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Taking Engineering Services Offshore - The Scandinavian Experience

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Abstract: “Offshoring” has become increasingly attractive for European engineering consulting firms, either through the use of external resources (outsourcing) or by relocating internal activities (the captive arrangement of foreign direct investment). Consulting companies may experience lack of skilled personnel and/or an increasing pressure on costs. Moreover, countries like China and India provide highly qualified engineers at a relative low level of remuneration compared with their Western counterparts. The aim of this paper is to investigate the experiences of Scandinavian based consulting engineers concerning offshoring, which often begins with a single project, but early positive results and the production flexibility of many developing countries can quickly lead to a more profound collaboration and even to a strategic transformation of the Scandinavian firm. For its theoretical foundations the paper builds on international business and strategic management approaches. The empirical research uses desk research investigations of companies in Denmark, Sweden and Norway. An exploratory study focuses on a single case supplemented with a preliminary evaluation of the 30 largest consulting engineering companies in Scandinavia.

Keywords: offshoring; consulting engineers; Scandinavia; international business.

1. Introduction

Engineering outsourcing is expected to be a business worth USD150 billion a year by 2020, which would make it five times larger than in 2010. It is commonly assumed that companies use this strategy to cut costs of an expensive activity in industrialised countries by placing it in low cost developing countries [1]. While at the same time the developing countries seek to improve their industrial competitiveness by acquiring and upgrading their technology through offshoring arrangements with industrialised countries [2]. Currently the largest engineering offshoring destination is India, with about 25 percent, although China is also an important location and its role is expected to increase in the coming years [1]. Together both countries graduate more than 800,000 new engineers each year, with most of them willing to work at far below pay levels in the USA, Europe and Japan [3][1]. Several other countries also host offshored engineering including the Philippines, Malaysia, Thailand, Brazil, Hungary, Ireland, and the Czech Republic. The aim of this contribution is to investigate Scandinavian based

consulting engineers’ experiences using offshoring. Within the international perspective Scandinavian consulting engineering companies are considered medium sized [4]. The paper concludes by presenting a future research agenda.

2. Method

The theoretical frame is informed by a literature review aimed at assessing the accumulated published knowledge on offshoring companies’ longer-term development and their internal and external organization. Previous reviews suggest that international business, strategic management, operations management (supply chain management), marketing (industrial) and purchasing would be important research strands to pursue, not giving construction or consulting engineering special attention. Supplementary references on engineering offshoring in the global construction industry were also identified, as well as broader studies of engineering offshoring.

To identify the largest Scandinavian engineering consulting companies, the STD study [4] was used (Svenska Teknik och Design Företag). The ten largest engineering consulting firms in Denmark, Norway and Sweden were identified according to their turnover and number of employees, and hence selected for the study. Each was investigated through desk research using annual reports, media coverage, “LinkedIn” data and other types of information. Material on offshoring was found on consulting engineering companies operating in Scandinavia with headquarters in Denmark and Sweden, although not in Norway. Two long-term cases were particularly well described. For reasons of anonymity the case description below is a mixture of the two, and Danish sources are omitted. The case should be considered as early stage exploratory, relying on secondary sources. Also the desk research material of the largest engineering consultancy companies constitutes only an early stage exploratory study of offshoring and was chosen for discussion as comparison to the case company. The paper draws on Koch [5]

3. Frame of Reference

In this section we first define offshoring and developments in offshoring generally. Then offshoring will be explored within engineering and construction.

3.1 Definition of Offshoring

Offshoring is defined as a strategy for transferring activities across national borders, which may occur through the use of external resources (outsourcing) or through relocating internal production activities (direct foreign investment, captive arrangement) [6] [7]. It follows that outsourcing and offshoring overlap, and are related, as shown in Table 1.

