

Study on voluntary arrangements for collaborative working in the field of construction services  
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**Collaborative working in the field of construction services in Denmark**  
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Introduction

The population of Denmark amounts to 5.4 million people and grows by 0.2 per cent annually mainly due to immigration. The economy is highly open, with Danish exports and imports accounting for 54% and 53% of GDP respectively. The three most important foreign trade partners have traditionally been Germany, Sweden and the UK. Trade with other countries, such as the US, has increased, and China is becoming a more important source of imports. However, an expanded EU remains the most important trading zone, accounting for 70% of exports and 73% of imports in 2006.

GDP in 2007 was DKK 1,696 billion equivalent to € 227 billion<sup>1</sup>. Total employment is around 2.8 million, the largest ever.

Annual data	2007	Historical averages, per cent	2003-07
Population (m)	5.4	Population growth	0.2
GDP (DKK bn)	1,696	Real GDP growth	2.1
GDP per head (DKK)	308,782	Real domestic demand growth	3.4
		Inflation rate	1.3

Source: Economist Intelligence Unit, Country Briefings, Denmark, 8 Apr 2008

Construction's share of GDP was 10-11 per cent in the 1970s and 1980s but has since 1990 been around seven per cent, a bit lower 1990-2004 and slightly higher in the very latest years. Construction's share of employment was similarly just under 10 per cent 20-30 years ago and presently amounts to just over six per cent. As in the other Nordic countries, climate and physical geography influence building tradition and choice of building materials. Concrete and bricks in house building are however much more commonly used in Denmark compared to the other Nordic countries where wooden construction are more frequent. Nevertheless, due to competitive prices of wooden houses, a strong trend from end 1990s is import of wooden detached family houses and terraced housing from the other Nordic and Baltic countries. Recently global warming has influenced the construction market as the importance of lower energy consumption and precautions against flooding is increasingly taken into consideration in new projects.

1. Construction sector turnover, structure and employment

Compared to EU27 the Danish construction industry has grown quicker in recent years. The table shows that this was particularly the case in 2006 and parts of 2007. From 2007 growth in Danish construction has slowed down.

Construction production, index 2000=100												
	2005				2006				2007			
	q1	q2	q3	q4	q1	q2	q3	q4	q1	q2	q3	q4
EU	101.6	103.5	103.7	103.9	103.3	107.2	108.4	111.5	112.1	110.8	111.3	112.1
DK	97.7	100.9	101.0	103.0	105.5	104.5	113.9	125.4	109.7	114.4	115.1	111.6

Source Eurostat, Industry, commerce and services, Construction production

<sup>1</sup> € 100 ~ DKK 746 and GBP 100 ~ DKK 925, April 2008

Nevertheless the importance of the Danish construction sector relative to other economic sectors has been declining since the 1980s. Before then, when Danish politics and economy was characterised by rapid welfare state growth, high unemployment, and large state budget deficit and trade balance deficit the construction sector was used in politics to regulate the economy. Growth in publicly financed house building and infrastructure activities offered the possibility of a growing domestic demand for labour and inputs of building materials without causing major growth in imports.

<b>Construction's share of total turnover, million DKK</b>								
Mn. DKK	1970	1980	1990	2000	2004	2005	2006	2007
Total output all sectors	210192	671196	1386927	2169795	2456477	2630208	2820498	2949835
4500 Construction	23252	53943	101298	153175	159532	160124	167130	173429
Construction share	11.1%	8.0%	7.3%	7.1%	6.5%	6.1%	5.9%	5.9%

Source: National Accounts NAT07, Statistikbanken © Statistics Denmark

In a long time perspective the importance of construction has diminished from nine per cent of overall turnover to around five per cent with a moderately growing, but probably temporary, trend since the turn of the Century.

<b>Construction turnover distributed on subsectors, per cent</b>					
	1970	1980	1990	2000	2004
Construction of new buildings	61,2%	42,8%	31,6%	29,0%	34,6%
Repair and maintenance of buildings	14,2%	23,0%	27,1%	34,7%	34,1%
Infrastructure, etc	21,2%	26,5%	34,3%	24,2%	27,0%
Building materials for repair of buildings	3,4%	7,6%	7,0%	12,1%	13,0%

Source: National Accounts NAT07, Statistikbanken © Statistics Denmark  
Note: Data for 2005 to be published by Statistics Denmark summer 2008

In the most recent years the Danish housing market and property markets in general have witnessed extraordinary strong growth. This has been expressed in growth in property prices up to 25 per cent on an annual basis in 2005 and 2006. The phenomenon has been particularly profound in and around the big cities and conurbations but has gradually spread to larger areas and more peripheral regions. This obviously has had impact on activity in the construction industry resulting in the highest volume of new house building, biggest turnover in several years, a general shortage of labour, and import of labour and construction services from Poland, Lithuania and Germany. From 2007, however, property prices in central regions have stalled or decreased while prices continued to grow, although at a slower pace, in peripheral regions. In for example Copenhagen property prices dropped 19 per cent since they peaked by end of 2006 which brings prices back to the level of mid-2005. Prospects for 2008 and further therefore seems to be less promising for the property and construction industries.

