

From Senses to Sensors

Strategies for Maintaining and Enhancing Competence in a Virtual Organization

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Abstract. One key dimension of the virtualization of the workplace is the formation of new types of partnerships where organizations let internal functions be handled by an external partner, the so-called outsourcing of services. The formation of an outsourcing partnership imposes the risk of knowledge-drainage on the client organization as specific internal competence decreases when the service provider takes over the technological knowledge and has a significant impact on the business processes in general. The aim of this paper is to address the issue of partnership outsourcing and to explore strategies that are used to keep the competence within the client organization even as it opens itself up to the partnership. Based on the framework of Four Outsourcing Relationship Types provided by Kishore et al. [1], this paper investigates the relationship between a large minerals group, Alpha Corp. and its remote service provider, RDC. Alpha has three different strategies for maintaining competence within the organization while engaging in the outsourcing relationship. The first is exploiting the full potential of its partnership with RDC, the second is heavy investment in information technology, and the third is structured and systematic maintenance. The findings of the study show that the relationship between Alpha and RDC can be characterized as an alliance type relationship and that the only way for Alpha to preserve competence is to maintain an inspired and engaged workforce and fully embrace the partnership in order to create a win-win situation.

1 Introduction

Organizational transformation has been on the research agenda for a long time. Striving for efficient and cost-effective solutions has inevitably led to the extensive

use of information technology within modern organizations [2]. Over time the research scope has been extended to exploring new kinds of virtual inter-organizational networks [3, 4, 5]. One key dimension of this virtualization of the workplace is the formation of new types of partnerships where organizations let internal functions be handled by an external partner, so called outsourcing of services [3, 4, 6]. Organizing as a partnership suggests that the involved parties have an interest in giving something back to the other organization, which is something different than the traditional customer/vendor relationship of the market economy [6]. A partnership outsourcing relationship is thus likely to have a transformational effect on organizational form and function for those businesses involved [7].

A specific case of partnership outsourcing can be found within the processing industry, where remote monitoring technology is being increasingly used to monitor the machines used in the process line [8]. The maintenance unit, which is responsible for keeping the machines such as mills, crushers, and conveyors up and running, previously relied on the employees' personal skills and use of the senses; their individual ability to detect and correct any errors or problems that arose. Nowadays, these machines are instead often monitored through various sensors and IT-applications, which are continuously logging process data and passing it on for analysis [9, 10]. Such monitoring services are increasingly being outsourced to a remote service provider that uses the client's IT-infrastructure to access the data and perform the subsequent analysis with the aid of sophisticated software. As the service provider and the client organization become intertwined in the partnership, the client relinquishes some of its control over the maintenance work with the subsequent risk of knowledge-drainage on the organization [11]. Thus, a question that arises is how to keep competence within the client organization when the service provider assumes responsibility for the technological knowledge and has a significant impact on the business processes in general. The aim of this paper is to address the issue of partnership outsourcing and to explore strategies that are used to keep the competence within the client organization even as it opens itself up to the partnership.

This paper is focused on a case study of two companies: a large minerals group, Alpha Corp., and its remote service provider, Remote Diagnostics Centre, RDC. Alpha Corp. has in recent years made the move towards outsourcing strategic aspects of its maintenance organization. RDC is the company that was chosen for the partnership. The paper is organized as follows: the following section gives an overview of related research on organizational transformation and virtualization and on partnership outsourcing. Section three describes the research methodology. The actual case study is presented in section four and analyzed in section five. The paper ends with conclusions and suggestions for future research in section six.

2 Related Research

2.1 Organizational Transformation and Virtualization

In order to understand virtualization and organizational transformation, one must consider both the fields of information technology and organization studies and the impact they have on each other. Kling and Allen [12] made a call for applying organizational informatics in order to understand the relationship between the design and use of information technology and human behavior in organizations. Orlikowski and Barley [13] point to three broad genres of IT research where organization studies have relevance. These are characterized as studies of the impact of IT with regards to social and economic consequences, studies of the design and use of IT, and studies of the organizing and managing of IT services, which includes the sourcing of IT services. Virtualization can be found as a topic of study within all these genres.

