# Exploring the Transition Phase in Offshore Outsourcing: Decision Making amidst Knowledge at Risk

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## Abstract

We explore the transition phase in information system (IS) offshore outsourcing, focusing on ongoing decisions made in a client-vendor arrangement and the implications these decisions have for knowledge at risk. Drawing on time-compression and knowledge at risk literatures we argue that firms will need to make ongoing transitional decisions over time as knowledge intensive work is increasingly handed over from client to vendor. We conduct a longitudinal exploratory case study of a strategic development project transitioned from a European client to a company in India over a 4-year period. Analysis indicates: (1) four distinct phases of the transition: penetration, embedment, ramp-up and stabilization; (2) how transitional decisions and knowledge at risk vary across these phases. Results from the longitudinal approach have implications not only for understanding the 'what' and 'how' in IS offshore outsourcing but also for a deeper insight into the 'when' question.



**Keywords:** Offshore outsourcing; transitional decisions; knowledge at risk; India; longitudinal case study

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## Introduction

Information systems (IS) offshore outsourcing has become an important source of advantage for companies that seek to become - and remain - competitive in the globalized economy. In order for IS offshore outsourcing to be effective from locations such as India, it is essential that knowledge is transferred from the onshore client organization (hereafter 'client') to the offshore vendor firm (hereafter 'vendor'). Because the vendor initially lacks client-specific experience (Aydin et al., 2010; Lacity and Rottman, 2009), this transfer is needed to enable vendors to contribute to productivity gains for clients (Chang and Gurbaxani, 2012). According to Beulen et al. (2011), offshore outsourcing involves the transfer of organization-specific knowledge regarding processes and procedures from the client to the vendor, in addition to technology-specific knowledge. Mechanisms such as onshore placements of vendor staff, as well as formal training in client systems and processes, are necessary because they enable vendor staff to understand the client and work in the best interests of the client (Williams, 2011).

Scholars have noted how this knowledge transfer has an important temporal component, a sequential learning process that entails ongoing decisions to increase or decrease the proportion of activities relocated over time (Maskell et al., 2007; Niazi et al., 2016). Consequently, scholars in the IS field have begun to study characteristics of the transition period in which these decisions are made (Beulen et al., 2011; Kotlarsky, Scarbrough and Oshri, 2014; Tiwari, 2009). In the current study we define the transition period as the period of time in which knowledge and capabilities are handed over to a vendor firm in order for the vendor firm to perform for the client. The transition period starts immediately after the contract is signed between client and

vendor (Tiwari, 2009) and sets the initial conditions for building sustainable high-performing teams, able, ultimately, to contribute to innovation and quality as well as to implement cost-savings for clients (Beulen et al., 2011). The transition period sets the stage for the overall success of the relationship between client and vendor.

In the current study, we examine the transition period from the perspective of 'knowledge at risk' and the need for ongoing decision making throughout the transition period to manage knowledge at risk. The knowledge at risk perspective addresses situations in which knowledge becomes a liability or a risk. In the context of offshore outsourcing, knowledge at risk relates to situations which can lead to actual knowledge loss and suboptimal performance of the offshore outsourcing arrangement, such knowledge being related to the core competences and skills that fundamentally contribute to the client's competitive advantage (Ahmad et al., 2014).

Research has highlighted the consequences of knowledge at risk in offshore outsourcing, which can include loss of client productivity (Ahmad et al., 2014), reduced client competitiveness (Hoecht and Trott, 2006b) and poor responsiveness to market changes (Bhali and Rivard, 2005; Gewald and Dibbern, 2009). Nevertheless, our literature review revealed that, even though IT outsourcing (ITO) risks have been studied in depth (Liang et al., 2016), there has been little research to date on ongoing decisions made in offshore outsourcing transitions to manage knowledge at risk. Lacity and Willcocks (1997, 1998) conducted some of the earliest research in the field, highlighting competences that organizations need to develop in order to succeed in IS sourcing. Comprehensive literature reviews (Chadee and Raman, 2009; Lacity et al., 2009, 2016) point to knowledge transfer and knowledge retention as "perennial, prickly, future challenges" (Lacity et al., 2009, p. 142) and have called for more research from the vendor perspective, especially vendors from less-developed countries (Lacity et al., 2016).