#### *Number and size of firms and employment*

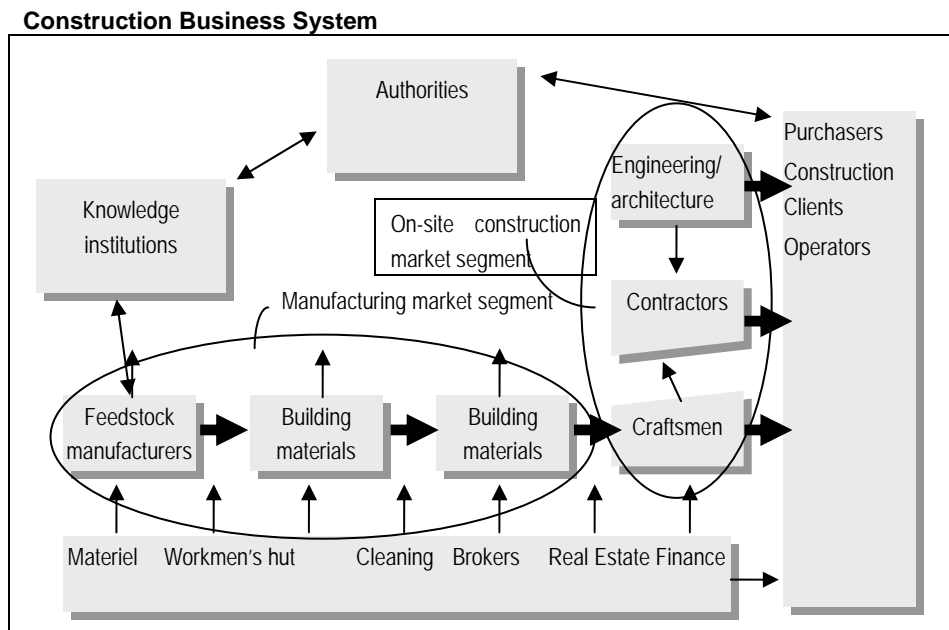
Number of firms in the sector has been growing in the most recent years. This represents a reverse of a long term development in previous decades where number of firms slowly but steadily has decreased with around 1 per cent annually. From 2003 to 2004 number of firms grew by 3.5 per cent and in the following two years by eight per cent and totalled 31,600 in 2006 against 26,110 in 2003, an increase of more than 20 per cent. Of these two thirds had less than five employees, more than one fourth less than 20 employees and only 6.5 per cent 20 or more employees. Only 0.4 per cent of firms in construction equivalent to just over 100 companies had more than 100 employees. There is only a handful very big contractor firms with more than 2-3,000 employees in Denmark, for example NCC with 3,300 employees in Denmark out of a total of 21,000.

<b>Employment in construction 1997-2006</b>									
1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
156197	160513	165206	167396	174092	173179	167934	166669	169418	179391
Source: Labour market statistics RASA, Statistikbanken © Statistics Denmark									

The rapid economic growth in 2004-2006 resulted in a mushrooming of new firms and therefore average firm size dropped to 5.7 employees in 2006 against 6.4 employees in 2003. The overall employment development in construction is shown in the table. Clearly the 2005-2006 change in total employment is unusually big.

<b>Completed building (in square metres) by ownership type and year of completion</b>					
	2002	2003	2004	2005	per cent
Private clients	4255537	4746804	5662993	4995187	57
Social housing organizations	320734	398050	398025	223040	4
Companies	2194069	2059552	2458187	2017268	25
Associations and institutions	205726	214594	279634	262172	2
Private co-ownership housing societies	155486	214927	283467	305567	3
Municipalities	516060	466986	524229	462120	5
Governmental	156744	63420	81659	118663	1
Owner-occupied flats	159951	123108	125365	181574	1
Source: Construction and housing BYGB3, Statistikbanken © Statistics Denmark. Here quoted from Gottlieb (2008a).					