Table 1. The four main strategic options of offshoring /outsourcing (adapted from [6])

	In sourcing	Out sourcing
Onshore	1. Internal domestic provision	3. Domestic outsourcing
Offshore	2. Captive/foreign subsidiary offshoring	4. Offshore outsourcing

Offshoring and captive setup refers to the situation where the firm owns and runs offshored units in another country [6], whereas offshore outsourcing refers to the situation with simultaneous transfer of ownership and location of an activity [7]. These definitions are challenged by multiple practices of companies that are involved in a range of hybrids, in-betweens, intermediaries, expatriates etc.

3.2 Long-term offshoring tendencies

The framework of Hätönen & Eriksson [7] can be used as a systematic attempt to conceptualize longer-term offshoring developments. It consists of four phases:

- Transactional
- Resource seeking
- Transformational
- Developmental

Hätönen & Ericsson [7] characterize the *transactional phase* as a “big bang”, where the “make or buy” problem tilts toward “buy”. Activities are transferred to outside vendors in the belief that market mechanisms result in lower transactions costs. Hence, Transaction Cost Economics (TCE) is the main underlying theory. In the *resource seeking* phase companies rely on external sources to provide production components and services. Here, the main theory becomes the Resource Based View (RBV) [7].

In the *transformational phase* the main theory is RBV, in combination with organization theory. In this phase, all parts of an organization can in principle be transferred to outside vendors [7]. And as offshoring and outsourcing become integrated legitimate tools in

the management repertoire, the concerns turn to the timing of offshoring.

Lastly, in the *developmental phase* the organization operates increasingly without boundaries with managing business development and continuous improvement of internal activities even becoming part of offshoring/outsourcing arrangements [7]. Management takes the form of portfolio management, as many internal activities are project-oriented. Yet, longer-term perspectives of external sourcing are employed, even as a ‘lifecycle’ perspective. This implies that the main theory applicable is RBV according to [7].

The literature on long-term offshoring development reveals varying responses to the long-term pattern [8] [7] and Vivek et al [9] find a shift from transactional relations to relation-based approaches and complementarity. Lampel & Bhalla [10] and Periera & Anderson [11] find continued focus on transactions and low cost. On this basis, it is not possible to follow Hätönen & Ericsson [7] and Vivek et al. [9] in their claim that transaction cost economics is becoming obsolete to the benefit of the resource-based view and other complementary resource-oriented theories.

3.1 Engineering and Construction

Within engineering and construction there is a similar tension between companies that continue to focus on the single project cost when collaborating with domestic and global partners, and others that change their business strategy and enter a transformative and developmental mode [12] [13] [14] [3].

The Committee of Offshoring Engineering, COE [12], suggests a distinction between engineering, procurement and construction (EPC) and Architecture, Engineering and Construction (AEC). Where EPC is based on considerable experience and practice of offshoring in the delivery of civil engineering, infrastructure and large plant facilities, AEC is (suggests COE) is focused on dwelling and residential housing. COE [12] finds that in 2004, 62% of the EPC companies were using offshoring for many projects. Also some AEC companies consider offshoring, but to a far lesser degree than EPC companies [3].

Messner [3] points out that most EPC companies appear to have international offices and are participating in multi-office execution strategies for the delivery of projects. Many of them have offices in low-cost engineering locations, such as India, China, Czech Republic, Russia, Romania, Poland, Mexico, and Taiwan [3]. Some of these were established especially to provide low-cost engineering services for company projects, while others performed specific design tasks for domestic construction projects.

4. The Case Study

The case study company is a Danish-owned multinational consulting engineering enterprise (ConsultCo) with its main office in Denmark. The principal areas of activity comprise engineering consulting on energy, environment, infrastructure, building and operations, construction management, economics, general management and information technology. These are organised into nine strategic business units (SBUs) supported by a general services department encompassing the IT organisation and staff. The major business development occurs within the SBUs. The company employs some 2000 people in the parent company in Denmark, and its international organisation. Some 50% of the turnover is generated in Denmark.

