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Developing a Methodology Based on Action Learning to Facilitate the Adoption of ICT in Small and Medium-sized Companies in Costa Rica

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English Summary

It seems that paradoxically the competitiveness in SMEs depends on effective use of ICT, however this adoption brings to the companies new challenges and the need to develop more competences, which may be the reason why SMEs, according to Levy and Powell (2000), are not investing in the adoption of ICT, and those which are using ICT are missing the potential competitiveness advantage.

The aim of this research is to understand and explore better strategies to support the small and medium-sized enterprises (SMEs) sector in Costa Rica in the information and communication technologies (ICT) adoption, in order to strengthen innovation capabilities and competitiveness in SMEs. These strategies are focused on the learning process and on the interaction of university, industry and government (Triple helix model). As outcome it is expected to make a contribution to practical knowledge about the elements to consider in these kinds of strategies, as well as to the triple helix model and action learning approach. The research is concerned with how to use the knowledge and resources that already exist in an effective way.

This research proposes to work with collaborative action learning projects to support the SMEs to develop ICT competences. Collaborative action learning projects are defined as concrete initiatives where practitioners from industry, government and university meet in order to develop a concrete ICT project in SMEs. The objective of those projects, which are conducted with the principles of action learning, is to improve one of company's business processes by using ICT. The practitioners have different backgrounds and experiences, as a consequence the challenge is to learn to work and learn together and combine the different perspectives for the benefit of all the participants and the success of the ICT project.

Research questions

The three central research questions are: (1) What are the necessary elements in a productive learning approach to facilitate adoption of ICT in SMEs in order to improve their business processes? (2) How can the action learning approach facilitate interaction among industry, government and university to achieve the multi-learning perspective of the triple helix model? And (3) How can collaborative action learning projects among university, industry and government support the adoption of ICT in SMEs in order to improve their business process and make them more competitive?

Methodology

The research is developed under action research methodology. Action research is understand as an interventionist-participatory approach to the acquisition of scientific knowledge conducted with people rather than on people. The participants are not objects, they are humans in a social context, acting in their everyday lives, which means that they are not acting in a "drama", the intervention or change that the researcher introduces in their contextual situation will influence them and will change their system, and therefore action research is greatly concerned with getting collaborative participation of the parties involved. The intervention allows the understanding, improvement or changing of a situation for the benefit of the people who are involved in

this particular situation, and during the time that the researcher carries out the inquiry, and this is the reason why they should be treated as co-inquirers, they are trying, together with the researcher, to make sense of what is happening there.

During the research project an intervention called collaborative action learning project, was designed and implemented. The intervention took place in Costa Rica from June to December, 2008. The project offered to the SMEs to investigate and find solutions to their business problems through developing a real ICT project with the intervention of the University and support of a governmental institution.

In the project participated a large public university, a governmental office, four SMEs and 5 students. The group came from different departments and positions into the organizations and members represented a verity of professional backgrounds and knowledge fields

Interaction within the collaborative action learning project

According to Revans, action learning has three systems (Alpha, Beta and Gamma). System Alpha is concerned with design, system Beta with implementation and system Gamma with learning.

When the participants of the CALP joined the project, they came with their own system Alpha; once in the project, they entered into "talent ring exchanges". In these talent ring exchanges, the participants' system Alpha became broader, and their capability to implement system Beta was influenced and modified by the rest of the participants. Inside the ring, synonymous with the project, they put together their individual system Alpha, creating a temporary collective system Alpha

Each individual/company/organization enters into the talent ring exchanges with their own system Alpha. One of the elements from their system Alpha was their expected outcomes of the project. Once they were in the project, they needed to build their system Beta. They needed to design a project to achieve the expected outcomes. The expected outcomes of the project were modified as soon as they started to discuss their expectations in the new context and with their new partners. The system Beta that they built might be different from the system Beta that they would build if they were not participating in the project, because now their system Alpha is broader. Now each individual has a new collective system Alpha that is used to achieve common and individual objectives.

During the project, the participants were reflecting upon their individual system Alpha, and some of them learnt something and modified their behavior as well as their system Alpha. When the project finished, the individual system Alpha was not the same, and the individual would enter into a new project with a modified system Alpha. They may also apply the knowledge created in their professional practices and for personal growth

Collaborative action learning project to develop ICT competences in SMEs

The research shows that collaborative action learning projects are productive in the adaptation of ICT in SMEs. The participants use the operational need of the companies as a field of inquiry which provides the opportunity to improve their competences along with the competitiveness of the SMEs.