Since the mid-1990s the Ministry of Enterprise and construction has attempted to introduce a view of construction in Denmark as an integrated business system as illustrated in the figure below. This is, however not the traditional view of the industry and thus for example national (and European) statistics are still organised along traditional lines where construction is separated from manufacturers of building materials, consulting engineers, design consultants etc. Whereas there may have been specific interests in highlighting the integration of activities across traditional sector divides it is nevertheless a fact that the industrial structure has been and still is very fragmented, particularly as regards the gap between relative few big companies and very many small firms. The division of labour is highly specialised expressed in number of industrial subsectors as well as size distribution of firms. While concentration index shows no indication of exceptionally high concentration rates in for example the contractor industry (Lotz 2005) there has for some years nevertheless been political focus on lack of competition in several construction and building material industries. In recent years a number of illegal cartels have been uncovered and taken to court by government anti-trust authorities.



Translated after: Erhvervsfremmestyrelsen (1993) Bygge/bolig. En erhvervsøkonomisk analyse

#### *Client-supplier relationships and supply side coordination*

Generally the supply side of Danish construction markets is split between vertically separated segments. Thus architectural design, technical design (consulting engineering), contractors and specialist contractors each belong to distinctly separated industries and in relation to any given construction project they have separate, specific responsibilities. Specialist contractors and subcontractors again comprise several specialised disciplines each of them organized with its own professional association, public regulation etc. Both coordination across trades and firms and inter-organizational communication and collaboration might generally be impeded by the traditional separation of trades and the big share of very small, small and medium sized enterprises.

Traditionally coordination has in principle been left to the construction client but as many client organization lack capabilities to do so project management expertise has often been acquired from consulting engineering companies. A number of small consultancies or individuals operating on a freelance basis offer project management services to clients. Contractors have traditionally been selected through a competitive tendering process following a detailed design prepared by architect and with specialist input from a consulting engineer. Earlier the lowest price tender has usually been selected but lately so-called most optimal price has become more widely used. Most optimal price basically means that price as selection criteria has to be seen in relation to a range of other ex ante specified technical or process criteria. Private sector clients are not subject to public procurement regulation and are consequently free to abstain from competitive tendering. Traditional organization of construction projects places a big responsibility on clients, of which many have very limited technical and organizational skills and resources to take complete responsibility for larger projects. By letting principal specialist contractors form consortia and thereby co-ordinate a number of specialist subcontractors clients have managed to reduce complexity and transfer responsibility to other actors.

#### *Design build*

Whereas Public-Private-Partnerships are still quite rare, although occasionally much spoken of and in fact promoted politically since late 1980s, design-build has for the past decades been a commonly used procurement model in Denmark. Design-build represented an integration of hitherto separately procured parts of the construction process and, not least, a

more clear governance structure allocating main responsibility to one contractor who co-ordinates all other contractors, subcontractors, designers, suppliers, etc. Since 1993 design-build contracts follow a standard contract. Other forms of governing relationship between client and suppliers include various degrees of co-ordination delegated to either (main) contractor or architectural designer or ultimately a model where the client himself co-ordinates all planning and design, construction, inputs and management. In Denmark design-build exists side by side with the other less centralised contractual forms. The growth of partnering should probably be seen as yet another consequence of the construction clients' permanent wish for substitution of fragmentation and uncertainty with more predictability in procurement. Voluntary arrangements for collaborative working may be seen as a consequence of the inadequacy or insufficiency of design-build and other traditional methods to meet the requirements of construction clients for better co-ordination, reduced uncertainty, fewer delays, defects and budget overruns. It is important to note though that partnering and other forms of voluntary collaborative arrangements should be seen as supplements to the usual contractual forms rather than as an alternative.

There may also be supply-side factors driving design-build as mode of operation as both upstream vertical integration of architectural design and technical design and downstream integration of marketing and sales may have positive impact for contractor firms in terms of economies of scale and scope etc. This is also reflected in contractors' forward integration of the developer role particular as regards large scale housing projects. Controlling sales enables the contractor to perform long term planning which again increases economies of both scale and scope. Reduction of market uncertainty facilitates more industrialised production, economically favourable procurement of building materials and stimulates positive learning curves in the organization.

Nevertheless integration at larger scale has mainly taken place in both consulting engineering and contractor industries in the form of horizontal mergers and acquisitions rather than vertical integration thus enabling the biggest companies to operate in an increasingly internationalised competition both in domestic markets and abroad.