One area of research on the concept of virtualization and organizational transformation is virtual work; that is work done from some other place than the traditional office such as distributed work environments and tele-working [14]. Virtual and ad-hoc teams are another aspect of virtualization where traditional organizational boundaries are transcended and transformed [15]. A third area of research is the virtual organization, which consists of networks where the traditional buyer-supplier relationship has evolved into a deeper collaborative effort, leading to internal business processes being outsourced to an external strategic partner [6]. A key concept for all these areas of research is the notion of distance, defined by Chudoba et al. [16, p. 280] as “the challenges people face to communicate, resolve conflicts, and maintain social interactions over time, space or organizational units.” A virtual organization thus faces the challenge of managing this distance as it opens itself up to external input. This is made explicit in the case of partnership outsourcing.

2.2 Partnership Outsourcing

The increased globalization, widespread use of new technology, and pressure to be on-line, flexible, and efficient have prompted organizations to rethink and reshape their original forms, and as a result of these demands, strategic alliances, joint-ventures, and partnerships have been formed [6]. These outsourcing partnerships are different from traditional outsourcing in that they presuppose a transformation from the pursuit of self interest in a hierarchically structured relationship to a partnership based on trust [17, 18]. Forming such a relationship changes the organization’s view of itself, from client and customer with the right to make high demands, to a partner that has to give something back to the service provider [11].

Kishore et al. [1] suggest a framework of Four Outsourcing Relationship Types (FORT): support, alignment, reliance, and alliance. These four types show various degrees of involvement/ownership substitution and strategic impact of the service provider on the client organization. With both ownership substitution and strategic

impact being high, the relationship is characterized as an alliance. In an alliance the monitoring mechanisms are considered high on mutual trust and low on contractual control. Furthermore, an alliance relationship entails common objectives and goal symmetry between the service provider and client. The objective is to engage in mutually beneficial behaviors. This is something very different from a support relationship where both ownership substitution and strategic impact is considered low. This is more consistent with the traditional view on outsourcing where the outsourcing decision has been made on the basis of determining whether the particular IT operation has been seen as a strategic asset or as a commodity. In the latter case, the decision to outsource has been made [19]. This view has been at the center of previous research describing the motive for outsourcing as focusing on core business, cutting costs, and providing a more efficient organization [11, 20, 21]. Partnership outsourcing in the form of an alliance relationship has not yet received equal attention from the research community, but it is growing in scope as organizations seek added value through long-term, mutual relationships with their service providers [22, 23].

Slaughter and Ang [24] claim that IS skills can quickly become obsolete, and that outsourcing is a way to provide a company with a skilled up-to-date workforce. Dyer and Hatch [25] have shown that organizations can gain competitive advantage by developing their network relations, as this enables inter-organizational knowledge sharing. However, partnership outsourcing also opens the organization up for potential knowledge-drainage as skills are moved from residing within the organization to the external supplier, putting the client at the supplier's mercy [11]. The client organization thus needs strategies for how to maintain core competence even while seeking new ways of doing business. In the words of Prahalad and Hamel [20, p. 82]: "Unlike physical assets, which do deteriorate over time, competencies are enhanced as they are applied and shared. But competencies still need to be nurtured and protected; knowledge fades if it is not used." Against this background, we shall examine the case of Alpha Corp.

3 Research Site and Methodology

In order to understand Alpha Corp.'s strategies, for maintaining competence within the organization while engaging in an outsourcing partnership, an interpretive case study [26, 27] was performed at Alpha Corp and Remote Diagnostics Centre (RDC). The rationale behind selecting the research sites was their willingness to cooperate, the availability of multiple sources and the possibility of purposeful sampling [28, 29]. There were two rounds of interviews carried out. The first round occurred in 2003-2004, during which we followed the initial discussions in forming the partnership between Alpha and RDC. The second phase of the study was conducted in 2006, when we revisited the organizations and followed up on the development of the partnership, explored the companies' strategies for maintaining the partnership and establishing trustful relations, and the impact of technology on the organizational transformation.

