's initiative task-network members and through their interaction with external actors. These have largely determined the quality and quantity of the resources available for application to innovative practice in the GBL's economic initiatives. The development of innovative local economic initiatives in resource poor peripheral regions requires dynamic and synergistic connections to firm and non-firm actors from

the regional, national and international innovation systems. However, just as important for the GBL's innovative practice, have been the strengths and weakness of endogenous networking mechanisms for the internalization and diffusion of exogenous technological elements and coordination of efforts to apply them to innovative effort.

It could be argued that networking capabilities are the most important resources and network construction the most important processes for the strengthening of this type of innovative economic initiatives, as managing network connections adequately provides, not only access to exogenous knowledge but also financial and technical resources. Furthermore, interaction among task-network partners enable coordinated endogenous effort for complementary R&D and the implementation of technological transformations.

Networking capabilities seem to be learned through repeated practice. There is little evidence of more structured mechanisms to facilitate learning to upgrade and transfer networking capabilities, between CORDES manager and the GBL's directive council and business management, for example. In this case, the mechanisms in place consist of the CORDES' manager making the necessary introductions and assuming that those conferred with the responsibility will be able to achieve the expected results from these networking relationships.

Analysis of how and why different initiatives have been able to acquire specialized knowledge suggests that diverse types of networking relationships are key for obtaining different types of external knowledge inputs; each demanding somewhat different networking capabilities to establish and maintain. Networking practice thus implies the development of specialized, mainly context contingent and tacit, knowledge concerning how and why to engage in diverse types of closer, longer term and more complex network relationships or more contingent and temporal linkages.

Networking cannot be reduced to its knowledge components alone as it requires the creation of specialized organizational and institutional configurations to facilitate interactive learning and other resource exchanges over territorial and organizational boundaries.[187]

The strengthening of innovative practice within local economic initiatives depends and must focus on continually strengthening capabilities for endogenous and external networking among the task-network actors involved. The key challenge is how to do this given the nature of the mainly practical learning mechanisms involved and the multiplicity of relevant networking partners, reasons for engaging them, types of relationships, etc.

A more reflexive, interactive approach would be, important for enhancing learning, making the relevant tacit knowledge of how and why to engage in certain types of networking practice more accessible to others in specific interface situations designed for this purpose. For example, within the GBL there is a seemingly unarticulated need to construct explicit processes by which key people within CORDES can "transfer" the largely tacit and context specific knowledge of how and why to network with different types of relevant exogenous actors, to the GBL directive council and the management and directive councils of the GBL's economic initiatives.

Similar mechanisms could be used to transfer emerging skills related to the management of participatory experimentation as a means of generation and diffusion of innovation relevant knowledge among producers. More explicit mechanisms should be set up between the international technical advisor who is conducting this process and other members of the CORDES technical staff, as well as the "popular technicians" selected for special training from among the producers.

[187] The organizational and institutional basis for the relationships from which innovative capabilities emerge is discussed in Section 8.2.

Synergistic connections between exogenous and endogenous knowledge bases

The implementation of innovative technological alternatives in the GBL's economic initiatives has depended on understanding why, how and from whom to mobilize a diversity of endogenous and exogenous resources. Analysis of the GBL's initiatives affirms that the dynamic assimilation of the exogenous knowledge resources is based to a great degree on the robustness of the contextually specialized and somewhat tacit endogenous knowledge bases.

The interdependent nature of innovations in components of technological systems and between linked systems implies projective, but also reflective, analysis of the changes that the introduction of exogenous elements will require in the remaining components of the linked technological systems of cultivation, processing and commercialization. This is necessary for understanding the substantial characteristics of the exogenous technology, how it will fit into the endogenous technological system and the dynamics involved in the implementation process. The applicability of these exogenous and endogenous knowledge bases to innovative problem solving can be assessed in terms of the depth of understanding demonstrated of the technological dynamics of specific systems or problem situations, as well as their scope and flexibility across contexts.

Building endogenous research and development capabilities is becoming increasingly important for the GBL's task-networks to complement and facilitate the dynamic assimilation of increasingly more complex exogenous knowledge. Equally important is the involvement of people with sufficient practical knowledge in order to understand and enable the transfer of technological components from exogenous systems whose functioning implies a great deal of tacit knowledge, such as granulated *panela* production in Colombia. In many cases, these two situations are present in the same process of technological transformation, adding complexity in terms of requirements for people who are able to translate, make the necessary connections, between these related but dissimilarly constituted knowledge bases.

Innovations that imply more substantial, radical changes in the technological systems require learning processes that are different from those necessary for the incremental innovations that have been required to consolidate the more radical innovations. The incremental innovations are more based on tacit knowledge accumulation and internal processes of reflection, while more substantial changes require learning by searching for new knowledge, techniques, and organizational examples from external sources.

A key for innovative practice is the deeper capability to synergistically link these distinct types of learning processes, making innovative connections between the knowledge bases of the different actors involved:

- *those responsible for the conceptualization and design of the more radical changes and those involved in the incremental process of transforming the technological system to accommodate and consolidate these changes;*
- *the exogenous knowledge sources enrolled in support of the initiatives and those people involved in endogenous research and development efforts;*
- *the scientific and engineering knowledge of NGDO technicians and the more tacit, experience based knowledge of producers and plant workers.*

The combined application of these different types of knowledge are important during the search processes to be able to understand the exogenous processes sufficiently in order to be able to identify the knowledge or technical specifications which are highly contextually contingent and thus problematic to transfer. For example, it would be crucial to be able to separate those elements of an exogenous production system which are related to local agro-ecological conditions such as specific plant varieties, from the underlying properties of these elements (bio-chemical and physical properties of the plants, for example) that are essential for obtaining the required production outputs under a wider variety of conditions.

Collective reflection on business practice to clearly define problems and opportunities for innovation has been a necessary input for effective exogenous knowledge search operations and endogenous R&D processes for generating innovative alternatives in the GBL's initiatives. Critical reflection has allowed moving beyond learning by doing to improve practice, to a more conscious understanding of how and especially why the technological systems function the way they do and of their inter-relationships.

Current reflexive learning and action strategies are generally related to participatory performance evaluations and different types of strategic and operative business planning within specific initiatives and also at the level of associative governance mechanisms like the GBL's economic working group. The problem with these general mechanisms has been the weakness of implementation of overall strategies and specific planned activities, especially when inter-organizational cooperation is involved.

A central question is then how to stimulate greater critical reflection among the diverse actors integrated in economic initiatives in such a way as to provide feedback and enable further innovative practice. One possible alternative, that is supported by analysis of innovative practice in general, is to break the reflexive process down into more manageable steps, putting greater emphasis on converting the resulting action proposals into tangible results that motivate sustained commitment to the longer term interactive efforts. Bilateral interaction between service providers and producers or enterprises, reflecting on and developing alternatives to resolve specific technological problems may be seen as a first step towards more complex cooperative initiatives involving a wider diversity of actors.

Analysis of the emergence and consolidation of innovative capabilities in the GBL's economic initiatives demonstrates how explicit efforts to learn from experiences in implementing technological innovations have resulted in strategic changes in continuing practice; breaking down the investments required into more riskable steps to make them more viable for producers, for example. Reflection on the general experiences of implementing these innovative initiatives has also enabled a continual refining of the overall development strategy as well as the design of specific new projects to strengthen existing innovative economic initiatives or to create new ones. This has given rise to an agglomeration of potentially complementary innovative initiatives and facilitates their continued convergence in terms of conception and image as well as joint definitions of problems and viable innovative solutions.

This internal positive evolution of technological trajectories based on limited reflexive learning within the GBL highlights the importance of the agglomerated co-evolution of innovative economic initiatives and the potential for further connections between experiences of the GBL's initiatives and other emerging regional agglomerations of economic initiatives (as discussed in Sections 8.2 and 8.3 respectively).

Learning relevant for innovation in the GBL's initiatives has involved interaction with members of the task-network and/or exogenous knowledge sources, and thus depends on established internal and external network connections and networking capabilities. The dynamic assimilation of exogenous knowledge inputs has required skillful coordination of capabilities at the nexus between the external inflows of diverse kinds of knowledge, frequently embodied in cooperating actors, and the internal learning dynamics of the people involved in implementing the proposed innovative alternatives. Within the GBL, CORDES Bajo Lempa has played the key role mediating the flow of externally acquired knowledge and other resources into the task-network context and supporting their application in innovative practice. This can imply direct absorption and translation of knowledge to make it available for application within the agglomeration or the enrollment of knowledgeable individuals that then "transfer" their knowledge through different interactive mechanisms to other key actors.

Facilitating dynamic assimilation implies a shared understanding of the capabilities of the actors involved and how they can best complement each other. Facilitating the interactive learning, that is the basis for this process, implies understanding not only what is known and needs to be known by different actors involved, but also their ways of knowing and learning, which are divergent across sets of actors like producers and agricultural engineers. These aspects of task-network knowledge

bases are slowly emerging through practice in the GBL's initiatives and more explicit reflective efforts are required to strengthen this deeper understanding of related actor capabilities and the cognitive perspectives that they bring to innovative practice.

In conclusion, strengthening the complex set of capabilities necessary for dynamic assimilation of exogenous elements and the endogenous generation of novelty requires purposeful interactive learning with other experienced actors and critical reflective learning from ones own productive and marketing practice. The accumulated knowledge is largely tacit and embedded within the initiative's task-network and thus a potential source of competitive advantages and sustainability.

Constructing an enabling organizational and institutional set-up for innovation

The development of organizational conduits, embodied within sustained personal and organizational relationships established within the task-network context, has been important in bridging the gap between CORDES' conceptualization and design of innovative project initiatives and innovative practice related to the emergence and consolidation of the GBL's economic initiatives.

For example, one of the most important weaknesses in the innovative capabilities of the GBL's economic initiatives is the establishment of concrete organizational mechanisms, working routines and institutionalized incentive structures to facilitate interactive learning and human capital formation. The limited organic mechanisms do not guarantee an adequate diffusion and local adaptation of the innovative technical knowledge accumulated through practice and assimilated from exogenous sources to the wider group of producer families in these initiatives.

The need for more systematic processes of interactive learning and coordination between the GBL's different initiatives related to innovative effort is recognized by diverse actors involved in the GBL effort and was one of the reasons stated for the formation of the ETM economic working group. Through this effort, CORDES, FUNDE and the GBL leadership sought to institutionalize a certain way of dealing with identified business performance problems. However, the methodological process developed for its functioning has been insufficient to overcome counterbalancing institutional inertia towards non-cooperation between the actors involved.

At a deeper level, this negotiated process reflects the organic linkages and institutional qualities of their relationships (trust, reciprocity, horizontality, etc.) can be integrally conceptualized as the accumulated social capital built up between actors that enables cooperation or in its absence, limits it.

The innovative outcomes of a determined group of knowledgeable actors, organized in a certain way, is thus contingent on the way in which these actors decide to bring the diverse resources they have mobilized to bear in an ordered problem solving process. This suggests the importance of effective institutionalized routines enabling or constraining interactive innovative practice. The strengthening of different interactive learning mechanisms is necessary to progressively build up endogenous capabilities for knowledge creation and diffusion within the task-networks.

Interactive learning and other networking practices by individuals within or across organizational boundaries are enabled and constrained by the immediate organizational and institutional frameworks in which they are embedded. These frameworks are the expression of past actor capabilities applied in their construction. They must be made to co-evolve with learning and networking capabilities in relation to the demands emerging from innovative practice in different functional areas.

8.2 Explaining the Emergence of Innovative Capabilities

The central question addressed in this section is: *How and why do innovative capabilities emerge in the task-networks of actors involved in innovative economic initiatives and agglomerations of related initiatives such as the GBL?*

The conclusions presented build off of the analysis presented in the previous section and in Chapter 6, highlighting the key arguments made concerning the causal mechanisms that explain the emergence of the deeper innovation capabilities among the task-networks of actors involved in the GBL's economic initiatives. The lessons derived from this analysis focus on how the emergence of these capabilities can be facilitated within the context of the different task-networks and the GBL as a whole.

Emergence of deeper innovative capabilities

Different actors have become enrolled in different ways within the GBL's economic initiatives, placed as they are within the context of their historical evolution, territorial localization, related systems of innovation, technological frames, trajectories and regimes, etc.,. These actors are involved in networking relations with other actors within and exogenous to their task-networks. These relationships are characterized by certain qualities that are built-up over a specific interactive trajectory.