The company has long followed a strategy of globalisation combining leading edge expertise in selected products within civil engineering with a regional presence in Northern Europe. This strategy has led to a number of mergers and acquisitions as well as offshoring of engineering design and other activities. Civil engineering is a strong business area involving a presence and engineering activities at sites and countries around the world. Several mergers and acquisitions have involved integrating captive units in low cost countries. For around 30 years some routine engineering tasks have thus been undertaken in India by a wholly owned subsidiary. The whole set of expansive activities has required integrative managerial actions.

A new wave of offshoring activities began around ten years ago. Initially SBUs throughout the company were hesitant, and for this reason only work for small projects was offshored from time to time. A director stated: "We cannot force our managers and staff to engage in offshoring to India. They must have a real incentive to do it, and it is therefore crucial that we are able to show good examples and positive results from offshoring that can create this kind of incentive across the organization"

However the offshored projects showed good results. The work was of good quality and documented cost savings were around 40%–50% for some types of project, and between 20% and 30% for most others. This gradually diffused across the various managerial levels and catalyzed an internal strategy development process about how the company could exploit the opportunity.

By 2012 ConsultCo's strategy was based on integrating the Indian units in its business. The 450 employees in India include 70 within detailed engineering design and there is a strategic aim to continue growing the Indian unit. However, this implies interdependence and the Indian engineers are now perceived by HQ to be demanding in terms of wages and task content. A liaison officer responsible for contacts between Danish based and India based

employees in ConsultCo puts it this way: "The Indian engineers know exactly what they want. They ask critical questions, are voluntarily suggesting ideas and are clearly stating that they want to be along on the demanding tasks rather than just entering data"

The need for competence development, HR policy and practices is thus evident. The liaison officer continues: "Many of (the project members offshore at) our infrastructure projects are senior engineers, and several have requested to be part of the design of the motorway itself rather than just the exit ramps. We have tried to provide that"

The liaison officer is backed up by a senior manager pointing at the possibility of winning contracts of Indian infrastructure based on the company's competences, improving its attraction as a work place for Indian engineers.

5. Discussion

The case company ConsultCo combines local and global presence and covers both EPC and AEC. However, it appears that offshoring activities are related mainly to its EPC activities. Overall growth is now dependent on a differentiated performance of its business areas. Some are negatively impacted by the crises (the local Danish market), whereas others (India and civil engineering) are successful. The case shows how consulting engineering companies in Scandinavia can transform their business based on long-term presence in India. The case also shows a high level of interconnectedness between the Danish firm and its Indian offshoring partner. They use project organization as the first organizational instrument in their collaboration. After the transfer of a first project, the firm experienced a rather fast development through project expansion (resource seeking) to a transformation of strategy [13], and also because of the Indian partner's European customer portfolio, which provides a strategic expansion option for the Danish firm to the European market. The firm stations expatriate managers at the Indian subsidiary's facilities and also uses a liaison officer to enable coordination and collaboration. Expatriate managers and liaison officers are seen as facilitating coordination and communication between the Danish and Indian sides. Moreover the strategic transformation also implies that the two companies engage in a mutual dependency, where retention of employees at the offshored unit also becomes an issue for the European company.

Jensen [13] [14] raises the question of what impact offshoring professional services will have on the core company's resources, referring to the risk of 'hollowing out' the core company. His engineering consulting case exemplifies the surfacing of new opportunities rather than hollowing out.

Other Scandinavian companies such as Ramboll, COWI, and Thyrens have followed this pattern, and

there are some that follow the project set-up pattern (for example ÅF). Moreover, the preliminary screening of the largest Danish, Norwegian and Swedish companies shows that many (Alectia, EK Jørgensen, Sweco, WSP Sweden), and especially some of the Norwegian firms (Asplan Viak, Hjellnes, Multiconsult, Norconsult), do not operate offshoring at present. Hammarström et al [15] interviewed nine CEOs of Swedish consulting engineering companies and find that they observe and follow the IT-companies offshoring practice, yet refrain from practising it themselves. Compared with large multinational engineering consultancies this status can be seen as ambivalent supplication to offshoring [4]. Among those following a long-term strategy of offshore presence there are infrastructure engineering companies that have operated worldwide for a much longer period than the last wave of offshoring reflects (such as by Niras and Norconsult).