The author and another project member collected data through a mixture of techniques including semi-structured interviews and document reviews [28]. Together we performed 31 interviews with people from both Alpha Corp. and RDC and visited the industrial sites where the remote monitoring technology was in use. The respondents ranged from technical staff and maintenance personnel to division managers and corporate executive officers from both organizations. The interviews had one structured part with a framework of questions concerning the partnership, the technology, and the organizational impact of the outsourcing solution and technology introduction. Moreover, there was an unstructured element with follow up questions and questions that emerged from previous interviews, documents and meetings. All interviews were recorded and then transcribed. We also examined documents and minutes from internal meetings. The data was read through and cross analyzed before being coded into categories concerning the partnership and the technology and their relation to organizational transformation and strategy. This was done by finding patterns in the data and statements that could be grouped together.

In this paper, the different categories that emerged from the empirical data are presented as three separate strategies used by Alpha Corp. to maintain competence within the organization while opening up for virtualization. Some specific quotes from the interviews are used to highlight certain discussions, but for the most part, the material constitutes the overall findings from the interviews. The conclusions that are drawn are based on the patterns that emerged in the coding process. As recommended by Miles and Huberman [30, p. 278] a preliminary copy of the results was presented to and circulated among the interview respondents to ensure credibility and authenticity of the research.

4 Strategies for Maintaining Competence

Alpha Corp. is an international high-tech minerals group with mines, processing plants, and harbors in Sweden and Norway. The company has about 3500 employees. As a part of a larger reorganization strategy, Alpha Corp. has developed a strategic vision of improving service and maintenance work in order to increase production without investing in new machinery. As a part of this, Alpha has increased spending on equipment monitoring and preventive maintenance from 3 million SEK to 11 million SEK and formed an outsourcing partnership with RDC. Since Alpha's competitive advantage is highly dependent on having a skilled workforce, maintaining a high level of competence is central to Alpha's survival. In order to do this, Alpha has three strategies that are meant to not only maintain but also increase competence. The first is exploiting the full potential of its partnership with RDC, the second is heavy investment in information technology, and the third is structured and systematic maintenance.

4.1 Gaining Competence from the Partnership

RDC was created as a joint venture between Alpha Corp. and two of its long term business partners. Alpha Corp., who initiated the establishment in 2003, owns 20% of the company and is its first customer. RDC's business concept is to provide advanced condition monitoring of machinery and equipment all over the world. Initially Alpha Corp. was the company's only customer, but in the business plan it is clearly stated that within a couple of years RDC should expand and take on new customers. Alpha encourages this planned expansion as they hope that it will lead not only to shared costs but also to an increased level of competence as RDC learns from other organizations and brings that knowledge back to Alpha.

Alpha also expects RDC to be an active partner. Building and verifying knowledge through close inspections of damaged machinery is seen as a way for RDC to increase its competence. Alpha also sees that RDC should be able to maintain a broader competence than Alpha's staff, and RDC is also contracted to educate Alpha's staff on vibration analysis, the method used to detect damages within the machinery. The knowledge that RDC gains from monitoring Alpha's machines is thus brought back to the organization. Furthermore, Alpha expects RDC to provide input when new plants are being built, based on their expertise in remote monitoring. In return, Alpha opens up its organization to RDC and gives them full access to the machines and technological infrastructure. RDC can use Alpha machinery to increase its own level of competence by trying out new methods and technologies in a real setting. In that way, the partnership proves to be mutually beneficial.