## 2. Background to the application of voluntary collaborative arrangements and means of promoting them

In Denmark the most commonly used term for voluntary arrangements for collaborative working in the construction sector is 'partnering'. Initially, in mid-end 1990s, a frequently used term was 'new arrangements for collaborative working' but since then partnering has become the predominant way of describing a variety of organizational initiatives aimed at overcoming mistrust and adversarial practices in construction and advance trust and productive collaboration. As such partnering is the outcome so far of many years of research, experimental building projects and policy analysis in the construction industry and business policy system. Project partnering has become by far the most frequently occurring form of collaborative arrangements and partnering has become a widely accepted term associated with mostly positive connotations. Since 2003 it has been mandatory for government construction clients to use key performance indicators and consider the application of voluntary collaborative arrangements including PPPs and partnering when planning construction projects. By government construction clients is meant clients whose projects are covered by The Government Construction Act together with construction project for clients receiving more than 50 per cent funding of current expenses. Moreover, it is well-known that many other construction clients, including municipal and other public sector clients together with many construction industry firms, apply the partnering guidelines of the Danish Enterprise and Construction Agency. Therefore the published official partnering guidelines do not only address state bodies but is principally an attempt to introduce new practices among all actors within the construction industry (Erhvervs- og Boligstyrelsen 2004).

The official definition of partnering, published by the Danish Enterprise and Construction Agency, is that is

"a voluntary collaborative arrangement in a construction project characterised by dialogue, trust, openness, and early inclusion of all relevant partners to the construction project. Moreover the project is carried out within a mutually agreed objective and based upon shared financial interests" (authors translation) (Erhvervs- og Boligstyrelsen 2004).

The general background to the publication in 2003 of the Government Construction Act as well as the Guidelines for Partnering Projects is many years of political debates, working commissions, experimental building projects, empirical analysis and evaluation, etc. all focussing on the lagging relative productivity development of the construction industry, high levels of defects, time and budget overruns and ensuing litigation.

In both 1990 and again in 1993 analyses of the construction sector highlighted the lagging productivity of the Danish construction sector – it was evidenced empirically that the use of resources in the construction of a housing project had almost doubled from 1969 to 1986. While the complexity of the construction process had grown the way in which construction was organised appeared to be unchanged. On-site production at the construction-market was characterised by fragmentation, discontinuity, and changing collaborative constellations in new locations each time a new project was initiated. Moreover, the industry was characterised by an orientation towards domestic markets, protection from competition, and dependency on the public sector as a purchaser and as regulatory authority. In short the construction sector was confronted with a series of issues related to lack of competitiveness, lack of competencies and capital, lack of production methods to operate within more than one market segment, lack of a collaborative tradition, and lack of innovation (Erhvervsfremmestyrelsen 1993).

#### *Public procurement policy and partnering*

Whereas the industry's own contribution mainly was to participate in the political debates and in working committees the strategy agreed upon comprised a range of public policy instruments to be employed in the years to come. These included utilisation of

- i) the public sector as purchaser;
- ii) regulation/deregulation of the area;
- iii) research, development and technological service;
- iv) education and training;
- v) supplementary infrastructure, including information infrastructure.

While the success within the last four areas has been fairly limited the first policy area, the public sector as purchaser, has proven quite influential. The policy instruments here included publicly supported special development programme for renovation of buildings and experimental demonstration projects as to new types of collaborative arrangements. The explicit assumption underlying all initiatives was that they would contribute to promote productivity development within the industry. Policy programmes were launched in 1994-1998 and in the report from 1998 the term partnering was mentioned for the first time in a public policy report. The next programme ran 1998-2001 and focussed even more explicitly on developing collaborative arrangements in construction by means of experimental projects and otherwise, for example implementation of lean in construction projects. Upon termination of the programme it was stated that projects of the 'New Forms of Collaboration' programme had resulted in

- (1) economic savings of 5–20 per cent in both design and construction coupled with the prospect of increased profit margins for the companies,
- (2) increased product quality due to closer and more trustful collaboration,
- (3) Fewer resources tied in disputes and no settlements in arbitration
- (4) Better working climate throughout the entire construction process (Gottlieb 2008b).

The experimental projects were continuously evaluated, debated and reported in a network of interested public construction clients and other stakeholders and these reports later formed

the backbone of the first version of the official partnering guideline. The new policy initiatives on public construction procurement policy and partnering were decided and then published in 2003. Generally, the policy seems to have been successful as it has been accepted not only in government construction clients' practices but also by other public sector clients, in municipalities and even among major contractor companies using partnering actively in their marketing in major markets. Other forms of voluntary collaborative arrangements have had less influence in the market.