The deeper innovative capabilities of the GBL's task-networks have emerged from and are expressed through this interactive social practice and, thus, depend on the specific nature of the organic linkages and the more intangible qualities of the relationships between the actors engaged in these social interface situations. While the specific competencies of the people involved in these different task-networks are important, what has been fundamental for these initiatives' overall innovative practice has been the quality of interaction between these people and the organizations in which they are embedded.

Analysis of key relationships between actors within the GBL's economic initiatives and between them and exogenous actors reveals that the most important intangible, cognitive, aspects of interactive innovation practice are establishing:

- Mutual understanding and shared language codes necessary for effective communication,
- Complementary motivations to engage in joint practice over time,
- Conventions of social inclusion and reciprocity, building from non-exploitation to synergy,
- Reliability concerning the fulfillment of agreements and trust in the expected application of capabilities to resolve problems in agreed upon ways,
- Agreed upon co-responsibility in terms of assuming the risks involved in innovative activities.

These aspects can be understood as the specific *institutional basis for the relationships* from which deeper innovation capabilities emerge. The institutional basis for these relationships is socially constructed over time and is reflected in tacit understandings of what constitutes appropriate behavior. These are cognitive constructions existing in the minds of the actors involved and are thus heavily influenced by their past experiences in previous interactions within these relationships or similar interface situations. Greater codification of these conventions for expected behavior through negotiations resulting in explicit agreements, project proposals, terms of reference, signed contracts, etc., reflect situations where the risks of non-compliance with responsibilities is too great to rely on informal mechanisms. This relation specific (informal and formalized) institutional framework exists within regional, national and international cultural conventions for behavior and other formalized institutional set-ups that also enable or constrain the interactive practice of the actors involved.

The *organizational basis for the relationships* from which the innovative capabilities of the GBL's actors have emerged is reflected in the particular configuration of linkages between the actors involved; the way these are structured in relation to networking and learning as expressed in each of the functional areas of innovative practice. In the case of individuals, their engagement in collaborative innovative practice is mediated by the organizational configurations in which they are embedded and the relationships established between their respective organizations (if their relationship crosses organizational boundaries).

How the particular capabilities of actors can be oriented, or not, towards collective innovative practice depends to a large extent on the particular nature of the interconnections among them, within and

across organizational boundaries in the task-networks and with key exogenous actors. Within the scope of their relationship, what collaborative innovative practice is realizable is also constrained or enabled by a specific institutional room for maneuver; part of which they have constructed through interaction and part of which is exogenously determined, although internally mediated. The same can be said for the enabling and constraining forces of the organic linkages and institutional basis for the relationships between a task-network's organizational actors.

Innovative capabilities of actors (individuals and organizations) within task-networks are constructed through interactive learning and resource exchanges with other relevant actors, and by their organizational configuration and institutional basis. What innovative practice actors are able to engage in within their organizational and institutional room for maneuver depends on their accumulated innovation capabilities that can be applied to this task and the complementary capabilities of other actors they are able to enroll. These dynamics reveal the complexities of the co-evolving nature of structural factors and agency in relation to innovative practice in innovative economic initiatives.

Potential and realized synergies between innovative capabilities

The emergence of deeper innovative capabilities in the GBL's economic initiatives has depended on the realization of synergies between the potentially complementary actions of a triangle of key actors: the leading NGDO, the progressively autonomous management of the different initiatives, and the producers and workers who are the cooperative owners of the enterprises and their elected leadership.

As stated earlier, the evolving web of internal and, especially, the exogenous inter-personal and inter-organizational network connections provide the organizational conduits through which the diverse resources needed for implementing technological innovations in the GBL's economic initiatives flow. However, the relevance of dynamic network connections has depended on the complementarities existing between the capabilities of the interacting partners as expressed in collaborative innovative practice. Synergy in the collective innovative practice of the GBL's economic initiatives is expressed in outcomes greater than what could be expected from the sum of their individual efforts due to the exploitation of complementarities. What synergy exists is the result of these actors learning to learn together and cooperate over time; valuing and depending on the specific knowledgeable contributions of task-network partners.

The compatibility between capabilities being applied to the development and implementation of technological alternatives depends on the requirements of the task at hand and the capability accumulations of those involved, but also, to a high degree, on the way in which they coordinate the application process. This process is characterized by a certain logic (related to the motivations of those involved) and methodological sequence that is more or less consciously negotiated and designed collectively.

In the GBL's economic initiatives, this interactive logic and process design is integrated into the projects and the working routines of the NGDO programs and people involved. Also reflected are the motivations and action strategies of the other actors involved; their relevant capabilities and the way they are applied in interaction with the NGDO to the implementation of technological transformations within the economic initiatives.

The synergistic exercise of innovative capabilities depends on the capabilities of the actors involved to negotiate their interests and understand the interests of others, in order to facilitate cooperation.

Constructing synergistic learning connections between the dissimilar knowledge bases of local producers and NGDO technical staff, as well as between industrial workers, plant management and business support personnel, has depended on the confluence of their motivations and action strategies. In some cases, there is a complementary co-evolution of knowledge bases and their related

perspectives on the task at hand, and this has been crucial for overcoming the limited frameworks of thought that each possess as to the problems and challenges faced by the initiatives and the development of alternatives to meet these challenges.

In contrast, contested perspectives on the current situation, problems and future trajectories of these initiatives between the NGDO management and the managers of some of the more autonomous business initiatives, as well as between management and producers are weakening relationships and creating non-coordinated action trajectories. The need and opportunity for obtaining potentially important financing or fulfilling market demands have not been sufficient to overcome the built-up mistrust between several of these initiatives and between them and the leading NGDO. This situation reflects intrinsic difficulties in motivating business managers, for example, to dedicate scarce time and resources to complicated processes of taking collective, co-dependent steps to innovative, to take advantage of business opportunities or resolve collective problems. This is especially true if the final results of the process and their potential firm level benefits are not clear to all those involved.

Taking advantage of the potentials for synergy between the GBL's economic initiatives, in terms of the co-development of their specialized knowledge bases and the coordination of concrete activities, depends on breaking a vicious circle. Trust is the key for combining capabilities in distinctive new ways; being able to rely on the capabilities and co-responsibility of others is necessary if these actors are to make significant new leaps in innovative practice. Meeting the challenge of obtaining sustainable business performance implies the need to do so.

Greater collective reflection within the task-networks and the GBL itself, concerning the complementarity of individual actor capabilities would enhance their collective innovative capabilities as it would help consolidate a shared vision of their future and actions needed to attain this desired future state. It would also provide the basis for collective action among these network partners necessary for transforming common external problems and proactively taking advantage of potentially important resources embedded in the regional, national and international innovation systems. Due emphasis clearly must be placed on obtaining tangible results in relation to collectively articulated priorities.

Generation of horizontal networking and power relations

The quality of relationships and synergies among the GBL's task-networks depends on the negotiation of their diverse perspectives and relative power positions which can facilitate or impede cooperation. Difficulties have arisen and persist where unequal power relations exist and some members of the task-network are not able to take on co-responsibilities that could create greater synergies within these networks as a whole. This is especially true of the producers in assuming their role as proactive owners through greater participation in the established associational governance mechanisms, but also protagonists in the diffusion of innovative knowledge between current and potential integrants in their initiatives. Interaction between actors with different power positions and internal logic to their actions (*campesinos* and technicians, for example) has required special abilities among the different actors involved in order for the results of this interaction to be synergistic and positive for all involved in the processes of participatory experimentation.

The structure of power relations can obscure or clarify perceptions of the capabilities of other actors or as to the most optimal roles different actors should play at any time in the innovation process. The way power relations are structured can create confluence or divergence in the expected outcomes of participation in the initiatives which can lead to coordination problems and disintegration or organizational strengthening. Greater horizontality and equality in power relations between the task-network partners would favour the emergence of greater synergies. This depends on negotiations to promote the convergence of interests, the building of horizontal relationships, establishing mechanisms that facilitate interactive learning and especially the strengthening of the capabilities of the "weakest" actors to assume co-responsibility and increase their contributions towards innovative practice.

Coordinating innovative practice within and between the GBL task-networks

Analysis of the dynamics of the GBL's task-networks suggests that the individual capabilities can be seen as opportunities that can, or cannot, be taken advantage of in innovative processes. The capability to implement innovations is best characterized as a collective attribute of the task-networks, not of the individual actors involved. Innovative practice depends on their collective vision of the outcome and the coordination of their individual capabilities to achieve the expected results. This coordinated action has not emerged spontaneously but has required proactive facilitation.

CORDES has been a catalyst for the conformation of the GBL and promoting horizontal co-operation between the agglomerated economic initiatives. Within the task-networks CORDES, but now progressively business management, has promoted necessary coordination between producers, and between producers and those people in charge of processing and commercialization operations, although not always achieving expected results.

The complexities of playing this role are revealed in the case study, as CORDES' coordinating role has become increasingly problematic. Its legitimacy to continue playing this role, which implies the exercise of significant power, is questioned by the increasingly autonomous business initiatives within an evolving atmosphere of limited trust. In part, it is for this reason that CORDES has promoted the formation of the GBL and increasingly expects the GBL's directive council and the business working group to take responsibility for this coordinating role.

The capabilities to play these complex coordination roles represent a combination of the specialized knowledge base of the key people who are directly responsible for this organizational function and their personal networking skills. However, their coordinating actions are highly contingent on the enabling force of relational proximity, built up through continued interaction and some degree of shared values within the organizational set-ups in which they are embedded. Thus, the specialized capabilities related to the coordination function emerge from social interface interaction, largely within the context to which they are applied and have both personally embodied and institutionalized organizational dimensions.

A key role within the task-networks of innovative initiatives is the coordination of the capabilities embodied in the diversity of internal actors, and the enrollment of exogenous actors to complement these endogenous capabilities. The complexity of this type of networking capability requires special conditions and special combinations of people. This implies a significant challenge of constructing the individual and collective capabilities of these actors to effectively assume this role.

As stated above, a key to meeting this challenge will be making the tacit knowledge accumulation in key people within the leading NGDO more accessible and transferable, to the members of the GBL's directive council and emerging configurations of people related to the management and governance of the consortium's diverse economic initiatives. The same could be said as well for the need for the cooperative directive councils to assume greater responsibility for the overall coordination of learning processes and other activities within their respective initiatives. This process of interactive capability transfer will require building trust through continued socialization and the building of a mutually understandable explicit language where these are currently lacking. Explicit efforts are also needed to strengthen the capabilities of producer owners to make an active contribution and benefit from participation in spaces created for collective reflection and interactive learning.

Territorial and relational proximity and the creation of meaningful trust

Analysis of the GBL economic initiatives, as compared to other economic initiatives that exist in the rural areas of the surrounding municipalities in the Nonualcos micro-region and San Vicente, suggest that the emergence of innovation capabilities has been facilitated by the duration of the interaction between CORDES, as a locally embedded but externally linked supporting actor, and local producers with significant endogenous organizational capabilities and productive potential. The long term presence of CORDES Bajo Lempa largely explains the emergence, but most importantly

the progressive consolidation, of the GBL's innovative economic initiatives. There are still greater opportunities for creating co-evolutionary synergistic specializations between the agglomerations of related economic initiatives and *their* network of supporting enterprise service providers.

Sustained support is necessary to provide the conditions to motivate the families to take the risks implied by involvement in innovative initiatives, and to provide the opportunities for these families to strengthen their capabilities and contribute positively to the development of the initiatives as a whole. For supporting actors, this implies the need to plan for medium to long term accompaniment to be able to complement the developing capabilities of the local families throughout the strengthening of innovative local economic development initiatives. There is a medium to long term time horizon implied in the implementation of the substantial innovative processes in the GBL's economic initiatives and their consolidation through subsequent incremental innovations.

Sustained relationships are a necessary but not sufficient condition for synergistic cooperation and the institutional conventions that support interactive innovative practice, built up through sustained interaction, must be continually maintained and are relatively easily eroded.

The nationally unique configuration of the GBL consortium and *Poligono de Solidaridad* looks to create concrete opportunities for greater interaction and synergy between the previously disperse economic initiatives and enhance their collective image as novel experiences worthy of support and emulation.