When RDC was established, Alpha recruited some of their own employees and moved them to the new company. A reliable member of the group was made CEO. This was a strategic move to establish trust. However, not all of RDC's employees came from Alpha, and a strict business contract was also written to regulate the partnership. Alpha has a designated person who is in charge of the contract with RDC and who is to ensure that they deliver what they have promised. This move of personnel, however, also meant the move of some specific competence from the maintenance organization to RDC. One way that Alpha tries to handle this outflow of competence is by investing in information technology.

4.2 From Senses to Sensors

Alpha's strive to become a leading minerals group has been very technology driven, as there is a strong belief that IT will lower costs and increase production. Preventive maintenance and remote monitoring is seen as one way to increase knowledge and enhance performance. However, although Alpha Corp. recognizes the importance of data collection and analysis they also state that they do not have the time to become good analysts. This is instead outsourced to RDC. Many of the respondents at Alpha want more integration between the two companies. They want a common interface where information is shared, and steps have been made in that

direction as RDC will have access to Alpha's new maintenance system. Alpha sees large opportunities for knowledge recycling if the information and experience that now is within RDC is made available to Alpha. Again it is the reciprocity of the partnership that is expected to give both organizations advantages. Increased transparency through the use of a common platform and interface is a step in that direction.

Alpha is also investing a lot of money in sensor technology. In the past 20 years, they have increased the number of measuring parameters from three to 33. They have also increased the number of points of measurement from about 100 to more than 15,000. Currently, Alpha is collecting and storing data from all parts of the production process. By transforming the maintenance organization and making it dependent on sensor technology instead of on the use of the senses, Alpha expects to be less reliant on skilled individuals and instead have the knowledge stored in the maintenance system for the entire workforce to share. This is seen as a strategy to maintain competence but also as a strategy to increase the level of competence as more people gain access to information faster. This is of course dependent on people actually using the system in the way it is intended and performing maintenance in a structured, systematic way.

4.3 Transforming the Maintenance Organization

In recent years Alpha has undergone an extensive maintenance make-over and focused on systematic, preventive, and structured maintenance. For this purpose, Alpha has put a lot of time, money, and effort into creating a single maintenance system that is to be used by everyone that comes into contact with the machinery, including RDC. Structured maintenance also means that everyone should know what is expected of them, which duties to perform, and when they should be done. Predictability is highly regarded as that is seen as a way to avoid costly, unexpected stops. Furthermore, the staff should feel engaged in their work. Again, Alpha expects to be able to use the partnership to achieve this. RDC is seen as a potentially positive influence on Alpha's staff as the company helps put the focus on preventive maintenance and can show how the use of technology can improve maintenance work.

Alpha's staff sees a great potential in how maintenance is organized in the outsourcing partnership. To have the condition monitoring focused in one organization, such as RDC, means that the collective knowledge will be high. It also makes it possible to specialize in this area, which could not be done, when the competence resided within individuals spread across the different production units at Alpha. Thus, by moving the competence from the internal organization to the external service provider, several Alpha employees actually argue that the level of competence has increased. Another benefit is that RDC's staff is constantly available with access to backup. It can of course be argued that Alpha could have created RDC as a service division within the company and gained these same benefits through insourcing instead of outsourcing. However, Alpha strongly insists that since RDC is

an external partner, their opinions and analyses have more leverage than if they were an internal division. Several division maintenance managers state that they use RDC reports to exert pressure on their own organization, to ask for more money, and to inspire their staff. They are convinced that this would not have been possible if RDC had not been a separate organization.