#### *Framework agreements and consortia*

Nevertheless there is among policy makers and even some researchers a firm belief that the establishment of (more) framework agreements, construction consortia or alliances would benefit the achievement of overall goals as to productivity development in construction in general. Moreover it is considered a matter of government policy to stimulate and encourage private companies' establishment of such collaborative arrangements, perhaps further fuelled by the relative success of the project partnering initiatives. Framework agreements were invited tendered for in 2005 in relation to construction of social housing by the Ministry of Welfare: The Ministry expected substantial interest from the industry but only one consortium tendered for it and moreover it later pulled out. Whereas the Ministry in the proposed framework agreement opened for the construction of a quite big volume of central government supported housing projects within a four-year period, it basically left it to the discretion of the country's 98 municipalities whether any of these projects would actually be realized. This taken together with other uncertainties, for example that the price of a housing unit should be uniform no matter its geographical location, all in all resulted in so unfavourable conditions that no consortia except one even considered bidding. It naturally contributed to the unattractiveness of the framework agreement that the construction and housing markets were booming at the time. As regards construction consortia and alliances more formalised (and publicly known) inter-firm relations are few. The boom in the Danish housing market 2003-2006 made some contractors enter into arrangements with design companies about housing construction to meet a strong demand and rapidly growing market prices. One of the more specialized market niches that these consortia wanted to address was affordable housing. It was given a prominent place in the present Copenhagen Mayor's municipal election campaign in 2005 but has not succeeded to bring about more than 12 apartments until now. The consortia as well as developers and other actors in the housing market have since 2006 witnessed drop in house prices in the region of 15-30 per cent and consequently there is now a surplus in the supply of residential housing of historical dimensions. In 2008 even the demand for business and office space has been diminishing and prospects for construction markets are generally uncertain.

Keeping in mind that PPPs, construction consortia and alliances, to our knowledge, largely do not occur in a Danish context or still are in their infancy, the Danish experiences with voluntary arrangements for collaborative working in the construction industry appear to be developed on the background of substantial inspiration from the UK. Thus the political initiatives leading to the application of project partnering partly replicated the sequence of policy initiatives applied in the UK:

- Analysis and think tanks with participation of a range of professional and construction market organizations
- One or more series of demonstration projects including evaluations and recommendations
- Use of public procurement as policy tool
- supplemented by The Benchmark Centre for the Danish Construction Sector providing hard evidence of the benefits from partnering etc.

From the experience of other Nordic countries it is known that there has been a similar strong influence from the example of the UK (Larsen 2008). There is further information as to the origin of partnering and other forms of voluntary collaborative arrangements in the [annex](#).

### 3. Extent of application of voluntary collaborative arrangements and experience of their use

Whereas the first introduction in a Danish context of the concept partnering took place early in the 1990s it is not until some 15 years later well into the 21<sup>st</sup> Century that partnering has become rather stabilised and institutionalised – both in political terms and as a specific project-based practice.

With the help of an expert panel the Benchmark Centre for the Danish Construction Sector, BEC (Byggeriets Evalueringscenter 2005b) identified 122 projects implemented in partnering in the preceding years. Data were collected in 101 of these cases as to a number of variables such as organization, activities, incentives etc. The study confirms that partnering largely did not occur in Danish construction before 2000. Of the evaluated projects two third were new building projects while around one third were renovation projects and less than five per cent were either engineering or facilities management projects.

The 'official' Danish definition describes partnering as a voluntary collaborative arrangement in a construction project characterised by dialogue, trust, openness, and early inclusion of all relevant partners to the construction project. According to the Enterprise and Construction Authority partnering guidelines (Erhvervs- og Boligstyrelsen 2004) dialogue is a key quality of partnering projects. It is best stimulated and facilitated in a construction project if all major partners are involved at an early stage and come to know each other through mutual activities of which the first typically is a so-called 'kick-off-workshop'. 76 per cent of the projects examined in the BEC 2005b examination opened the project with a kick-off workshop. Contractors participated in all kick-off workshops, the client in 95 per cent of them, the consulting engineer in 91 per cent and architectural design consultant in 89 per cent of these workshops. Other partners such as subcontractors, foremen, representatives of local authorities only participated in less than 15 per cent of the workshops. Professional workshop facilitators were used in almost two thirds of the workshops. There was a distinct difference between small and big projects. In big projects kick-off workshops were used in nine of ten cases whereas this was only the case in two thirds of projects smaller than DKK 50 million (Euro 7 million) (Byggeriets Evalueringscenter 2005b).

In addition to the initial workshop some projects had other joint activities. Celebration of the completion of specific steps in the building process is traditionally taking place in most projects. Other examples of joint activities were workshops in the course of the project in every third case and evaluation workshops also in one third of the cases.