Physical and relational proximity has enabled CORDES' management team to accumulate a detailed knowledge base, learning from the experiences of each initiative. This learning process has supported the development of decision making heuristics and specific lessons applied to facilitating innovative practice in these initiatives. CORDES' internal networking practice and coordination of the relations between task-network actors has required significant mutual understanding and trust where it has been effective. The territorial agglomeration of the GBL's economic initiatives has facilitated the development of deeper learning and networking capabilities that were necessary for CORDES to play its strategic role in managing the emergence of these initiatives and accompanying their initial steps towards business consolidation.

The innovative capabilities of the task-networks involved in these initiatives have emerged in relation to the territorially agglomerated, systematic development of specific endogenous technological trajectories, characterized in the GBL by an increasing focus on organic production and the integration of producers and workers as cooperative owners of the agro-industrial and commercial operations.

Within the population of producers in the area of the GBL's influence, diversity seems to challenge and motivate others to creatively replicate what they see as successful strategies for diversification into new economic activities. The assumed process of creative combination of the complementary knowledge bases between producers linked to the different initiatives is facilitated by their territorial proximity.

Sustained interaction among producers facilitates the creation of a shared view of the future perspectives for the evolution of the economic initiatives in which they are involved, and perceiving the tangible results obtained by some members reduces the perceived risks of investing in innovative alternatives. Effective collective action and organization are important steps in consolidating the appropriation of these initiatives by their producer owners. Territorial agglomeration of producers has, thus, facilitated the mobilization and effective use of local resources, breaking down investments into risk-able and manageable steps, and constructing mechanisms that facilitate the integration of further producers.

The agglomeration of primary producers involved in similar activities has, in part by design, created the conditions for the emergence of processing and commercialization operations, to which these producers are vertically linked as providers and owners. The GBL's economic initiatives are potentially complementary by design and there are multiple potential synergies between them in terms of knowledge interchange as well as co-operation in their marketing and commercialization efforts

that could potentially give rise to further specialization of the commercialization function within the consortium.

The process of vertical differentiation within the territorial context can stimulate a progressively more intense learning process to enable improved coordination of primary production, processing and commercialization operations. This is especially important in developing a business strategy for presenting novel products in national and international niche markets, which require coordinated progressive technological transformations at all these levels.

The co-evolutionary development paths of the GBL's initiatives reflect path-dependent learning processes in terms of their relation to previous decisions and the general development of the agglomerated firms along specific technological trajectories. This practice is, however, not path determined as the actors are capable of reflecting on their practice and changing their course, within the scope of current technological trajectories and regimes, or in relation to new ones.

Altering paths requires building new learning and networking capabilities, transforming organizational configurations and institutional set-ups and creating additional room for innovative maneuver. There is a continuing need to proactively search for and foster new business opportunities and synergistic linkages within the agglomeration of potentially complementary initiatives.

Quality of interaction and sustainable business performance

As a final note in this discussion of the emergence of deeper innovative capabilities it is necessary to note that "quality of interaction" within the task-networks internal and exogenous relationships is certainly reflected in the business performance outcomes. However, this influence is mediated through the construction of the deeper and more functional innovative capabilities and how these are expressed in innovative practice to transform the initiative's technological system and business practices.

Within the GBL economic initiatives, the quality of interaction between the actors involved in the different economic initiatives has enabled their (limited) advances towards sustainable business performance, through the implementation of technological transformations within their interconnected systems of agricultural production, ago-industrial processing and organized commercialization. The generation of novelty within the economic initiatives is also translated into performance outcomes in relation to exogenous factors that form part of the selection environment. Thus, the causal relations between the specific qualities of the interactions from which innovation capabilities emerge and the sustainability of business performance outcomes are heavily contingent on other factors.

There is a direct relationship between improvements towards established performance goals and the realized synergies between the innovative capabilities of the task-network members, especially those directly enabling the effective internalization of exogenous technological elements and the emergence of internal research and development capabilities. The integrated process of developing and implementing innovative alternatives is the point of most direct connection between the expression of innovative capabilities and the transformation of routine business activities to generate more sustainable business performance. The emergence of the learning and networking capabilities, in turn, is contingent on the quality of interaction between the task-network members and between them and exogenous ones.

8.3 Regional Factors and Innovative Practice in Economic Initiatives

This section addresses the question: *How and why do regional factors related to the localized production system, business support network and associational governance structures of Tecoluca's emerging regional innovation system, enable or constrain innovative practice in local economic initiatives?*

It synthesizes the most important arguments made through applying the conceptual framework developed in Chapter 4 to the analysis of emerging innovation system dynamics within Tecoluca's regional context in Chapter 7. The lessons drawn from this analysis focus on how to strengthen the capabilities of actors engaged in providing enterprise support services and in associational governance practice to create room for innovative maneuver for regionally located economic initiatives. They also highlight how localized economic initiatives can better take advantage of regional factors, which represent opportunities for their innovative practice, and work to create room for maneuver where it is restricted.

Development and expression of regional social capital and innovation capacity

Tecoluca's emerging regional innovation system can be differentiated in terms of its relative innovative performance from those emerging in other Salvadoran or Central American territories, based on the particular dynamics of inter-connectedness between enterprise service providers and economic initiatives co-located within the regional boundaries. Key aspects of the formal and informal institutional set-up are also regionally specific. These include the emerging consensus as to the region's economic development strategy, focusing on adding value to local products, generating non-farm employment opportunities, environmental and social sustainability, as well as economic competitiveness, reflected in territorial development plans and in practice in innovative economic initiatives and their products. Other crucial institutional factors include meaningful trust, reciprocity and transparency, which are built up and/or destroyed through regionalized interactions within and across institutional boundaries over time.

Tecoluca's regional innovation capacity can be understood as the inter-dependent capabilities of the region's initiative task-networks, the enterprise support networks and the actors participating in associational governance mechanism to proactively create an enabling context for the emergence and strengthening of localized innovative economic initiatives. Collective capabilities for transforming the existing organizational and institutional structure of the regional innovation system have been especially relevant for enhancing the room for maneuver for innovative practice in this regional context.

Tecoluca's regional social capital accumulation, relevant for innovative practice, can be visualized as the existing room for maneuver provided by the specific combination of the region's formal and informal institutional set-up that governs inter-personal and organizational interactions between actors in the RIS, as well as the un-traded interdependencies and organic networking relations that exist between these actors that facilitate coordinated innovative practice.

Within the GBL and Tecoluca, the contextually embedded, historically constructed, systematic relations between people and organizations have fostered a significant level of mutual understanding and a shared expectation of cooperation as the primary means of implementing innovative alternatives to resolving common problems. There are also shared values as to key issues related to the social and ecological sustainability of the local economic development process. Meaningful trust has facilitated specific transactions relevant for innovative practice and the lack of trust has proven to be a significant barrier to the realization of synergies between actors in other interactive situations. These can be seen as key institutional components of social capital embedded in relations between actors in these local contexts.

More tangible characteristics of social capital accumulation in the GBL and Tecoluca are reflected in the quality of the networking connections across horizontal and vertical dimensions, internal and external to the task-networks, which enable the flows of knowledge and other resources necessary for innovative practice. The quality of inter-connections formed in the associational governance mechanisms that enable collective strategizing and collaborative actions in favor of innovative practice is an integral part of Tecoluca's social capital accumulation.

The fragility of social capital accumulation is demonstrated by the fact that many of the opportunities for consolidating innovative efforts and business performance of regional economic initiatives are not being taken advantage of due to weakness of connections and a lack of trust in existing relationships. The breaking down of these organic linkages is related to perceived violations of trust, openness and transparency and reciprocity in the fulfillment of commitments in their relationships.

Special emphasis must be placed on building and maintaining synergistic connections between different actors within the regional innovation systems over time. The accumulation of regional social capital and innovation capacities are long term processes. Understanding the current dynamics of a regional innovation system implies analyzing the historical dynamics of relationships among relevant territorial actors and their exogenous connectedness. The current social capital accumulation, facilitating room for maneuver for cooperative innovative practice, was built up through social interaction reflecting the collective innovation capacity of regional actors. The expression of the region's current capacity to support innovative practice will be reflected in future tendencies in terms of family livelihood sustainability, competitive business performance, ecological resilience or fragility, social cohesion, democratic governance, etc.

The relevance of regional governance mechanisms for innovative practice

There is a process of organizational confluence of the enterprise support capabilities of a diversity of actors involved in a relatively dense web of interactive spaces within Tecoluca's regional context which are designed to facilitate associative governance of economic development practice, joint elaboration of strategies and the coordination of efforts to implement them. This relatively recent process of progressive *meso* level interaction is transforming elements of the formal regional institutional set-up through development planning, but also building up mutual understanding, meaningful trust and behavioral conventions that further favor collective actions to promote innovative practice in regional productive agglomerations.

The creation of associative governance mechanisms that bring together actors from the enterprise support network, are important as they create additional opportunities for interactive learning between these organizations and can facilitate their coordinated support of priority agglomerations of producers. However, the general failure of these mechanisms to consolidate meaningful innovation relevant results in Tecoluca's RIS, suggests the need to strengthen the specific means by which the implementation of planned activities is coordinated.

The creation of networking relations and increasing quality of interaction between some of the actors involved in these mechanisms (for example, CORDES and territorial development programs), has provided organizational conduits for knowledge and other resources flows to regional economic initiatives. These mechanisms increasingly play a meso-level role mediating between relevant exogenous actors from national and international systems of innovation and localized agglomerations of economic initiatives. The have demonstrated certain potential in coordinating the demands articulated by producers and the provision of services by an increasingly consolidated regional business support networks, as well as mobilizing specialized external actors to complement endogenous regional capabilities.

Regional development planning provides an overall framework for economic development activity and is facilitating a certain level of coordination between actors in Tecoluca's emerging regional innovation system. Collective reflection on common problems and elaboration of joint action strategies to implement innovative alternatives represents an important collective capability in itself. Regional development plans have also served as important tools for mobilizing resources for investment in specific economic development initiatives and innovative efforts. However, these collectives of actors have experienced significant difficulties in translating elaborated strategies into effective coordinated actions, which could feed back into reinforcing the vicious circles of distrust and individualized action they were designed to break.

These mechanisms also have the potential, but limited demonstrated capabilities, to facilitate reflexive and interactive learning from the experiences of innovative economic initiatives, different enterprise support methodologies and mechanisms to implement territorial development plans. The fragility of conventions facilitating interactive learning and cooperation is demonstrated through the difficulties overcoming (and not perpetuating) a lack of trust in the outcomes of coordinated activities expressed by different regional actors, and thus an unwillingness to risk their limited capital and human resources to participate in associational governance mechanisms and concrete planned initiatives.

Innovating in the periphery in rural regions like Tecoluca implies working with the limited resources that exist in terms of the organizational and collective innovation capabilities of the economic actors and the relevant business support network. This suggests extreme caution to avoid the problems like those caused by overly ambitious projects, based on unrealistic assumptions as to the production and management capabilities of the families to be involved as well as those supporting them. A critical assessment of the initial experiences with the implementation of several territorial development plans also suggests insufficient analysis of the capabilities of the actors to implement the proposals. Experience suggests reducing these ambitious proposals to more implementable steps for service providers and risk-able steps for the families to be involved.

The consolidation of some sort of regional development corporation that can act as a meso-level coordinator of the regional innovation system and a connecting link to mediate relations with relevant actors from the national and international innovation systems is necessary. There is a crucial need for the empowerment of regional governance structures providing them with adequate capital and human resources to play their role in the implementation of the regionally specific development strategies they have designed.

Only through actually working together on the implementation of joint initiatives, facilitated by having the necessary funding and competent people involved, can inter-organizational trust be built up and the potential synergies of cooperation be realized and thus institutionalized in the regional innovation system.

Weakness and potentialities of the municipalities as system integrators

Strengthening the innovative capabilities of the task-networks involved in local economic development initiatives is directly linked to transforming the local organizational and institutional context to make it more conducive for their emergence and consolidation. In El Salvador, this depends to a large extent on the dynamics of state decentralization and the transformation of the municipalities to fulfill their potential as local economic development actors.

The municipality in Tecoluca has demonstrated motivation to become a proactive promoter of local economic development in the region and has taken some important steps in this direction. However, its capabilities are especially limited due to a lack of financial resources and technical expertise in relevant areas. The emergence of LED as a municipal priority is reflected in the mobilization of external financing to construct infrastructure designed to facilitate local enterprise activity. This new effort has been closely coordinated with CORDES which demonstrates the importance of their mutually supportive, reciprocal relationship.