5 Discussion

The FORT framework developed by Kishore et al. [1] suggests four different types of outsourcing relationships with varying degrees of involvement/ownership substitution and strategic impact. The first two types of relationships, support and alignment, have a low extent of involvement. Such outsourcing relationships tend to be short termed and project specific: “Clients generally control the specification, design, and implementation aspects of outsourced projects and services and these relationship, therefore, do not entail transfer of skills to the client firm or training of the client firm’s personnel” [1, p. 89]. The other two types of outsourcing relationships, reliance and alliance, on the other hand, entail a high extent of ownership substitution. The client organization invests heavily in service provider-specific assets, such as technology, infrastructure and skills. In an alliance type relationship, the strategic impact of the service provider on the client organization is high, which calls for a high degree of mutual inter-organizational trust in order for the relationship to hold. “Moreover, the impact of the alliance relationship on the organization and the degree of lock-in with the particular service provider is so large that it is usually difficult to reverse this relationship” [1, p. 90]. In such a relationship it is therefore crucial to achieve goal symmetry between the two parties so that they engage in mutually beneficial behavior, and to manage the notion of distance as described by Chudoba et al. [16] in order to maintain trust.

This paper attempts to expand and build on the framework provided by Kishore et al. [1]. The findings from the study provide support for the authors’ description of an alliance type outsourcing relationship. Alpha Corp. and RDC refer to themselves as strategic partners, the degree of ownership substitution is high and the strategic impact of the partnership is considerable. If RDC fails to do a good job, Alpha risks a complete factory breakdown. As the relationship is difficult to reverse, it is essential that there is mutual trust and understanding between the two organizations. The FORT framework is useful in providing an understanding for the mechanisms of different outsourcing relationships. However, it merely touches upon the issue of competence. When two organizations become intertwined in an alliance type outsourcing relationship, there is an apparent risk of competence-loss from the client organization as skills are moved from residing within the organization to the external supplier. While engaging in such a partnership, it is therefore important to identify and secure strategies for minimizing the knowledge-drainage on the client organization.

Alpha Corp. has three different strategies for maintaining the competence within the organization even while engaging in the outsourcing partnership. The first is a

focus on the potential gains from the partnership, where Alpha has high hopes on the benefits of the partnership. The second strategy is a focus on technology, where investment in a common platform and interface is to increase transparency and enable the exchange of knowledge. The third strategy is to maintain a structured and systematic maintenance organization. According Alpha, these three strategies have already been successful, as the number of unplanned maintenance stops have decreased and production has subsequently increased. Furthermore, the partnership has provided Alpha with new insights about its own organization and improved its workforce. Both Alpha and RDC state that they are very happy with the partnership and that they look forward to even closer integration.

However, letting someone else handle a strategic business asset poses a risk as the organization opens up and exposes its core to a third party leaving itself very vulnerable [11]. It has to be a win-win situation in order for the partnership to work, and while client organizations may relatively easily see the benefits of the partnership, service providers might prove to be more skeptical as they enter into a long time commitment [23]. One emergent problem is how to handle issues of responsibility. Alpha prides itself on its structured organization, but as it opens itself up to the partnership it will be increasingly difficult to determine who is responsible for what. A move towards a more integrated relationship also means the blurring of roles and functions. This is something that should not be ignored, as it is potentially detrimental to both organizations.

Gallivan [6] speaks of the virtual organization where internal business processes are outsourced to an external strategic partner in a partnership-like relationship. However, he argues that trust is not a critical element for virtual organizations. Instead, he states, "Given a set of practices to ensure the control, efficiency, predictability and calculability of processes and outcomes in virtual organizations, effective performance may occur in the absence of trust" [6, p. 277]. Based on my study, I disagree with this statement. Alpha has made the move towards a heavy reliance on technology and strives to replace its dependency on individual team members by embracing a new maintenance system that should contain the sum of all individual staff knowledge. The manner of use is highly specified, and one would expect that this given set of practices ensures effective performance. However, Alpha admits to having problems with getting people to use the system. Either they do not enter all relevant data, which means that certain calculations and analyses cannot be performed, or they ignore warnings that the system sends out, since the machines appeared to be working well when they last walked by them. This is attributed to a long preserved distrustful attitude towards technology and towards management. Without trust, there is no efficiency, predictability, or calculability, as workers do not behave in accordance with the control mechanisms. This attitude also initially showed in Alpha's workers' relationship with RDC. The service provider can detect erratic behavior in a machine long before it actually causes a breakdown. Many Alpha workers therefore did not initially believe in RDC's reports and listen to their warnings. However, with the support of the managers, RDC has had the chance to prove that their analyses have been on target, by letting a machine run until it breaks down and then picking it apart and analyzing the cause. This has been a very

effective strategy and has led to a certain change of attitude and a trustful climate. As a result, both Alpha and RDC now get more out of the partnership than they initially did as members from the organizations work more as a team than as two separate entities with specific tasks to perform. Although the partnership is regulated with contractual control measures, mutual trust has proven to be very central to the success of the relationship.