*Example: Öresundbron* – The Öresund fixed link between Malmö (Sweden) and Copenhagen (Denmark) combines rail and road and consists of both a tunnel a bridge. It was constructed 1994–2000 and thus followed a few years after the construction of the Great Belt bridges 1988–1998. The Great Belt project was characterised by unacceptable many serious accidents and death of seven employees. Not only was this tragic in itself but it also gave very poor publicity to the project. Therefore the planning of the Öresund-project right from the beginning integrated means to develop better management methods in order both to prevent accidents as much as possible and to create a better image of the project in the public. This was primarily done by means of a very early involvement of all partners and stakeholders in the project in order to make everybody pay special attention to safety, environmental hazard and work environment. The aim was to create new standards for work environment and safety. In addition to the parties actively involved in the project also relevant associations, trade unions and other parties were involved. This contributed to stimulate a broader accept among all parties in the construction industry of the necessity and desirability of developing new forms of management and collaboration in order to avert or reduce hazard, damages and accidents (Dyreborg 2006). New procedures, managerial routines and collaborative arrangements were supplemented by financial incentives. Furthermore the contract included arrangements and incentives to keep the project on budget and time resulting in the project being finished a year ahead of the time schedule. The experiences of the Öresund project were core in inspiring the introduction of voluntary collaborative arrangements in the following years. It further added to the process that the project manager from the Öresund-project a few



years later was co-founder of the construction clients' association and its chair for the first nine years.

*Example: Enghaven housing project; strategic partnering* – Whereas partnering has become a quite common way of organizing collaborative arrangements in construction projects during the first seven years of the Century there is still scope for experimentation with further development of the partnering model. One way this experimentation has taken is in demonstration projects to try including more elements into the partnering model. In the Enghaven-example this included a strategic partnering perspective and early inclusion of more partners at an early stage. While it is common in partnering arrangements that the main parties to the construction project – client, contractor, architectural and technical designer – are involved in a collaborative effort from an early phase it is new to try enrolling subcontractors especially at an early/earlier phase. The Enghaven-project is the first in a series of projects, hence the label "strategic". The overall economic framework (the price) was settled at an early stage and flexibility, productivity gains and economic incentives in general therefore was to be realized by means of economies of scale due to the strategic multi-project approach.

Generally the Enghaven-project, the first of a series, displayed no visible economic savings or time savings. Moreover the fixed price resulted in that most project partners experienced the project as very similar to a traditional design-build project. Despite these shortcomings there is a positive feeling among project participants due to the development of a long-term project organization in which many resources were spent knowledge and information exchange, prevention of conflicts and very positive team building in general. All in all the positive evaluation concerns soft factors while progress as regards the hard factors appears to be more uncertain.

*Example: Road Management and maintenance* – From 2003 the Road Directorate entered a number of partnering agreements in relation to contracts on road management and maintenance. The Road Directorate contracted with three large contractors six contracts amounting to in total Euro 20 million each year. The Road Directorate wanted to supplement traditional contracts with partnering agreements mainly for three reasons:

- i) improvement of dialogue and reduction of conflicts with contractors,
- ii) optimization of products and processes and development of new methods
- iii) improved quality control and cost management.

The measures specifically taken to promote collaborative working included among others:

- specification of shared goals and transformation of these into operational indicators,
- incentives to further product and process optimizations including sharing of financial savings between contractor and the Road Directorate,
- the promotion of team spirit and collaborative working by the use of team building activities such as seminars, workshops, etc.

The partnering agreements were evaluated after three years. The evaluation clearly showed general cost savings in the three first years of 3, 6 and 4.5 per cent respectively. In selected single contracts savings amounted to up to 10-25 per cent (plantation management). Calculation of savings is extensive and detailed and includes the value of for example savings related to fewer delays for road users due to better planning of maintenance works, lower safety risk for maintenance workers, reduced consumption of contractor man-hours, and reduced need of investments because of better quality maintenance works. More generally the benefits of the applied collaborative measures provide opportunities for the Road Directorate to include the effect of process optimizations in future invitations to tender and consequently achieve generally lower costs. From the contractor's view benefits are mainly a generally improved competitiveness due to better work process planning, more efficient administrative processes and moreover a direct remuneration of good performance in terms of payout of a tangible share of savings.

*Example: New Headquarters to the Danish Confederation of Trade Unions* – When the Danish Confederation of Trade Unions in 2000 planned its new headquarters it was the intention to implement the construction project as a partnering project with extensive collaboration between the project partners including designers and specialist contractors in addition to client and main contractor. The partnering agreement comprised formulations of shared goals as to project implementation as well as agreement regarding incentives (sharing of savings/deficit respectively).

In general the involved parties evaluated the building as an environmentally friendly work of high architectural and functional value. However, the positive results were achieved at the cost of significant time and budget overruns. As the partnering agreement included a formula for the sharing of deficits all involved parties had to shoulder their part of the extra costs.