The municipality's potential role as catalyst for strengthening the dynamics of Tecoluca's emerging regional innovation system would be facilitated by its political legitimacy, especially if there was cross-party diversity among several associated municipalities. Municipalities currently lack access to financial and human capital resources capable of playing the proposed role of facilitating linkages between diverse actors, articulating demands among firms for support in innovative ventures and the complementary capabilities of business service providers, universities, etc. There is a need for associational regional mechanisms between municipalities and other key actors to form technical teams to promote territorial economic development.

Regional enterprise network's capabilities to enable innovative practice

Actors from the regional business support system have facilitated flows of knowledge and other resources that have been a decisive factor in the attempts to introduce technological innovations in the principal agglomerations of economic activities within Tecoluca's regional context. Given the opportunity to do so, some of the producers involved in regional agglomerations of economic initiatives have demonstrated their ability to make significant changes in their existing production systems and diversify their economic activities in order to maintain and improve their livelihoods. Others have not.

A significant aspect of the NGDO role that is not adequately recognized, especially by the state, is its ability to develop innovative (although not always successful) economic initiatives. Many of the enterprise support providers have improved their abilities to respond to their implicit and explicit demands for support through learning processes reflected in internal transformations made in their working methodology and the quality of inter-connections with the producers and enterprises they are working with. There is still a clear need to implement existing proposals for greater specialization of their services and differentiation of strategies for supporting technological innovation in producers' productive and marketing systems, in relation to their demonstrated capabilities and interests.

Further motivating and enabling the innovative efforts of regional producers implies greater understanding of their economic strategies and capabilities. Recognizing the innovative capabilities of local producers, their strengths and weaknesses, is a fundamental first step for supporting agents to take in order to be able to complement these capabilities. Increasingly close relations with regional economic actors are needed in order to specialize their service provision to meet their evolving demands. Reflexive learning on their practice supporting regional enterprises, and on that of others providing similar enterprise support services is crucial to capitalize on these experiences introduce innovations and improve performance as service providers.

There is a general fragility in the capabilities of the actors from the regional support service network to sustain their presence, delivering services over the time required for the development of the innovative capabilities of agricultural producers and small scale agro-industrial business initiatives.

A significant downside to NGDO capability to promote innovative economic initiatives is that their work is highly conditioned on uncertain funding of short term projects. Their presence in a determined territory is often as an external agent working as a service provider for several years for the duration of a territorial development project and then leaving. Thus, they often promote innovative business initiatives that they are not able to adequately support through consolidation, which often takes longer than is initially planned for.

The territorial embeddedness of the territorial development programs and the NGDO service providers they contract is limited by the duration of their work, total dependence on limited sources of external funding and the lack of localized influence over their decision making processes. The constrictions on their relative decision making autonomy is detrimental for their ability to manifest learning modifying their practices, especially in relation to their inter-dependence on others in innovative initiatives.

A limited number of NGDOs have achieved greater territorial embeddedness, maintaining their presence through enrollment of long term cooperation from strategic partners and relentless search for complementary financing. The nature and diversity of these financing arraignments offers them relatively greater decision-making autonomy and possibilities to modify their organizational contribution to milieu dynamics. Territorially embedded NGDOs like CORDES have played a key role in promoting greater connectivity between key actors within Tecoluca's regional innovation system and greater proactivity from the municipality in relation to local economic development. They have acted as mediating or bridging agents, linking rural families, their organizations and emerging business ventures to national state agencies, international sources of knowledge and other resources and market contacts interested

in purchasing locally produced goods. Their developing territorial roots and localized identity serve as a more stable platform on which to establish the reciprocal knowledge and complementary resources flows required for the co-evolution of service and production specializations.

The territorial embedding of the enterprise support network is crucial to strengthen the role of these actors in the articulation of innovation demands from producers and the co-evolutionary specialization of their capabilities to provide relevant services or mediate with exogenous actors who can meet these demands. There is an essential need for a more stable regional resource base, especially in terms of endogenously controlled financing mechanisms and enrollment of more highly trained human capital, on which to promote the types of transformations suggested in the diverse regional development plans.

NGDOs, can complement specific local governmental capabilities but must not assume a leadership role or create any type of local dependency on their inherently uncertain future contributions. State recognition of the capabilities of NGDOs such as CORDES would justify greater support for their role in the creation and strengthening of innovative local economic development initiatives. State support of NGDOs could be through the municipalities as they are the state agencies with the greatest knowledge of local conditions and most accountable to the local population's priorities. The synergistic relationship between CORDES and the municipal government in Tecoluca suggests that this type of relationship could be extremely important for increasing the innovation capacity of regional innovation systems. The concerted framework of Local Economic Development Plans, facilitated by the municipal government, would provide the basic strategy in the context of which producers and NGDOs could propose the creation and/or strengthening of initiatives. This would require the decentralization of resources and decision-making power for municipalities to be effective facilitators of LED processes. There would be a corresponding need to development greater mechanisms to guarantee the transparency and accountability of NGDO work with public funds.

Assuming this type of role would, however, require hard decisions for NGDOs with respect to roles in political advocacy campaigns as well as being service providers to innovative economic initiatives. The example of CORDES suggests that this is also a crucial aspect of their contribution to local development dynamics. The question of how NGDOs would maintain their autonomy as actors, while increasing the sustainability of their contributions to innovative local economic development practice, is a central issue to deal with.

Economic actors' weak engagement with innovation opportunities

The participation of representatives from economic initiatives within the associative governance mechanisms is weak or, many times, non-existent. In part, this is due to the way these mechanisms function which often does not lead to concrete results. On the other hand, non-participation reflects an attitude on the part of many economic actors that participation in these types of spaces does not lead to immediate concrete results. The combination of these two dynamics forms a vicious circle impeding the further articulation of producer demands for services to support their innovative efforts and the related specialization of services provided by the enterprise support network and the more general regional room for maneuver promoted through associational governance.

The GBL's and other regional economic initiatives are only slowly recognizing the importance of the benefits of integration into the regional innovation system, as well as their own potential role in stimulating the emergence of other innovative local economic development initiatives. The non-existence or weakness of representative producer organizations limits their possibilities for proactive engagement with other regional actors.

The inter-connections that do exist between the region's economic initiatives and the actors from the emerging regional innovation system are almost entirely mediated by the specific enterprise service providers working with them. While this is a useful service, it is also an area where the enterprises

need to develop their collective capabilities to participate directly in associational governance practice, transforming these mechanisms and creating new ones to more fully meet their needs for support.

In general, Tecoluca's regional innovation system is characterized by the weak capability of economic actors to articulate their needs to develop and implement innovative technological alternatives to their production and marketing problems. There is a continued dependence on the external agents to search for improved product, organizational and market options. Some positive steps have been taken by the producer associations that do exist to take a more pro-active role in negotiating the priority areas for support, the methodologies to be used and the expected results from exogenous support service providers. Others are providing technical support services directly to their members, or considering this option.

More direct support needs to be provided to strengthening the collective capabilities of the associations of economic actors to assume greater responsibilities within the regional innovation system. This will better guarantee the fit between their demands and the services provided and prepare them for directly assuming some services, especially technical assistance and training, when financing for subsidized services is no longer available. The endogenization of capabilities such as market exploration and business planning within the producers' associations is crucial if they are to be able to manage a process of continual technological upgrading. The primary focus of support should shift from providing these types of services (eg. facilitating business planning), to supporting endogenous capabilities to design and implement these processes in the future.

Within the regional context there is a significant, but largely unrealized, potential for greater synergy between economic initiatives engaged in similar economic activities that could motivate and facilitate innovative efforts. This highlights the importance of greater proactivity by the GBL's task-networks in building further linkages between their initiatives and producers embedded in the emerging agglomerations of economic actors within the Tecoluca region. Within these agglomerations there are producers with significantly more experience and productive capabilities than many of the producers from the repopulated communities associated with the GBL. These producers have frequently managed to accumulate their productive capabilities over time, often with little or no support from NGDO or state service providers. However, they are often struggling to make ends meet on a family basis, without the support needed to innovate and build upon their potentials. Although the conditions of these agglomerations should facilitate internal knowledge diffusion, their current conditions are not conducive to the creation of significant novelty. Changes driven by local learning processes and depending on often limited local resources will generally be incremental and tend to be path dependent.

The lack of crucial horizontal linkages with other similar producers, vertical linkages to agro-industrial or commercialization enterprises and relationships with complementary service providers (like CORDES but also El Roble and BIOTEC) limits greater innovative effort on their part. There is a significant opportunity for synergistic collaboration and innovative linkages between the GBL's economic initiatives and these regional productive agglomerations. Through greater connections to actors like CORDES, these local agglomerations may be conducive to innovative practice because the potential connections formed through proximity are precisely those that could facilitate the dynamic assimilation and diffusion of exogenous innovative alternatives.

8.4 National and International Factors and Localized Innovative Practice

This section addresses the fourth research question of: *How and why do specific factors related to the national and international institutional set-up and interaction with national and international actors, facilitate or constrain innovative practice in Tecoluca's regionalized economic initiatives?*

The conclusions offered synthesize the analysis from Chapter 7 concerning the relevance of the institutional and organizational configurations of the national and international systems of innovation,

to which innovative regional economic initiatives are related. The lessons derived from this analysis are focused on how the task-networks of economic initiatives can better take advantage of exogenous factors that represent opportunities for their innovative practice and work to create room for maneuver where these factors are constraining such efforts. In addition, the lessons identify how actors involved in the enterprise support network and associational governance mechanisms can improve their proactive mediation of these exogenous factors, to facilitate regional innovative practice.

National and international market configurations and institutional set-ups

The formal and informal institutional framework that governs market transactions in the main national and sub-national regional markets, as well as the configuration of key market actors involved, directly affect the competitive positioning of novel products from regionalized innovative economic initiatives. These institutional frameworks are thus becoming increasingly important factors enabling and constraining innovative practice in the GBL's and other regional economic initiatives.

The exploitation of local producers marketing their primary production in an unorganized fashion, has motivated innovative efforts to add value to local products through processing and to re-organize commercialization operations to more directly place upgraded products in more profitable market niches. Direct access into higher paying niches of the formal national market, however, has implied significant challenges in terms of obtaining legal registration as a business, environmental and sanitary permissions to operate and paying taxes (which informal market intermediaries don't comply with). This has implied dealing with new and powerful actors such as supermarkets which take products on concession and pay only after several months, and complicated bidding processes to compete for public procurement contracts of food inputs to public hospitals, as well as private contracts with hotel chains.

Facing these challenges has required a continuing process of negotiating with different state agencies to formalize different aspects of their business operations, as well as, incremental innovations in initiative marketing practices: placing greater emphasis on product presentation, understanding the dynamics of customer demands and competition, networking to establish advantageous market connections, etc. Customer demand for quality and quantity has also fed back into the initiatives as motivation for further innovations in their production systems and making connections with additional input providers and similar producers in order to increase commercializable volumes and supply consistency. The increases in working capital required to deal with the terms of purchase and payment dictated by supermarkets are also significant.

The international regulations and standards established for organic and now "fair-trade" certification have had important effects on the innovative process in the SAMO initiative, which is the only regional initiative of its type currently exporting. For this initiative's task-network the opportunity to enter into these niche markets motivated certification efforts which in turn implied technological innovations in order to progressively meet organic and fair trade standards. Entrance into these markets has provided resources for innovations and projected upgrading of their production system to meet expanding market demand and increase production efficiency and profitability.

In contrast, the strict regulations on entrance into European and Northern American markets are generally hostile towards the types of eventually exportable products being developed in the region such as granulated *panela* sugar and gourmet or traditional Salvadoran style dairy products. The unilateral opening of the Salvadoran market and a lack of controls over contraband products (as well as a lack of public support for national producers) has also placed regional vegetable, plantain and cheese producers at a disadvantage against competition for other Central American producers that benefit from lower labor costs and government subsidies.

Taking advantage of national and international market opportunities requires a proactive attitude as well as significant networking and interactive learning capabilities applied to upgrading production

and commercialization processes to be able to competitively present novel products for demanding customers. Access to demanding local markets would expand the possibilities for profitable sale of their products and the accumulation of marketing knowledge, before adventuring onto the international market, especially in relation to products still under development.