Additionally, there has been little research on the subject of knowledge at risk within the context of client – vendor arrangements during the transition period. This period is crucial to the overall success of offshore outsourcing but is considered the most challenging (Kotlarsky et al., 2014). Furthermore, the academic attention it has received is limited in terms of the depth it goes into within the transition phase and the extent to which it deals with knowledge at risk (Beulen et al. 2011; Kotlarsky et al., 2014; Tiwari, 2009). For instance, Kotlarsky et al. (2014) viewed the transition period in terms of three 'waves'; a wave being defined in advance within the overall project plan as a group of applications to be transitioned from client to vendor. Tiwari (2009) developed a three-phase transition period process model for offshore outsourcing (familiarize – adapt – accelerate), but did not explicitly capture knowledge at risk over time.

We address these limitations in the current paper by exploring knowledge at risk over the time period in which knowledge-intensive work is increasingly 'handed over' from a client firm to a vendor firm in India following the signing of an offshore outsourcing contract. Our central question is stated as: how does the transition period in an offshore outsourcing arrangement unfold in terms of ongoing decision making and the management of knowledge at risk? Drawing on insights from time-compression diseconomies theory (Dierickx and Cool, 1989; Cohen and Levinthal, 1990; Vermeulen and Barkema, 2002; Cool et al., 2012) - which suggests that an organization will be better off if it spreads learning efforts over a longer period of time instead of compressing it into a short period - we argue that it is not only an issue of knowledge transfer over *distance* that can impact the performance of an offshore outsourcing arrangement, but also an issue of knowledge transfer over *time*. We conduct a longitudinal exploratory case study, analyzing 181 weekly project status reports that were recorded by a software development team in a vendor firm for use by both the client and the vendor, and augment this with insights from

the engineers and managers involved. Such reports are a useful source of information on the ongoing decisions made as the transition progresses; they provide valuable insight into how knowledge transfer decisions are compressed over time. Using this approach, we respond to recent calls to study knowledge transfer as a long-term process (Liang et al., 2016; Park et al., 2011) and we also bring a dynamic angle to the subject of decision-making amidst knowledge at risk within the context of offshore outsourcing.

There are two key areas of findings. Firstly, the case analysis reveals four distinct phases of an offshore outsourcing transition, which we label: penetration, embedment, ramp-up and stabilization. These phases describe the chronological structure during which decisions relating to knowledge 'hand over' from the client to the vendor are made. We locate a 'ramp-up' point after which all IS activity for the project is performed by the vendor in India. We note this resembles a "go-stop" cycle as caused by absorption constraints within time compression diseconomies theory (Cool et al., 2012). While the presence of such a point in time is found in prior studies (Kotlarsky et al., 2014; Tiwari, 2009), our findings differ from these studies because, in our case, the precise point in time was not planned at the outset, and it appears to be associated with a dramatic reduction in knowledge at risk. Secondly, we identify how the client firm's knowledge at risk and the subsequent decisions to adjust the proportion of work sent offshore vary across the phases during the four-year transition period. Findings suggest the highest level of absorption constraints (Cool et al., 2012) occur during the embedment phase, prior to a 'ramp-up point'. This embedment phase is a critical period of time in which the vendor is most restricted in terms of its ability to process an increasing volume and complexity of client requests. Only when this is under control do we see the vendor's decision to accept and execute the 'ramp-up'. While this has some similarities with Tiwari's (2009) description of adapt and

accelerate phases, our findings differ as the timescales involved in our study ran into years as opposed to months, and also we highlight the risk to clients prior to ramp-up.