Although there were improvements during the course of the project, project partners were generally dissatisfied with the way collaboration developed throughout the project. Dissatisfaction specifically related to the will and ability of other partners to keep budget and time schedule and collaboration in general as it was evaluated poorer than in traditional projects. Afterwards it was concluded that two factors had been particularly important: 1) that the collaborative aim of the partnering agreement was interpreted very differently of the different partners and 2) too many individual team members had been replaced during the project causing lack of social bonds and common understanding of the goals and intentions of the partnering agreements this again resulting in many conflicts throughout. The project was evaluated by the National Agency for Enterprise and Construction and many of the experiences of this project later served as inputs to the process of preparing the national partnering guidelines

#### 4. Evidence of performance improvement

In an evaluation of the benefits of using voluntary collaborative arrangements both the views of the different suppliers and the customers are relevant. There does not seem, however to be much if any evidence as to the view of contractors, architectural and technical designers or other suppliers and subcontractors. The contractors themselves mainly refer to customer satisfaction when explaining the many benefits of partnering (NCC 2008). Clients stress that partnering

- facilitates better use of knowledge in the project across boundaries between firms, more commitment or loyalty to the project and therefore a better project in the end,
- enables more openness between the parties to the construction project. Because this openness regards competencies as well as economic interests a consequence is that many misunderstandings are prevented and continuous adjustments enabled,
- leads to more satisfactory economic results because it, as part of the process, is agreed that economic savings as well as budget overruns will be shared between the partners.

The Benchmark Centre for the Danish Construction Sector, BEC (Byggeriets Evalueringscenter 2005a) surveyed the experiences of 18 public, 7 semi-public and 10 private construction clients with project partnering compared to traditional projects, see table. These 35 construction clients have experiences from a very large number of construction projects. Generally there is little doubt that construction clients prefer a partnering organization for a traditionally organized construction project. They particularly stress 1) fulfilment of client requirements within the economic framework 2) inclusion of the client in planning of the project, 3) absence of budget overruns and 4) value for money i.e. high quality relative to the price paid.

### Comparison of partnering projects and traditional project

From your experience with both partnering and traditional projects how are the following goals met?	with partnering		not different	with traditional organization		total	
	much better	better		better	much better		
	%	%	%	%	%	N	%
All involved parties achieve economically satisfying result	9	69	20	3	0	35	100
Good work environment and safety at site	14	31	54	0	0	35	100
User involvement	23	54	23	0	0	35	100
Involvement of client in planning	23	51	23	3	0	35	100
Client needs are met within the agreed framework	17	60	20	3	0	35	100
High quality relative to price	17	51	29	0	3	35	100
Time schedule is kept	14	31	49	6	0	35	100
Agreed price is kept	15	44	29	12	0	34	100
Good collaborative atmosphere in between key actors	37	60	3	0	0	35	100
All necessary information is provided	6	15	79	0	0	34	100
Possible to make adjustment according to client's wishes	34	37	29	0	0	35	100
Good handling of conflicts	20	80	0	0	0	35	100
Absence of defects at final delivery	9	40	51	0	0	35	100
Respectful attitude towards local context	9	20	69	3	0	35	100
Relevant competences involved in planning phase	9	51	34	6	0	35	100
No problems after project delivery	6	44	50	0	0	34	100

Source: *Byggeriets Evalueringcenter (2005a) Bygherrers tilfredshed med partnering. p 15, (authors translation)*

Other important factors as seen from the client's perspective are inclusion of the best professional expertise in the planning phase and good collaboration and a friendly atmosphere among key persons in the project and at the site. In some fields partnering organization seems to have less or insignificant effect, particularly as regards information exchange and the way the construction project affects the surrounding local environment.

#### *Voluntary collaborative arrangements and small and medium sized firms*

A recent Danish study suggests that it is a rule rather than an exception that small and medium sized construction companies collaborate voluntarily with other SMEs to avoid shortage of construction services or labour. The major part of these relations is with known partners and thus collaboration, although almost always informal, has a certain permanent character of 'strategic partnering' or informal alliance. Firms estimated that 80 per cent of turnover was traded in relations with firms with whom relations could be characterised as close. Collaboration with such closely related business partners had decisive influence on flexibility, efficiency and profitability of the interviewed firms (Steenstrup 2008)

While behaviour and performance of construction SMEs may be characterised informal collaborative arrangements it is generally the impression though that partnering in the 'official' version to a certain degree excludes SMEs because partnering contributes to raise entry costs. A study of partnering practices in Nordic construction suggests that small and medium sized firms may be disfavoured by developments towards more collaborative inter-firm approaches such as partnering (Larsen 2008). The major drive towards partnering and other voluntary arrangements for collaborative working comes from big contractor companies and

public sector clients with big projects. It could be anticipated though that as the news about the good experiences of partnering gradually become known among more construction clients also and more and more firms become experienced in the implementation of partnering the initial costs related to commencing a partnering project (workshops, knowledge and information exchange, establishment of collaborative procedures, etc.) could be lowered. This will gradually enable also small and medium-sized firms to engage in partnering projects.