However, the creation of market niche for novel regional products (gourmet quality dairy products, granulated panela and sub-products, dried cashews, cashew juices and liquors, etc.) is contingent on complementary activities of a diversity of national and international actors to raise customer consciousness to create the necessary institutional set-up for market transactions, etc. In general, access into formal markets should be facilitated by support for the necessary formalization of different aspects of business operations, as well as regulation to mitigate the most abusive purchasing practices by powerful market intermediaries such as super-markets and guarantee the transparency of public procurement procedures.

Technological trajectories and regimes

The globalized process of structuring a technological regime related to cleaner, agro-ecological and organic agricultural and agro-industrial production has provided an important market opportunity, as well as motivation and knowledge for innovation along this trajectory in several of the GBL's initiatives. For example, the development of certification regulations and agencies to govern entrance into select organic markets is an expression of social concerns related to this regime about healthy products (especially for Northern customers) and to a lesser degree about the environmental consequences of chemical dependent agricultural production. Decision-making heuristics related to this general regime, have influenced the path dependent confluence of the technological trajectories being followed by several of the GBL's initiatives. In addition, people involved in agricultural and agro-industrial enterprises, frequently in other countries, that have advanced along technological trajectories related to cashew, panela and plantain production have provided important knowledge inputs for innovation in regional enterprises.

From a producer's perspective the technological transition to cleaner or organic production requires major initial and successive incremental changes over time in production systems. This may imply short term economic losses in favor of longer term productivity gains and, thus, the need for external public and/or private support to motivate and make this process economically viable.

Severe limitations to a more generalized transition to these types of production systems requiere concerted action to generate consciousness among intermediate buyers and final consumers in the Salvadoran market of the increased value of cleaner or organic products. Fundamental would be the recognition of the environmental costs of the current technological regime versus the environmental services that a cleaner regime would provide, which should be taken into account in comparing the societal benefits and thus public support for this type of transition.

International development cooperation and national territorial development policy

Outside of the GBL, internationally financed territorial development programs, implemented in cooperation with different national government line ministries, have been the most important actors promoting innovative economic development initiatives in the Tecoluca region. They have invested significant resources and also demonstrated certain learning capabilities and flexibility to progressively improve the fit between the enterprise support services they provide and the demands of diverse types of producers and enterprises present in the territories they are designed to "develop."

CORDES and Tecoluca's municipal government and others like the CDM and municipal women's groups have played a proactive role in engaging and enrolling territorial development programs to support consolidation of innovative efforts in different economic initiatives. This has been achieved

through establishing relationships with key people and participating actively in the associational mechanisms of different types promoted by these programs (participatory planning and evaluation exercises, working groups, more permanent committees, etc.).

The overall impact of these programs is, however, significantly limited in terms of the duration of their mandated efforts, as compared to the significant time horizons implied in the development of innovative economic initiatives and the capabilities of different regional actors to assume the dynamics these programs have initiated. Contracted service providers are generally not be able to continue supporting these economic initiatives after program financing runs out. There are no regional entities created with the capabilities necessary to finance their work providing technical assistance and training, elaborating market and feasibility studies, supporting regional planning, etc. Currently one way of dealing with this problem is to prolong commitment to supporting a given territory.

The integral experiences (positive and negative) from the existing national model of promoting territorial development through a succession of largely unarticulated internationally funded programs, offer an opportunity to develop greater coherence and effectiveness in the national government's support efforts to increase regional access to investment funds, an adequate educational system and specialized technical training relevant to local efforts and technology transfer.

Eventually, however, analysis of this situation suggests the need, as already stated, to empower associations of actors within regional innovation systems to be able to develop and implement their own endogenous territorial development strategies; promoting innovative economic initiatives in this context and specializing enterprise support services to meet their needs for endogenously "cultivated" technological alternatives.

Enrollment of external actors, creating regional room for innovative practice

CORDES, Tecoluca's municipal government and other local actors have demonstrated the importance of proactive enrollment of national governmental agencies, as well as other national and international actors, in favor of specific economic initiatives, as well as long term investments in local economic development dynamics.

The GBL and actors from Tecoluca have demonstrated an important ability to exert influence on key policy making and development organizations from the national and international contexts, in favor of improving local family livelihoods and, more specifically, the room for maneuver for innovative economic initiatives. Especially important have been their contributions to advocacy that was successful in achieving the forgiveness of land and other debts for families in land transfer communities and investments through national government ministries in major public works products in this FMLN controlled territory.

The active projection of a positive image of the GBL and its innovative economic initiatives and the widespread recognition of the GBL's work, even among many national and international actors which express political positions divergent from those publicly advocated by the GBL on issues like free trade agreements, facilitates the external cooperation that CORDES has been able to leverage from them. Of course, image without significant substance to the projected story would not last long as a strategic asset.

A similar argument could be made for Tecoluca's FMLN government which has not only been able to leverage significant international cooperation from a diversity of sources, but also from territorial development programs and central governmental agencies to support the significant improvements they have made in the territory's socio-economic infrastructure. They have been publicly recognized for their efficiency and transparency in the implementation of funds from the governmental Social Investment Fund for Local Development (FIS-DL for example).

The mutually reinforcing and synergistic relationship between CORDES Bajo Lempa, the GBL's membership and Tecoluca's municipal government, supported by a common development vision and linked personal histories of many of the people involved, has been an important factor empowering their efforts to leverage needed resources from these types of exogenous agents.

This collective ability to promote transformations in external structural factors, that potentially limit their innovative processes, is an integral expression of their networking capabilities and relationships established with a diversity of public and private actors, local, national and international, as well as their ability to learn from their individual and joint efforts to leverage the resources and policy actions they need from them.

8.5 Concluding Reflection on Lessons and Cautious Optimism

There is a dynamic relationship between endogenous task-network innovation capabilities and exogenous regional, national and international dynamics enabling and constraining their innovative practice. The opportunities that have motivated innovation in the GBL's and other regional economic initiatives and an important part of the resources necessary to carry out the innovative processes have been of national and international origin, especially the markets for novel products, financing and the specialized knowledge. However, the dynamic assimilation of exogenous alternatives and the generation of novel products have been dependent on the capabilities of the local actors involved in implementing technological transformations and their room for maneuver under the regional conditions.

The roles of task-network partners involved in regional economic initiatives and, indeed, their further integration must be flexible over time to adjust to the dynamic nature of the innovative processes being implemented and the shifting relevance of regional, national and international factors affecting their innovative practice. This is a lesson they seem to be learning through critical reflection and searching, but also muddling through crisis and learning by doing along the way.

The achievements of task-network partners, and especially their potential, suggest a positive end to the story of the GBL's innovative economic initiatives, offering room for cautious optimism as to the possibilities of finding innovative solutions to the most pressing socio-economic problems facing rural families in El Salvador. At the same time, the GBL's current problems, the rather unique combination of capable actors involved in these initiatives in contrast to others in the regional and national context, as well as the structural instability of rural El Salvador's fragile insertion in the globalizing world economy caution us against succumbing to overdue optimism.

The advances and especially the difficulties dealt with by the actors involved in the GBL's innovative economic initiatives are a rich source of lessons that can be creatively applied by task-networks to facilitate the emergence and strengthening of similar efforts in rural El Salvador and comparable Southern contexts.

CHAPTER 9

Critical Theoretical Reflections and Future Research

Chapter 9 concludes the thesis, providing a critical assessment of the achievements and limitations of the present research effort, the strengths and weaknesses of the conceptual framework and a future research agenda, as well as, proposals for further research in important areas were our empirical understanding is weak and the related need for further developing the existing conceptual framework to add value to the analysis of this new empirical material.

Section 9.1 presents a general reflection on what I consider the most important achievements and limitations of the effort to develop a conceptual framework that could be applied to the analysis of the multiple facets of this case study to reveal conclusions and lessons of more general importance for innovative economic development practice in rural El Salvador and similar Southern contexts.

Section 9.2 offers a final critical reflection on the *case* of applying the conceptual framework to the analysis of the technological transformations under way in the GBL's economic initiatives, the innovative capabilities of the task-networks involved and the configuration and functioning of the emerging regional innovation system in which they are embedded. I offer a retrospective assessment of the strengths and weaknesses of the conceptual framework as applied to this case study in a rural Southern context and highlight some lessons learned as a researcher.

Section 9.3 builds on this reflection to lay out an agenda for what could be understood as applied development research to deepen our understanding of the emergence and expression of innovative capabilities in task-networks of actors involved in innovative local economic initiatives in rural El Salvador. I also propose analyzing how the configuration and functioning of emerging regional innovation systems enable further innovative practice in such initiatives; stimulating coordinated local efforts to provide greater room for innovative maneuver and proactively mediating the mobilization of complementary exogenous resources for the development of innovative economic initiatives.

9.1 Achievements and Limitations of the Research Process

Research advances

The empirical material presented as the basis for case study analysis represents the systematization and integration of a diversity of relevant information sources. These include personal knowledge accumulated over time through a participant observation over 12 years as a FUNDE researcher, primary information from assorted interviews and personal communications over time with relevant people, and an assortment of "grey" largely unpublished market and feasibility studies, development plans, public presentations, internal GBL memorandum, etc. I also integrate the contributions of more structured research efforts by the author and others concerning the emergence and initial consolidation of the GBL's and regional initiatives, as well as the emerging regional innovation system. The inputs from these knowledge sources have been integrated through the descriptive analysis of the GBL's economic initiatives and the configuration of Tecoluca's regional innovation system, ordered according to categories that emerge from the conceptual framework.

The conceptual framework developed in Chapters 3 and 4 represents a novel contribution integrating the arguments of authors associated with diverse approaches to studying the systemic nature of technological innovation and local economic development. More specific novelty is introduced through the analytical delimitation and development of the concepts of different types of task-network innovative capabilities, as well as the related concepts of accumulated regional social capital and innovative capacity to actively provide room for maneuver for innovative practice.

This research effort represents a contribution to the relatively recent process of convergence between authors related to diverse research fields and conceptual approaches analyzing: technological development, transfer and transformation, innovation dynamics among territorial agglomerations of industrial firms, the nature and functioning of national and regional systems of innovation, as well as the dynamics and goals of regional / local economic development.

The conceptual framework from Chapter 3 is systematically applied through a detailed case study analysis of the dynamics of technological innovation, the nature of the GBL's innovative economic initiatives and the emergence and expression of innovative capabilities within the task-networks involved. This is complemented by the application of the conceptual framework from Chapter 4 to the analysis of Tecoluca's emerging regional innovation system and the relevance of this system's configuration and functioning for innovative practice in the GBL's and other regional economic initiatives. Included here, as well, is an analysis of similar exogenous factors from national and international systems of innovation.

This multifaceted case study is placed within the larger context of rural development dynamics in El Salvador as set out in Chapter 1 based on a synthesis of original analysis and that offered by recent secondary sources. The generally restrictive implications of these dynamics are highlighted as exogenous factors analyzed in chapters 6 and 7. Potential contributions of the self-proclaimed alternative rural development model emerging from within the GBL, as well as the progressively more coherent attempts to structure a regional innovation system around Tecoluca, to transforming these problematic rural development dynamics are integrated in the lessons learned.

The thesis is, thus, a contribution to the progressive application of largely northern conceptual constructions to the analysis of technological innovation and regional development dynamics in the South. It can be understood as a direct result of interactive learning between northern researchers from the University of Aalborg in Denmark and myself and other researchers from several organizations in Central America. It is related to the other PhD thesis, numerous published articles and working documents that have emerged from within the context of the SUDESCA project.[188]

The main arguments made throughout this analysis are synthesized and further developed in the concluding Chapter 8. These are used as the basis for lessons designed as a contribution to strengthening the efforts of initiative task-networks to implement innovative technological alternatives and the collective capabilities of the actors involved in emerging regional innovation systems to enable their innovative practice.

Research limitations

As I suspect is the case with most PhD research projects, my original research plans were overly ambitious. Following the pragmatic advice of my supervisor, the reality of this effort implied cutting out several comparative case examples of innovative economic initiatives being developed in the rural Salvadoran and Central American context. In addition, I was planning to include a chapter specifically applying the lessons learned through case study analysis to a critical assessment of specific proposals to promote LED initiatives and the overall strengthening of local / regional innovation systems included in existing territorial development plans making explicit reference to Tecoluca's regional context. The purpose of this assessment was to be the identification of requirements that would facilitate the implementation of these proposals. The realization of these efforts is discussed as a future research challenge.