Such companies therefore have long-term experience of being multinationals and can operate offshoring like their internal arrangements. Offshored tasks encompass Building Information Modelling (BIM) design, design of standard bridges, motorways and even larger infrastructure projects. There were no examples of back office tasks being outsourced/offshored, such as travel accounting, recruiting or other business processes [11]. The differences between firm strategies in using offshoring shows elements of in-house reliance on the regional market and project or transformational offshoring set up, either as outsourcing or captive local investment. Future research with need to address the particularities of project based construction companies in offshoring.

6. Managerial Implications for Scandinavian Consulting Engineering

Among both theorists and practitioners there is continued divergence as to whether offshoring should be a short-term controlled exercise (project by project) or a long-term transformation. Sehgal et al [1] take the most initial point of departure in discussing the managerial approach to the very first project to offshore. Their advice is fivefold:

1. Choosing the right project
2. Identifying the appropriate business model
3. Teaming-up with the right vendors
4. Creating robust performance metrics
5. Establishing a strong governance structure

They recommend not taking the most business critical and/complex projects, to go beyond the dichotomy of either outsourcing or establishing a captive unit (a subsidiary). This recommendation is consistent with the results of the literature study, where many variants of set-ups were found. While the recommendation of

creating robust performance metrics might sound attractive in addressing a core company manager's anxiety of risks of spending in vain. Jarvenpaa and Keating [16] and the case results remind us of other side-effects of establishing rules and regulations for carrying out engineering work. Jarvenpaa and Keating's results [16] underpin that strong governance might imply soft management, such as Consultco's Liaison Officer also reflect. When recommending scrutiny of possible vendors Sehgal et al [1] suggest going beyond price and look into the vendor's capability and other experiences. This can be tackled through bidding procedures they claim.

However in focusing on the very first project in an offshoring relationship Sehgal et al [1] seem to fall short of relating to the longer-term strategic choices that are involved. Experiences in and outside construction point at emergent journeys of offshoring [17] [10] [11]. This insight puts the first project in another light. Then it is more of an initial probe of a possible future strategic partner, than a single business operation to be terminated as such.

7. Creating a Sweden-China Research Agenda on Sustainable Renovation

The preliminary insight from this exploratory study has led to the conceptualisation of an initial research agenda in the specific area of sustainable renovation. The observation concerning a cross-national global arrangement would be beneficial for value/cost reasons in this area, given its importance both in China and Sweden. In the research we will appreciate the possibility of a wide range of organisational forms of Chinese-Swedish industry collaboration, where offshoring of engineering tasks related to sustainable renovation in Sweden to China is only one option. We will study the global status of operating in China and the West and propose to map some of the organisational arrangements currently used. This would form a basis for following the facilitation of a new collaborative constellation in the building and related industries in Sweden and China operating in sustainable renovation.

8. Conclusion

The aim of this contribution was to investigate Scandinavian based consulting engineers' experiences using offshoring. The study is of an exploratory nature and focused on a single case supplemented with an analysis of the preliminary status of the 30 largest consulting engineering companies in Scandinavia, i.e. Denmark, Norway and Sweden. Through a literature review of offshoring in general, and in particular a compilation of studies of engineering offshoring, it becomes clear that offshoring involves significant strategic choices and is not sufficiently dealt with if

understood only as single project endeavours. Moreover, even within the project frame, trust, communication and proper (soft) management are important. There are indications of an ambivalent hesitation among the companies concerning offshoring. Consulting engineering firms in Scandinavia entering offshoring are recommended to exercise openness for longer-term learning and strategic engagement, even if the collaboration might start and end with a single project. Future research will study such engagements.