The outsourcing of certain services is a way to provide the organization with a skilled, up-to-date workforce [24]. An outsourcing partnership is also a commitment from both parties as the organizations enter into a long-term relationship where mutual dependency increases with the passing of time. The competence that is built up within the partnership is unique to the collaboration and not easily replaced by someone else [25]. For Alpha this poses a slightly higher risk than for RDC. If RDC were to go out of business or move on to another partner, Alpha not only loses a competent partner, the company has no internal resources to turn to. A strategy to prevent this total loss of competence is to make sure that RDC educates Alpha's staff in its methods of measuring and analysis, in line with Prahalad and Hamel's [20, p. 82] claim that, "competencies are enhanced as they are applied and shared." However, most of Alpha's staff state that as long as they have a general idea of what remote monitoring is about, they now see the opportunity to focus on other issues and are not interested in a deeper understanding of what RDC is doing. Chudoba et al. [16] state that distance appears to make it more difficult to maintain trust. However, in the case of Alpha Corp. and RDC it seems as if the trust that has developed between the two organizations might actually help maintain the distance between them and discourage the sharing of competence. This relationship between distance, trust and competence should be further explored in future research.

RDC is currently very satisfied with the partnership with Alpha as they have full access to the different machines where they are free to perform experiments and develop their methods. However, what will be the incentive for maintaining the close ties with Alpha when RDC has evolved and taken on new customers? Today the partnership is in part based on trust, in part based on contracts. Which aspect will be dominant as the partnership evolves and what will this do to the competence level at Alpha? I believe that the answer lies within Alpha's own organization and their capability to engage their co-workers, as it is the only way that they are going to keep competence within instead of doing without. Gaining competence from the partnership, increasing the use of technology, and structuring the maintenance organization all depend on the willingness of Alpha's co-workers to embrace and employ these strategies. By doing so, the alliance can blossom and competencies can be both nurtured and protected.

6 Conclusions and Suggestions for Future Research

This paper is an illustration of the warning finger raised by Prahalad and Hamel [20, p. 82]: "Unlike physical assets, which do deteriorate over time, competencies are enhanced as they are applied and shared. But competencies still need to be

nurtured and protected; knowledge fades if it is not used.” The aim of the study was to address the issue of partnership outsourcing as it grows from the use of new technology and to explore strategies that are used to keep the competence within the client organization even as it opens itself up to the partnership. Based on the above discussion, I conclude:

- The outsourcing relationship between Alpha Corp. and RDC follows the characteristics for an alliance-type relationship as described by Kishore et al. [1]. The extent of ownership substitution and strategic impact is high and the relationship is based on mutual trust.
- The way for a client organization to maintain and potentially increase competence, while engaging in a partnership outsourcing relationship with a service provider, is to maintain an inspired and engaged workforce.
- Alpha Corp.’s strategies for maintaining competence can only be successful if the organization fully engages in the partnership and treats it as something of highest strategic importance. In that way the reciprocity of the partnership will help preserve competence.

This study has also shown that as the organizations move towards deeper integration the concepts of trust and control are highly central to the discussion of partnership outsourcing. Future research should therefore be concentrated on exploring these issues in order to better understand the workings of such relationships. The relationship between distance, trust, and competence would also benefit from further research, as would the role of technology in forming and maintaining the partnership, since they are important factors in providing a richer picture of this phenomenon.

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