The most significant true limitation to the research effort reflected in the thesis was the inability to conduct a more anthropological study of the factors affecting the decisions of producers to integrate themselves and maintain participation in innovative initiatives, or not. These factors include the evolving relationship between the motivations of producers and their capabilities in terms of relevant accumulations of knowledge and capital resources, their current economic activities and the logic of their overall economic livelihood strategy, as well as their historical relationship with the actors promoting the innovative initiatives studied. Recognizing the importance of this type of study that

[188] The majority of these publications are available electronically in English and Spanish at the SUDESCA web page (http://cinpe.una.ac.cr/sudesca).

the Technological Innovation Committed in San Vicente identified as a priority I elaborated an initial methodological design. It was, however, impossible to mobilize the resources necessary to implement this research effort.

I had to settle for the fact that social-science research is advanced through successive approximations and, thus, it is also necessary to include this study as a future research challenge. In retrospect, I consider that I am now in a situation to improve this initial design. I can now more explicitly compare and contrast perspectives expressed by the producers, with those conjectures made in the thesis concerning these relationships on the basis of personal understandings and the perspectives of the enterprise support actors. Pragmatically, the analysis of the results of such an investigation would have implied additional time for the development of the relevant conceptual framework and probably an additional chapter.

Finally, during my last 6 months of work at Aalborg, I became increasingly interested in the evolving conceptualization of territorial agglomerations of economic activities, regional systems of innovation, learning regions and innovative milieu. There is an evident confluence with conceptualizations of local economic development, which is an emerging priority in El Salvador and Latin America in general. This interest is reflected in the conceptual framework developed in Chapter 4 and applied to analysis of the configuration and functioning of Tecoluca's regional innovation system in Chapter 7. Although this was part of the initial research design, this analysis acquired greater relevance and its final form during this last phase of writing-up. The empirical basis is thus largely a combination of my knowledge built up through participant observation and available secondary sources. This analysis should thus be considered more exploratory in nature as compared to that of the dynamics of the GBL consortium, its innovative economic initiatives and especially the SAMO, for which a greater depth of interview material was available.

9.2 Critical Reflections on the Conceptual Framework

In general, the combined arguments made by the diversity of authors cited in developing the conceptual framework as to the related factors and causal mechanisms that explain innovative practice, have demonstrated their applicability to explaining the capabilities that have enabled the implementation of innovative technological alternatives with the GBL's economic initiatives. The integral conceptualization of regional innovation systems and the dynamics of their component sub-systems also provided an adequate basis for the analysis of the strengths and weaknesses of regional actors to support the emergence and consolidation of local innovative economic initiatives in Tecoluca's regional context.

Especially important is the value added through the integration of the different approaches providing diverse perspectives or ways of understanding the task-networks of actors associated in the GBL's economic initiatives, the capabilities that have enabled them to achieve what they have in implementing innovative technological alternatives, the configuration of the regional innovation system and its relevance for their innovative practice, etc. The combination of these different but largely complementary perspectives provides the basis for a more comprehensive analysis of the case study experience presented.[189]

Reflection on the process of integrating this diversity of conceptual perspectives into the conceptual framework and systematically applying them to the case study analysis also reveals areas where further development of the conceptual framework is necessary. These three general assertions are exemplified and developed further in the following discussions of the key concepts utilized in the thesis.

[189] This is also a conclusion drawn by McLoughlin (1999) concerning the application of diverse perspectives on technological and organizational shaping in processes of technological change to the analysis of a case study of several innovative experiences in manufacturing firms.

Technological transformation

The broad definition of technology and technological transformation proposed by Muller (2003) draws our attention to under recognized dimensions of innovation capabilities, in addition to interactive learning. It highlights the interdependent and dynamic relations of technological components for the management of innovation processes. Understanding these dynamics is a key cognitive capability associated with dynamic assimilation of exogenously acquired and internally generated technological elements into local technological systems. Implementing technological transformations is, however, more than a mental exercise, as it requires the existence of certain types of relationships between endogenous and exogenous actors and networking capabilities to mobilize the necessary resources through these organic conduits.

In retrospect, the conceptualization of specific instances of technological innovation with the GBL's economic initiatives, i.e. specific transformations made in the products or other process components of technological systems (Freeman 1982), is not as important as the conceptualization of the innovative trajectories on which these initiatives were embarked. Radical innovations frequently do not acquire their economic, social and/or ecological significance in isolation from the process of incremental innovations needed for their consolidation. Incremental innovations also may or may not be part of more radical innovative trajectories. A focus on innovation trajectories requires greater foresight in terms of analyzing the future economic potential of innovative initiatives that currently are not profitable, as well as greater focus on the larger social relevance of innovative processes in terms of sustainable business performance (Orozco 2004).

Analysis of several of the GBL's initiatives also suggests that along innovative trajectories, dynamic assimilation of exogenous technological alternatives by task-networks of actors implies a synergistic relationship between operational, adaptive or "innovative" assimilation (Bell and Albu 1999; Muller 2003). Over time the continued operative assimilation of exogenous alternatives developed and adapted by other actors, can transform the system in a way that improves labor and capital productivity, net income generation, greater family integration in the production process, food security and dietary diversification and greater net family income.

This suggests that more capable actors may catalyze the innovation process developing alternatives adopted by other members and eventually transformed to meet their individualized needs. Obviously over reliance on the "absorptive" capabilities of certain actors, like CORDES, implies dependence, fragility and vertical relationships, instead of synergy between horizontally linked partners with complementary capabilities. The point is, however, to highlight the importance of dynamic assimilation as a process characteristic along a certain technological trajectory and that static analysis of the assimilative capabilities of specific actors within the task network may lead to a distorted understanding of this process.

Technological trajectories and regimes

The contributions of Dosi (1988) and Hull et al. (1999) concerning technological regimes and trajectories are further developed by Schot's (1992) arguments and complemented by similar conceptualizations of the social construction of technological change offered by Bijker (1987) and Callon (1991, 1992). Together these contributions provide a solid understanding of the co-evolving process of how actors transform technologies and create technological frames of different types and in turn, how their innovative practice is enabled and constrained by the trajectories and regimes in which they are embedded.

Actor networks managing innovation in economic initiatives

The Social Carrier of Technology and task-network concepts (Muller 2003) proved central to conceptualizing the configurations of multiple actors jointly enrolled in the GBL's innovative economic

initiatives. In order to understand the strengths and weaknesses of innovative practice in the GBL's economic initiatives, it is of crucial importance to focus not narrowly on the economic activities within the boundaries of the small and medium scale agro-industrial enterprises, but to take a more integral perspective focusing on the task-network of actors directly involved in its emergence and strengthening. This is especially the case here as these enterprises have emerged from NGDO implemented projects and involve associated producers as providers but also business owners. This is frequently not the case. Instead, external actors work with local producers or small-scale enterprises to strengthen their productive and commercial operations, not create new ones. However, it seems that the combined task-network / social carrier of technology concepts are also applicable to this type of situation, as is reflected in the efforts to develop granulated *panela* and stimulate the technological upgrading of irrigated plantain production.

The conceptualization of the task-networks and the innovative initiatives as social interface situations (Long 2001) suggests rightfully that they must not be reified as consolidated units, but analyzed as dynamic actor configurations. Although these actors may have complementary individual and linked innovative capabilities, they are autonomous in nature with frequently divergent and possibly conflictive perspectives and power positions. The analysis of interaction within the task-network context must also be framed in terms of the actors' relative power positions, knowledge bases, cultural perspectives, etc., if the specific outcomes are to be understood. This is necessary to understand how the specific characteristics of the diverse knowledge bases that actors bring to a situation frame their understanding of problems and alternative options for solving them. Further analysis of the specific determinants of the quality and the results of social interface interaction between actors from diverse life-worlds in relation to innovative economic behavior is at the center of several of the future research proposals outlined in Section 9.3.

Task-network innovation capabilities

The six basic characteristics that define actual social carriers of technology provided a central inspiration for the development of the concept of innovation capabilities and are correspondingly reflected in this novel conceptual synthesis. However, the general check list of Social Technology Carriers demands complementary theoretical construction of key aspects of each characteristic to clearly identify specific capabilities that enable these actors to implement technological innovations. These characteristics are complemented through the conceptualization of technological capabilities especially by (Bell 1997, Bell and Albu 1999), as well as the emphasis on learning and networking from the systems of innovation approach.

The most important weaknesses of this conceptual framework concerning innovation capabilities is that it does not provide a coherent explanation of the mechanisms or concrete processes through which the innovation capabilities of the task-networks of actors directly involved in implementing economic activities emerge.

Regional systems of innovation

The systems of innovation approach emphasizes several aspects that have proven to be of crucial importance in relation to innovative practice in the GBL initiatives:

- Interactive learning by doing and searching as the basis for innovation,
- The close relationship between innovative learning and the production process,
- Networks, networking and the importance of complementarity between users and producers of technology and other network partners,
- The enabling and constraining influences of formal and informal institutional set-ups for innovation processes.

The conceptual framework developed by a diversity of authors for understanding the dynamics of regional systems of innovation, integrating complementary conceptualizations of learning regions and

innovative milieu, shows its robustness as an analytical tool for analyzing the strengths and weaknesses of system and sub-system configuration and functioning.

The main weakness of this framework is its lack of explanation as to the emergence of regional innovation systems, especially their territorially specific organizational configurations and the institutionalization of the particular "rules of the game" guiding their functioning. In contrast to the conceptual explanations of the emergence and development of industrial clusters, based on significant research effort in the North and the South, there is a notable lack of analysis as to how the other sub-systems that are integrated into a regional innovation system are socially constructed. More precisely, in this thesis the nature of the capabilities that enable actors from the regional enterprise support network and those involved in regional associational governance mechanisms to play their roles in supporting innovative regional practice, and how these capabilities emerge over time, is under conceptualized and the empirical basis for further discussion of this matter is a central theme for further research.

In addition, various authors identify the importance of vicious and virtuous circles of cumulative causation, as well as the emergence of synergy to explain how the collective results of innovative efforts are often greater than the particular contributions of the actors involved within the context of systems of innovation and specific innovative initiatives. However, a more precise explanation of these phenomenon is lacking. As is a more precise conceptualization of what formal and informal institutional factors are most important in relation to different types of innovative processes and how and why institutions actually come to exercise enabling or constraining power over innovative practice in the context of regional innovation systems.

My initial attempts to deal with some of these problematic areas is reflected in the initial conceptualizations of regional social capital and regional innovation capacity in the concluding section of Chapter 4.

Conceptualization, reflexive application and re-conceptualization

My experience of applying the conceptual framework to the case study analysis suggests that a certain level of imprecision on a conceptual level is almost necessary. This is because the specific causal relations between diverse aspects of collective innovative practice are contingent on the convergence and/or divergence of the intentionalities and capabilities of actors within specifically constructed organizational and institutional settings. Although this rather chaotic complexity is possible to conceptualize in a general way, the specifics only emerge through the reflexive, grounded, application of these ideas to analyzing the evolution of concrete experiences within their historical and territorial contexts.

For example, Loasby's conceptualization of cognitive connections between dissimilar knowledge bases is perhaps the most clear, concrete example of a causal mechanism related to the emergence of innovative options and practice. What connections are made, how exactly they are made, how and why those making these connections are able to then create innovative options and transform these into innovative practice within a given context, is difficult to grasp conceptually without a concrete situation to deal with.

In addition, within the conceptual discussion of local economic development and regional systems of innovation there is a heavy emphasis on collaboration as the basis for "active collective efficiency" in facilitating regional innovative practice. The configuration and functioning of associational governance mechanisms and territorial development plans, as mechanisms to facilitate the overall coordination of activities, are important expressions of regional collective capabilities relevant for innovative practice. However, it was the repeated failure of these associational mechanisms to fulfill their purpose, frustrating the actors involved, that suggested that their design and functioning was crucial and, thus, the capabilities for designing them and making them function. The difficulties of implementing

territorial development plans suggested that it was also necessary to explain the generalized collective weakness demonstrated by regional actors to implement these planned activities.

The systematic application of the conceptual framework to empirical case study analysis forced me to revise earlier conceptualizations, further developing and specifying certain concepts and elaborating further connections between them. This is reflected in the conceptual development between Chapters 3 and 4, the concluding sections of Chapters 6 and 7 and then Chapter 8.