Our analysis contributes to the literature on knowledge transfer and decision-making in offshore outsourcing. We provide new insight into how time is structured during transition by getting inside the transition phase itself and allowing hard project status data to inform our understanding of the reality of transition. We add to the literature on the temporal nature of offshore outsourcing transitions by showing how knowledge at risk and ongoing decisions change over time. By focusing specifically on the time dimension, we extend the work of previous scholars who have examined knowledge management risks (Trkman and Desouza, 2012; Marabelli and Newell, 2012), including work in international offshore outsourcing from a distance perspective (Niazi et al., 2016). In this sense, our study advances understanding of decision-making in offshore outsourcing by arguing that ongoing decisions to address knowledge at risk are a key feature of the phenomenon and are dynamically evolving as a result of the interactions and learning between teams spread out over vast distances. It also extends work in the field of knowledge management that has emphasized the need for ongoing flexibility in knowledge management arrangements (Pan and Leidner, 2003; Ranganathan and Balaji, 2007), as well as answering calls to examine new issues surrounding the processes involved in knowledge management with IS research in the 21st century (Alavi and Leidner, 2001). Furthermore, the present study provides support for the use of time compression diseconomies theory in the analysis of knowledge-related phenomena and client-vendor transitions within offshore outsourcing, something that prior research into offshore outsourcing has not done.

## Knowledge Transfer and Knowledge at Risk in Offshore Outsourcing

The study of knowledge transfer has received immense attention in the academic literature (e.g., Argote and Ingram, 2000; Argote et al., 2003; Bae and Koo, 2008). Scholars have investigated knowledge transfer from various angles, including the role played by the context in which knowledge is transferred (Tsai, 2001; Wathne et al., 1996), the perspective of knowledge taken (practice versus structural/cognitive) (Marabelli and Newell, 2012), the role of the individuals involved (Levin and Cross, 2004; Bae and Koo, 2008), the role of information technology (Pan and Leidner, 2003), the nature of knowledge (Simonin, 1999), and the role of 'fit' between context, units (such as individuals, groups and organizations), and the nature of the knowledge (Argote et al., 2003). Ko et al. (2005) described how, while there have been many definitions of knowledge transfer, there has been consensus that knowledge transfer occurs when knowledge is shared (by a sender) and utilized (by a recipient). In other words, knowledge transfer describes the process "through which one unit (e.g. group, department, or division) is affected by the experience of another" (Argote and Ingram, 2000, p. 151).

While much of the literature portrays the benefits of knowledge transfer, scholars also have highlighted problematic aspects, such as reduction in competitiveness that one party (the 'sender') can suffer as a result of a decision to transfer knowledge (Trkman and Desouza, 2012; Brunold and Durst, 2012; Edvardsson and Durst, 2014). Others have highlighted how, once knowledge has been transferred, both sending and receiving parties may suffer from a loss of knowledge (Ranganathan and Balaji, 2007), disrupting business operations (Alaranta and Martela, 2012). Scholars recently have lamented that the study of the downsides of knowledge transfer represents a rather neglected field of investigation (Trkman and Desouza, 2012; Jiang et

al., 2013) despite the fact that eminent scholars in the field earlier described the transfer of knowledge involving people as one of the most challenging (Argote and Ingram, 2000).

Knowledge at risk in the context of offshore outsourcing is present when there are situations that lead to actual knowledge loss and suboptimal performance of the client-vendor arrangement, with a potential erosion of the client's competitiveness (Ahmad et al., 2014). This is worrisome in offshore outsourcing; the sender shares but the receiver does not properly internalize and/or utilize the knowledge in the way the sender intended (Martinez-Noya et al., 2013; Williams, 2011). This puts the client in a vulnerable position because the knowledge transferred might become obsolete and no longer nurtured (Bustinza et al., 2010; Mahmoodzadeh et al., 2009). Clients face the prospect that capabilities and knowledge may be lost as a consequence of transitioning work to an offshore outsourcing vendor (O'Donoghue and Croasdell, 2009; Martinez-Noya et al., 2013;). In such situations, the strategic decision to engage in offshore outsourcing may even be challenged: what once was a knowledge asset becomes a knowledge liability.

It is also possible these risks will be heightened in situations where clients and vendors happen also to be competitors (for example if they are engaged in co-opetition). In situations where clients and vendors are not competing for the same customers and where the IT operations being outsourced are not strategically important, risks will be lower. Risks will also depend on the scope of outsourcing, for example, determined by whether only maintenance is outsourced or whether full system development is outsourced as well. Furthermore, differences in languages, nation and organizational cultures, time-zones, laws and legal systems as well as vendor opportunism supported by geographic distance (Ranganathan and Balaji, 2007; Cheng et al., 2016) can in combination contribute to the occurrence of knowledge at risk.