References

- [1] Sehgal V, Sachan S and Kyslinger R, *The Elusive Right Path to Engineering Offshoring*, Business and Strategy, 2010. Accessed November 2012 at www.strategy-business.com
- [2] Bennett D J and Vaidya K G, Meeting Technology Needs of Enterprises for National Competitiveness. *International Journal of Technology Management*, vol 32 no 1-2, pp. 112-153, 2005.
- [3] Messner J L, Offshoring of Engineering Services in the Construction Industry. In *The Offshoring of Engineering: Facts, Unknowns, and Potential Implications*. National Academies Press. Washington, 2008. Accessed November 2012 at <http://www.nap.edu>
- [4] STD, Sector Review -The Consulting Engineering and Architectural Groups: A Swedish and International survey, Svenska Teknik och Design Företag (STD), Stockholm, 2010.
- [5] Koch C, Offshoring Engineering - Experiences of Scandinavian Engineering Consultants, in Kajewski S, Manley K and Hampson K (eds), *Proceedings of the 19th CIB World Building Congress: Construction and Society*, Queensland University of Technology. Brisbane, 2013.
- [6] Bunyaratavej K, Doh J, Hahn E D, Lewin A Y and Massini S, Conceptual Issues in Services Offshoring Research: A Multidisciplinary Review, *Group & Organization Management*, vol 36 no 1, pp. 70-102, 2011.
- [7] Hätönen J and Eriksson T, 30+ Years of Research and Practice of Outsourcing - Exploring the Past and Anticipating the Future, *Journal of International Management*, vol 15 no 2, pp. 142-155, 2009.
- [8] Bengtsson L and Berggren C, The Integrator's New Advantage – The Reassessment of Outsourcing and Production Competence in a Global Telecom Firm, *European Management Journal* vol 26, no 5, pp. 314-324, 2008.
- [9] Vivek S D, Richey Jr R G and Dalela V, A Longitudinal Examination of Partnership Governance in Offshoring: A Moving Target, *Journal of World Business*, vol 44 no 1, pp 16-30, 2009.
- [10] Lampel J and Bhalla A, Living with offshoring: The Impact of Offshoring on the Evolution of Organizational Configurations, *Journal of World Business*, vol 46 no 3, pp. 346-358, 2011.
- [11] Pereira V and Anderson V, Longitudinal Examination of HRM in a Human Resources Offshoring (HRO) Organization Operating From India, *Journal of World Business*, vol 47 no 2, pp. 223-231, 2012.
- [12] COE, *The Offshoring of Engineering: Facts, Unknowns, and Potential Implications*, National Academies Press, Washington, 2008. Accessed November 2012 at <http://www.nap.edu>
- [13] Jensen P Ø, A Learning Perspective on the Offshoring of Advanced Services, *Journal of International Management*, vol 15 no 2, pp. 181-193, 2009.
- [14] Jensen P Ø, A Passage to India: A Dual Case Study of Activities, Processes and Resources in Offshore Outsourcing Of Advanced Services, *Journal of World Business*, vol 47 no 2, pp/ 311-326, 2012.
- [15] Hammarström M, Engwall M, and Lagergren F, *Ledningsutmaningar i konsultföretag - En studie av företagsledningarnas utmaningar i teknikbaserade konsultföretag på den svenska marknaden*. Stockholm, Royal Institute of Technology (Management challenges in consulting companies), 2012.
- [16] Jarvenpaa S L and Keating E, Global Offshoring of Engineering Project Teams: Trust Asymmetries across Cultural Borders, *Engineering Project Organization Journal*, vol 2 no 1-2, pp 71-83, 2012.
- [17] Jørgensen C and Koch C, Global Offshoring - Knowledge Journeys of Three SMEs, *International Journal of Globalisation and Small Business*, vol 4 no 3-4, pp. 360-379, 2012.