The need to re-articulate my conceptualizations of innovative capabilities, regional innovation capacity and regional social capital accumulation as integrating concepts became especially clear through this process. The initial attempt at their articulation in Chapters 3 and 4 represents a novel attempt to deal with the problems of the conceptual framework cited above. However, it was only through their application and re-conceptualization that I believe they have crystallized as discrete but related concepts that indeed help us to more fully understand on a conceptual level the empirical case study analyzed.

The problems of articulating these concepts are closely related to the problems of explaining the relationship between agency and structure in social systems. Innovation capabilities are clearly associated with the powers of agency of the task-networks involved in the GBL's economic initiatives. The agency of these actors, expressed in innovative practice, is clearly enabled and constrained by structural factors, such as their relationships to key actors from regional, national and international systems of innovation in which they are embedded.

The formal and informal institutional set-ups that characterize these systems also exercise indirect enabling and constraining powers, as mediated through exogenous actors such as organic and fair trade market intermediaries and certification agents. These institutional set-ups exercise direct influence on task-network behavior based on their understanding of said regimes: the opportunities that fair trade certification implies for advantageous product placement, but also the transformations required for obtaining it.

Certain types of what I have called innovative capabilities are precisely those that enable the task-networks to create room for maneuver, contributing to the transformation of organizational configurations and institutional set-ups that represent structural barriers to their innovative practice. A good example is the proactive enrollment of the Salvadoran State and international development agencies to finance the construction of a flood control system to mitigate this substantial risk factor for local productive investments within innovative initiatives.

Likewise, on a regional level I conceptualize the accumulation of regional social capital as the socially constructed organizational and institutional structures that directly facilitate cooperative efforts relevant for innovative practice. The other side of the coin is then regional innovation capacity, which is the integral sum of the system building capabilities of regional actors; the powers of agency expressed through the construction of those system elements that then facilitate cooperative efforts.

9.3 Future Research Challenges

This final section, briefly presents what I see as challenges for future research along the lines established in this thesis, applied to problems of local economic development in El Salvador and similar contexts.

Following up on specific research problems

As a continuation of the exploration into answering the different research questions posed in the thesis, taking into account the research limitations discussed above, I would prioritize work on the following specific research problems:

- Characterization and explanation of the emergence of different types of organizational and collective innovative capabilities in task-networks involved in the implementation of diverse innovative technological alternatives. This article will further existing analysis of the combinations of functional and deeper innovative capabilities that are required to engage in diverse types of innovative practice. It will focus on explaining more clearly the emergence of these innovation capabilities through a more structured comparative analysis across the GBL's innovative initiatives.
- Clarification and comparative analysis of the specific roles of producer organizations, NGDOs, territorial development programs and municipal governments in supporting innovative practice in economic initiatives within Tecoluca's emerging regional innovation system. Analysis of the nature, strengths and weaknesses of the innovative capabilities associated with playing these roles effectively in relation to specific initiatives. Explaining the realized and potential synergies between these actors in providing an enabling environment for innovative practice in the regional initiatives analyzed, thus strengthening the conceptualization of regional social capital.
- Characterization and comparative analysis of different localized actors' contributions to the construction of the specific organizational and institutional configurations that characterize Tecoluca's emerging RIS. Analysis of the strengths and weaknesses of their "system building" capabilities and the mechanisms that explain their emergence. Explaining the realized and potential synergies between these actors in order to further conceptualize their integral contributions to Tecoluca's regional innovation capacity.

Widening the scope to address regional / local economic development problems

In addition to these specific research interests that could be explored through articles, I propose the following elements of a research agenda opened through this research effort that I see as relevant for the FUNDE in its role as an NGDO research center promoting local economic development in El Salvador.[190] The more specific aspects of this agenda are focused on research directly relevant for promoting technological innovation in economic development initiatives and the consolidation of a regional innovation system in and around Tecoluca. However, I also suggest comparative studies that would be particularly relevant as the basis for more generally applicable regional/local economic development strategies and public policy.

Anthropological study of producer motivations and capabilities to innovative

The existing evidence suggests that the lead producers in many of the GBL's economic initiatives have frequently had advantages like accumulated productive knowledge or complementary economic activities providing capital resources and reducing risk, which seem to enable them to better take advantage of the opportunities associated with their integration into these initiatives. This argument, however, cannot be substantiated without a more complete understanding of the economic livelihood strategies and capabilities of the producers involved in these initiatives, as well as others who had the "opportunity" but chose not to.

I thus propose an anthropological study of their decisions to integrate themselves in innovative initiatives or not, and if so, their current level of participation in these initiatives. This will imply analysis of the evolving relationships between producer motivations, their capabilities in terms of relevant accumulations of knowledge and capital resources, their current economic activities and the logic of their overall economic livelihood strategy, on the one hand, and the opportunities presented by integration into these initiatives, on the other. Also important will be the nature of their historical relationship with the actors promoting the innovative initiatives.

[190] It should thus be clarified that the FUNDE is not an academic but a development oriented research center, i.e. the primary subjects for whom we intend our work to be of use are not fellow academics but fellow development practitioners and policy makers. FUNDE's nature (mission, objectives, etc.) as well as the intentions of the international donors that fund our work, dictate that our research efforts should provide results that are relevant as input for strengthening regional/local development practice (largely by other actors), as well as FUNDE's training and technical assistance services and coordinated policy advocacy efforts at different levels.

Development visions, strategies and practice of NGDOs

The GBL's proactive self-presentation as an alternative model for sustainable rural development in practice also demands greater exploration. In this sense, it would be important for CORDES and the GBL to more critically examine their actual practice and evolving working methodologies for supporting rural families to improve their livelihoods, including the creation of innovative economic initiatives. This would involve a more systematic analysis of their development strategy in practice, including a more specific study of impacts. A more rigorous comparison and contrast between their public presentations, actual practice and results would reveal priority areas for strengthening their capabilities to improve performance results and thus approach their utopic vision for the GBL and its impact in the lives of the families involved.

A comparison that would enable even greater clarification of these issues could be made between the strategies presented and actually practice by CORDES Bajo Lempa and those of other regional offices of this same NGDO. An especially relevant comparison and contrast would be with the Chalatenango regional office which has taken a significantly different approach to rural economic development; based in part on the producers' more limited productive resources, but also on the distinctive visions of key people responsible for strategic decision-making in this regional office.[191] Another revealing and more ambitious study would be the comparison and contrast of CORDES' capabilities with those expressed in the practice of other NGDOs working in the regional context around Tecoluca and other rural regions in El Salvador and/or Central America.

Actor capabilities and the problem of implementing development strategies

The primary need for greater empirical understanding at the regional level is concerning why implementation of the economic aspects of different types of territorial development plans and more concrete development strategies has proven so difficult? Especially relevant would be those aspects related to facilitating the emergence and consolidation of innovative economic initiatives.

One working hypothesis would be that this has to do with the process of elaborating these strategies in terms of the diversity of actors involved, their level of enrollment in this process and their explicit commitment to playing specific roles to implement planned activities. Related to this would be an analysis of the implementability of what is put down on paper, in relation to the current capabilities of those actors that would be responsible for translating these strategies into action. To what degree are these actors' capabilities analyzed, and to what degree are specific activities planned to enable them to fulfill their roles in direct implementation, monitoring, evaluation and general "managerial" oversight of this process? Exploring these issues would demand at least three areas of additional complementary research.

Further characterize and explain the evolution of the capabilities of regional actors to engage in associational governance practice, building off of the analysis in the thesis. Thus study would focus on the characterization of the individual and collective capabilities of different actors expressed in the design and elaboration of territorial development plans; specifically those aspects most relevant for the emergence and consolidation of innovative local economic development initiatives. A complementary focus would then be on the collective capabilities to coordinate and facilitate the implementation process demonstrated by those actors engaged in the associative governance mechanisms from which these territorial development plans have emerged. The intentions of the mostly exogenous but also internal agents promoting these efforts would be analyzed in relation to the demonstrated outcomes.

[191] An initial design for a joint effort between the FUNDE and CORDES to clarify the key element's of CORDES' overall development strategy, as constructed and practiced in different regional contexts was elaborated but final agreement was not achieved for its implementation. The idea was to support interactive learning between regions to take advantage of the diversity of their experiences and add coherence to the NGDOs combined development effort.

A further area to explore would be the emergence of NGO service providers as actors promoting innovative local economic development initiatives in rural areas. This analysis, focusing on the evolving NGDO work in Tecoluca's regional context, would compare and contrast the different types of NGDOs with greater or lesser territorial presence and roots. This study would also imply comparing and contrasting the development strategies pursued by the international development actors of different types that provide the bulk of the financing for NGDO activities, as well as the Salvadoran state's role in territorial rural development in this area.

There is also a clear need for a more in depth conceptual and empirical exploration of the specific relationship between different livelihood strategies, productive capabilities and the integration, or not, of families in innovative initiatives, when they are given the "opportunity."

Growing local economic development policy from the ground up

Taking advantage of what exists to constructed grounded policy proposals

The short term priority for FUNDE's efforts to develop "grounded" local economic development policy proposals should be the synthetic systematization and comparative analysis of existing studies of different aspects of local economic development practice at different levels in El Salvador. This type of comparative analysis would allow for the development of more generalizable lessons for practice, building off of those offered in this thesis. Through the SUDESCA and other research networks in which FUNDE participates this analysis could adopt a progressive Central American and Latin American focus.

For El Salvador and the FUNDE, a pressing issue, in this sense, is to build on the accumulation of research based and practical knowledge of promoting local economic development in rural areas, to more fully encompass the dynamics of intermediate cities, the most important urban areas in the eastern and western zones of the country as well as the central metropolitan area of greater San Salvador. Despite the country's rapid urbanization, little attention has been placed on the dynamic economic relationships between urban and rural areas, and even less concerning the industrial and commercial dynamics of urban and urbanizing centers.

Bottom up challenge to national territorial development proposals

At the national level, in El Salvador, there is also an emerging concern over the need for improved territorial development planning in relation to urban and rural development. A major contribution of a bottom up approach to regional/local economic development policy would be proposals concerning the configuration of innovative economic initiatives, regional/local networks of enterprise support providers and regional/local associative governance mechanisms; i.e. the regional systems of innovation necessary to mediate the localized adjustment and implementation of the general regional development strategies integrated in the existing national proposals.

Final comment on research challenges

Implementing this proposal for future research activities will represent significant personal challenges and transformations. In part it represents a return from reflection to practice, marking a transition back from academically oriented research for my PhD degree from Aalborg University in Denmark, to the type of action oriented development research that characterizes my work for the NGDO National Development Foundation in El Salvador. My objective, however, is to further demonstrate the potential synergy of combining these two roles. As stated in Chapter 2, I believe that my previous research work for the FUNDE embedded as a researcher-practitioner in Tecoluca's local economic dynamics gave me a unique perspective from which to conduct my PhD research. The main challenge will

be to become increasingly active as a researcher and teacher with local and international academic circles, without losing the advantages of territorial embedding in regional economic development practice in El Salvador or other Southern contexts.

Along these lines a key question is how to make the thesis and future research results accessible to key people involved in these processes as inputs to strategic decision-making. This is the level at which I think the lessons can be best applied to local economic development practice. The extent to which I achieve this will determine the local relevance of this work, and there is progressively stronger local expectation that researchers make their work locally relevant for local development efforts. The FUNDE is enrolled in the GBL for this reason, for example.

ANNEX 1

Ten Years of "Sustainable Rural Development" Work by CORDES, the GBL's Members and the FMLN Municipality

According to a presentation on the "sustainable rural development" work of CORDES and other members of the GBL, along with Tecoluca's municipal government (Espin 2004), in 1992, when Tecoluca's first repopulated communities were formed there was: "no electrical energy, no potable water, no good access roads no schools or clinics functioning, no permanent housing, no dykes or drains, no telephone service, no public transport, no parks, no communal "houses" for meetings, etc., no recreational areas, no public security presence, very little social and productive activity, nothing!"

During the first year (1992) the first floods occurred and some families decided to leave. CORDES and CRIPDES and others reacted to these floods, attending as best they could the problems but with limited vision as to how to manage the risk of future floods.