The effectiveness of this method is its potentiality of transforming information and knowledge into actions. Participants identify a problem, formulate a hypothesis, propose courses of action to deal with the problem, try out the actions and reflect and learn from the consequences of their actions. They are able to generalize from that consequences, this generalization is for themselves, for their practice, this helps them to work in a more effective way. This process allows them to internalize the experience, the learning and the knowledge created.

Furthermore, they have the support of a group, which is a collection of different experiences, knowledge, backgrounds and perspectives. This provides them with broader resources to go through the process that they would not have if doing this process alone.

The project itself demanded the participants to learn many things, not just in the technical aspect, that sometimes may be the easiest one, but challenged them to learn to learn, learn to listen, learn to reflect and learn to respect different perspectives. They realized the importance of these elements for the learning process and improvement of professional practice.

They also learnt some valuable lessons through the design, development and implementation of an information system, not only about information technology but rather about the systems, values, cultures and ways to work in the company

In summary, the main reasons for arguing that collaborative action learning projects are a productive way to support SMEs in their journey to adopt ICT are:

- Provides to companies knowledge and resources that they do not have at the moment
- Companies feel confident when working with the university and some non-profit organizations
- It is a good opportunity to gain knowledge about ICT at a low cost and in less risky conditions
- Companies work on their own problems
- The project allows creating join management within the organization
- There is the opportunity to develop multiple skills on the personnel
- It may be the beginning of become a learning organization

Action learning to facilitate the interaction of triple helix

In line with the interaction among university, industry and government, the focus of the research was to investigate how this interaction is useful and necessary in order to collaborate and combine, in a wise way, the available recourses from the three sectors.

The research has identified six premises from action learning that facilitate the interaction of the three sectors and the achievement of the expected learning. These principles will also guarantee a more effective and productive interaction of the sectors with major impacts on society in general. They are:

1. Work in small groups
2. Real work problems

3. Work together

4. Exploration of the system values in each helix

5. Action and reflection cycles

6. Focus on the person

Multi-layer integration methodology for development of ICT competences in SMEs

The main outcome of this research is a multi-layer methodology for development of ICT competences in SMEs that links different disciplines, actors, learning levels and approaches.

The methodology emerged from the knowledge generated in the CALP experience, the cycles of action and reflection of the facilitator group, my critical analysis of the data collected and the inputs of literature related with the topic.

The research showed the influence of several aspects in the adoption of ICT by SMEs, which suggests seeing the phenomenon in multiple layers that should be considered in order to design a strategy to support this activity.

The argument in favor of this multi-layer perspective is based on the experience gained in the research about the interrelation of different systems, and as a consequence, the need of individuals or organizations to develop the capacity to grow congruently in the different dimensions which they are composed of. A balance in the development is required.

The **first layer** of the methodology represents the need of combining several disciplines for the development of information systems that improve the competitiveness of the company.

The **second layer** of methodology refers to the different actors that are involved and can provide important support to SMEs.

The **third layer** is about different types of learning that should take place in the adoption of ICT into the company. This process influences the learning of the organization and of individuals, at different levels and in different fields.

The **fourth layer** is the different approaches required by this combination of different disciplines and actors to achieve the different levels and types of learning desired.

The methodology is oriented towards how the Informatics School can change their present teaching/learning practice to grasp the benefits of having an effective learning relationship with the industry and government and as a consequence to support the SMEs in their process of adoption of ICT and fulfill its role of the university as a promoter of social-economic development. This requires that the School includes it as part of it institutional objectives to support SMEs in their ICT development.

The methodology is based on five propositions:

- **Proposition 1**: Use the Problem Based Learning (PBL) approach as a pedagogical model in the Informatics School.
- **Proposition 2:** Establish the collaborative project with the companies on a basis of action learning.
- **Proposition 3:** Complete the PBL approach with some moral and ethical principles of action learning
- **Proposition 4:** Design a strategic partnership among the Informatics School, some companies and some governmental agencies
- **Proposition 5:** Have a solid action research basis in the Informatics School

The methodology proposes that the University uses PBL as a fundamental pedagogical approach to innovating and fostering initiatives of collaboration with industry. The PBL approach will be complemented with Revans' action learning moral and ethical principles. The way to work with the companies is based on a strategy of partnership implemented through collaborative action learning projects. Finally, it is necessary that these collaboration projects have the components of research led by the University, in order to guarantee the knowledge creation.

This research has made an attempt to understand the phenomenon of adoption of ICT by SMEs. The phenomenon is not a singular issue concerned with a particular discipline, nor with a specific sector. It is a complex system interrelated with other systems. There are several components of the system that should be considered in order to solve the problem in a more complete way