#### 5. Relationship to European and other policies

Generally, public procurement must conform to EU competition regulation and specifically the *Directive of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts*. It has been observed that this may cause difficulties as regards voluntary arrangements for collaborative working in the construction sector. If it is mandatory for public construction clients to choose the bid with the lowest price it will more often than not be detrimental to endeavours to further more collaborative relations and practices. If a proposed project can be chosen on the basis of most optimal price rather than lowest price also other considerations than financial ones are allowed to influence decision of public sector construction clients. Practical experience shows that it indeed is possible to invite bids without going against EU regulations. A very recent example is a project in a major 1960s social housing estate in Copenhagen which is going to be the biggest renovations scheme in Denmark ever. Only 25 per cent of the criteria concerns price whereas 50 per cent relates to organization, process and collaboration and the remaining 25 per cent other non-economic criteria. Similar experience exists in other Danish projects as well as for example Norwegian projects. This also stresses that price is only one parameter and not necessarily the most important one from the point of view of the public construction client. The move away from selection based primarily on price is nevertheless still a quite recent development as two thirds of the 101 partnering projects in the BEC analysis were based on price as main criteria (Byggeriets Evalueringscenter 2005).

#### Conclusions

In Denmark partnering, being the most common form of voluntary collaborative inter-firm arrangements in construction, has been sturdily promoted by public authorities, especially the Danish Enterprise and Construction Authority. Thus, since 2004 it is mandatory for public construction clients to consider partnering as a method of procurement. It has no doubt been instrumental that the Danish Association of Construction Clients actively supported government policy in this field and continuously strives to train, educate and qualify its member firms in order to enable them to apply partnering in construction projects with ever better results. The Chair of the Association has personal experience with partnering from the management of two major public construction projects since the mid-1990s. The public policy makers' pushing the ideas of partnering has evidently inspired not only construction clients but also the major contractor companies to introduce partnering principles in construction project management. Public promotion of collaborative working in construction is, however, not the only way to foster new forms of organising inter-firm relations in project organizations and project management. In for example Sweden the major contractors have been the main drivers of partnering arrangements whereas in Finland and Norway it seems that one or few major construction clients holds a core role as "change agents".

While voluntary collaborative arrangements have entered construction markets in the other Nordic countries in other ways than in Denmark, it is obvious that the Danish example has been inspirational for the initiatives in the other countries. Then again the development in both Denmark and the other Nordic countries has been much influenced by ideas and experiences from the UK. It seems that an important source of inspiration and transfer of knowledge is contacts between policy makers of different nationalities in combination with more scattered contributions from interactions in the research community, between professional associations etc. Moreover mergers and acquisitions throughout the previous decades have resulted in the establishment of big international contractor and consulting engineering corporations in the

Nordic and this has generally provided more resources for in-house innovation and product development in most of these. An important outcome of this is the development and evaluation of concepts and models for voluntary collaborative arrangements.








Whereas it is not really considered a serious criticism of voluntary collaborative arrangements it seems that there is some agreement that they do not necessarily result in lower price. This is, however, not considered a major problem as price *per se* was not the main reason for introducing voluntary collaborative arrangements in the first place. The important positive effects include for example a better collaborative process between client and contractor as well as between contractor and sub-contractors and, as a result of this, a more committed project team with fewer conflicts are valued so positively that price is not really an issue, unless of course in extreme cases of major budget overruns in large-scale projects such as the national broadcasting company's new headquarters.

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## Annex

The following figure "A brief archaeological overview of the development of partnering and partnerships in the Danish construction sector" is quoted from Gottlieb (2008b). It illustrates the development and sequence of construction policy initiatives since the mid-1990s. The following legends are used:

Symbol	Explanation
	Policy reports and analyses
	Debate papers
	Development programmes
	Institutions/organisations
	Policy agendas, orders, statutes, acts and laws
	Collection of projects
	Demonstration projects

The latest political reform programme regarding the construction sector was published in 2007 following a couple of years' work in the Construction Policy Task Force and was entitled along the same lines as most previous construction industry policy documents: "Better and cheaper construction" (my translation). It contains 24 proposals for needed reform initiatives within six main fields (Økonomi og erhvervsministeriet 2007):

1. Better value for money in public construction projects
2. Increased competition
3. Increased quality and protection of consumer rights
4. Administrative reform
5. Research and innovation
6. Manpower and competencies

Examples of specific reform initiatives include:

- strategic partnering
- improved regulation of public-private partnerships
- key performance indicators
- stimulation of all-season construction activity
- increased international collaboration in construction research