The region had significant environmental resources (quality soils, access to water for irrigation, recovered flora and fauna, the Lempa River and the Pacific Ocean) that gave it rich potential value. However, the repopulating families came from different parts of the country and many, especially the young ex-combatants had limited agricultural productive experience. They also came with low levels of education and without significant resources. The municipality was governed by an ARENA government (until 1994), and the Salvadoran government showed little interest in adequately accompanying the population, which had to look directly to international cooperation for support (through CRIPDES, CORDES, etc.).

This population did however have a "spirit of sacrifice, educated in the discipline and the organization of the decade of war." "Even with all the limitations and problems, was able to dream and think of the future with vision, working with decision and hope in its construction," with the support of CORDES, CRIPDES, the FMLN municipalities, and others. By 2002, this collective work had significantly changed the living conditions for the local families in terms of basic infrastructure and access to public services for the now 50 communities integrated into the GBL from Tecoluca and Zacatecoluca:

- Improved access to public education with primary schools in all the communities, a newly established high-school and a process with MINED to improve educational quality in the Bajo Lempa. NGO/GOES efforts to improve adult literacy, as well.
- Improved network of public clinics, including one specialized in attending women.
- Formal minimal "dignifying" housing for an estimated 60% of families.
- Dykes, drains and refuge centers on both sides of the Lempa River and system of early flood warning system to monitor water flows in the Lempa River and of the Pacific Ocean by satellite, to mitigate risks from flooding
- Electrical energy in 98% of the communities.
- Telephone service for an estimated 30% with fixed lines and an additional 30% with cellular phones.
- Potable water for 60% of communities which manage their own water systems.
- Several important roads have been paved and while most others are compacted dirt and gravel, all receive some level of maintenance through the municipality.
- Public transport to most communities with some regularity by buses and pick-ups.
- A new regional market in San Nicolas Lempa.
- Three municipal offices of the National Civil Police.
- Parks and communal recreation areas in 50% of communities.
- At least 10% of land in each community is left as a communal forest reserve and other significant forested areas of mangroves along the coast, along the rivers, and coffee/forest on the San Vicente volcano.

There has also been a significant regional effort to create local community base organizations, self-supporting social service organizations and a diversity of economic initiatives that are now integrated into the GBL.

Social Organizations

- Community directive councils, women's comités, youth committees, etc.
- Micro-regional organizations of rural communities: **SES, MES and IDES**
- Rural Women's Association **ASMUR**
- Rural Youth Movement, **JUVENTUD RURAL**
- Association of War Wounded, **ALGES**
- Local teacher's association
- Regional branch of a national association of rural repopulated communities, **CRIPDES**

Self-supporting social services

- Popular visual health clinic: **Ó x O**
- Potable water system for coastal communities: **LEMPA ABAJO**

Economic organizations

- Agro-industrial systems**, SAMO/APRAINORES, BIOLACT, SAAO**
- Agro-ecotourism, etc. **LEMPA MAR**
- Production and commercialization of fruits and vegetables, **AGROLEMPA**
- Small scale industrial initiatives run by youth organization **JUVENTUD RURAL.**
- Biological pest control laboratory / firm, **BIO-TEC**
- Financial services**, EL ROBLE.**
- Agricultural machinery, transport and workshop services, **MAQUILISHUAT**
- Services for agricultural training (currently not functioning), **JUAN MENDEZ**
- Agricultural input store: **SAN CARLOS LEMPA**

"All with strong roots in each community."

A fundamental step in this process of constructing an alternative rural development model in practice has been the creation of the Grupo Bajo Lempa as an umbrella organization, integrating the rest. This effort has received recognition, respect and still limited support from various central government ministries. The GBL also receive diverse national, Central American and international groups, promoted by international cooperation, NGOs, social organizations, governments and productive sectors interested in learning about this novel process.

ANNEX 2

Innovative Products
from Cashew Nut Shell "Waste Products"

As a sub-product of cashew nut processing it is possible extract a liquid from the shell (CNL) that is a natural phenol (90% anarcardno acid). Depending on the quality and the method of extraction, between 8% and 10% of the volume of the whole nuts processed can be recovered in CNL (Duncan, 1997). Cashew nut liquid is not extracted in El Salvador for commercial ends, mainly due to the fact that the existing volumes of production would not satisfy the demands of buyers in the international market and the lack of knowledge concerning the techniques necessary to extract, refine and utilize this oil on a national level (Rivera et al, 1997)

Duncan estimates that "90% of the CNL that is recovered is processed in order to make resins that are used as car break fluid. On the international market, the demand and the price for CNL is diminishing mainly due to the increase in the use of disk breaks in cars that don't use CNL. There are also products that compete with the CNL in the automotive industry and some of the synthetic phenols actually function better that the CNL" (Duncan, 1997).[192] It is thus clear that competition in this volatile market is not a viable strategy for El Salvador, even if all of the producers were combined.

Other identified applications for the CNL are the foundry in an oil base and the making of anticorrosive paint, lubricants, adhesives, waterproofing, marine varnishes, disinfectants, fungicides and insecticides (Duncan, 1997; Earth Trade 1993; CORDES, 1996; Corpeño and Portillo, 1984). Cashew nut liquid is also a potent antibacterial agent and it could be a new source of anti-microbial agents as well, especially in foods and cosmetics. It has been utilized traditionally for medicinal ends (TJP Market Development, 1998).

Based on technologically more complex processing operations there are significant potentials to develop CNSL by-products. Based on their review of the economically significant uses for cashew derivatives, especially the CNSL, Blazdell (2000: 225) conclude the following:

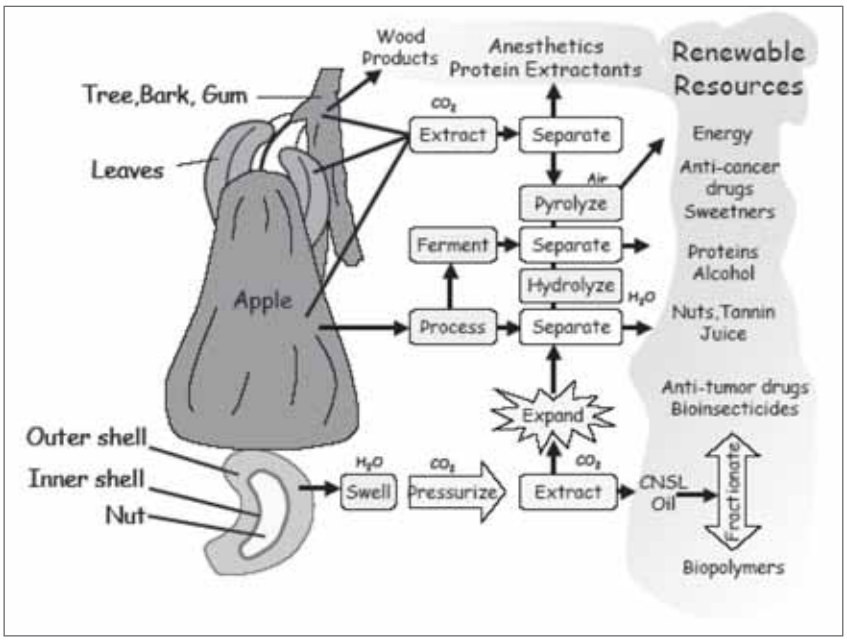
> "… the humble cashew is a source of many versatile material; medicinally its applications are diverse, whilst in terms of engineering uses it is amenable to polymerization reactions and chemical modification to give a variety of polymeric and industrial products. The fact that CNSL is also a low cost renewable resource which until recently was discarded as a waste product only adds to its appeal. However, among the innumerable potential uses to which CNSL can be put, only a few have become commercially successful…. It would appear that future use of CNSL could be in two main areas. The first would be in the form of competitive polymers that exploit its unique properties. The second, and potentially more interesting, option is the use of CNSL to derive simple molecules with or without modification: one exciting possibility may be to make CNSL based pesticides or drugs that are amenable to polymerization. This application alone could open up significant agricultural markets."

Smith, et. al. provide the following visual example of some of the potential by-products from the CNSL but also other parts of the cashew fruit.

[192] The price in 1978 was $1,500 per metric ton (MT) but by 1993 it was between $350 and $400 per MT (Earth Trade, 1993). Little possibility exists that the international prices will increase greatly given that "the capacity of the Indian factories to increase their production of CNL should act as an auto-regulating agent against considerable price increases"(Duncan, 1997).

Figure 3

Potential Innovative Products from Cashews
Green processing of cashew (Anacardium occidentale) with carbon dioxide and water



Source: Smith et. al. 2002

The possible applications of CNSL for pesticide use seem especially promising due to the agricultural base of the GBL's economic initiatives, and the existence of BIOTEC and the Agroservicio specializing in production and distribution of pesticides. Development of commercially viable CNSL products would, however, require significant research and development efforts that would demand learning and new partnerships to exploit. For example, Smith et. al. (2002: 1) report a potentially important research finding, especially due to its further complementarity with the organic focus of SAMO's operations and the GBL in general.

> "Cashew nut shell liquid (CNSL), which has many pharmacologically active components, is a byproduct of cashew nut processing but is difficult to separate without degradation due to its reactivity and confinement in the cashew nut's intricate honeycomb matrix. In this work, we present a method for processing cashew nut shell liquid (CNSL) and cashew nut shells with eco-friendly solvents carbon dioxide and water. In the process, carbon dioxide in its supercritical state is used to remove practically 100% of the CNSL with at most 1/20 of the amount of solvent used in previous supercritical extraction studies... Characteristics and quality of the extracted CNSL was evaluated to be equal or superior to those reported for CNSL previously. Processing of the shell material by supercritical water was demonstrated by in-situ observations that showed that the shell can be completely dissolved in high-temperature water at high pressures. From the results, it can be concluded that carbon dioxide and water can be used to develop green processing paths for cashew nut shells and probably for many similar agroproducts."

The development of the capabilities to produce and market these types of innovative products represents a significant challenge for SAMO and the GBL task-networks.

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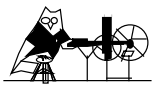

Esta tesis se imprimió
en Talleres Gráficos UCA,
en el mes de agosto de 2007
la edición consta de 137 ejemplares.

A realistic analysis of past and present "development" dynamics in Central America and in El Salvador, in particular, paints a pessimistic picture for the livelihood possibilities of the majority of its rural population and suggests the continuation of immigration as a principal survival strategy for many. However, an overly pessimistic outlook also reflects a lack of imagination and recognition of local actors' capabilities to overcome even the greatest odds to improve their livelihoods.

In this thesis I make a critical case study analysis of the experience of a consortium of local actors involved in innovative local economic initiatives in the rural municipality of Tecoluca. While the historical development dynamics in Tecoluca reflect the unsustainable development process experienced by the country as a whole, it is among the few territories where innovative local economic development initiatives are emerging that offer hope for more sustainable development in El Salvador in the future.

This multifaceted case study is focused on characterizing the innovative economic initiatives integrated in the Grupo Bajo Lempa; analyzing the innovative capabilities of the actors directly involved in these initiatives and the contextual factors that have enabled or constrained their practice, especially those mediated through the dynamics of Tecoluca's emerging regional innovation system.

Key elements of the strategy to build and strengthen these initiatives are technological innovation in organic agriculture and cleaner production, agro-processing and product differentiation for niche market commercialization. The effort to link small-scale producers as suppliers, but also owners of agro-processing and commercialization businesses and the integration of these diverse economic initiatives within the GBL are also fundamental elements of this innovative development strategy.

From this analysis I conclude that there is a dynamic relationship between endogenous innovation capabilities and exogenous regional, national and international dynamics enabling and constraining their innovative practice. The opportunities that have motivated innovation in the GBL's economic initiatives and an important part of the necessary resources have been of national and international origin, especially the markets for novel products, financing and specialized knowledge. However, the dynamic assimilation of exogenous alternatives and the generation of novel products have depended on the capabilities of the local actors involved in implementing technological transformations and creating room for maneuver in the regional and national context.

I suggest that the GBL's experience is of special interest as the achievements of the actors involved in these initiatives and especially their future development potential, offer room for cautious optimism as to the possibilities of encountering innovative solutions to the most pressing socio-economic problems facing rural families in El Salvador. At the same time, the GBL's continuing struggle to create profitable businesses and produce sustainable livelihood improvements, the rather unique combination of capable actors involved in these initiatives as compared to others in the regional and national context, and the structural instability of rural El Salvador's fragile insertion in the globalizing world economy, caution us against overdue optimism.

ISBN-13: 978-87-90604-38-7
ISBN-10: 87-90604-38-5

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