Table 1 provides a summary of key contributions with regard to the knowledge at risk perspective as found in the offshore outsourcing literature. As illustrated in Table 1, the literature gives insight into important 'what' and 'how' questions relating to knowledge transfer and knowledge at risk in offshore outsourcing. However, we note that there is a lack of insight in the knowledge at risk literature on how time is treated in analysis of offshore outsourcing transition, i.e., the 'when' question and the timing of decisions throughout the transition period. Conversely, scholars that have studied the transition period in offshore outsourcing have not engaged with the knowledge at risk perspective in any depth. Kotlarsky et al.'s (2014) analysis of transition was at a slightly higher level as it looked at groups of applications transitioned in waves in a pre-planned manner. This study stressed the impact of knowledge boundaries on codification in environments such as offshore-outsourcing. Tiwari's (2009) process model of offshore outsourcing transition had three phases: familiarize, adapt and accelerate and did highlight challenges such as limited availability of experts, lack of motivation and application of appropriate knowledge transfer tracking tools dedicated to knowledge transfer. However, there was not explicit treatment of knowledge at risk.

*** INSERT TABLE 1 HERE ***

### *Raising the 'When' Question: Time Compression and Absorption Constraints in Offshore Outsourcing*

Most literature on knowledge transfer between clients and offshore vendors within offshoring relationships highlights various forms of distance as a cause of knowledge at risk (e.g., Avison and Banks, 2008; Beulen et al., 2005; Cheng et al., 2016; Chua and Pan, 2008; Henley, 2006;

Mishra and Mahanty, 2016; Niazi et al., 2016; Youngdahl and Ramaswamy, 2008). The recently emerging transition literature suggests there is an alternative perspective related to the timing of ongoing decisions (i.e., the 'when' question) that has not received adequate attention. A vendor may not be able to respond effectively to new client requests because it has *not had sufficient time* to accumulate and internalize client knowledge and develop the capabilities needed to deal with the requests (Tiwari, 2009). Underlying this are decisions made by clients and vendors working together relating to task volume (where the vendor's capacity is full and work needs to be prioritized) and task complexity (the vendor needs additional training and capability development to fulfill the task). Consequently, the phenomenon of time-compression in offshore outsourcing raises an alternative way of understanding outcomes in this context.

We argue that clients can be put in a vulnerable position because of the effects of time-compression diseconomies (Dierickx and Cool, 1989): the pace in which decisions are made to attempt to transfer knowledge to vendors and draw on vendors in search of superior performance. If vendors are not ready or able to absorb new knowledge from the client (e.g., because they lack business knowledge of the client), then productivity will suffer (Mishra and Mahanty, 2016). According to theory of time-compression diseconomies, people are limited in their ability to learn quickly (Simon, 1959; Vermeulen and Barkema, 2002). It takes time for people and teams to learn, to assimilate their new experiences and grasp what worked and what did not work well (Cohen and Levinthal, 1990). Dierickx and Cool (1989) argued that the stock of assets in a firm is acquired gradually – or accumulated - over time (reputations take time to build, know-how takes time to develop and nurture).

We can apply this reasoning to knowledge transfer within offshore outsourcing: Absorptive capacity - the ability to recognize the value of new information, assimilate it, and

apply it to commercial ends (Cohen and Levinthal, 1990) - in a vendor team is developed over time. Consequently, the ability of a vendor team to absorb and utilize new client knowledge – which is a resource accumulation process - is bounded by time. Cool et al. (2012) discussed time dependency of resource accumulation in terms of three characteristics: productivity (the rate of producing a certain output), cycle time (the overall time to produce an offering that will be accepted by a client), and absorption constraints (limits to the bandwidth that firms have for handling new projects). While increases in productivity and reductions in cycle time may bring products to market earlier, absorption constraints reduce firms' ability to deliver because there will be limits to how firms can learn and apply new knowledge under time pressure. High speed can have a detrimental impact on successful outcomes in unpredictable environments (Chen et al., 2012).

Collectively, these studies suggest that reaching an optimal performance in an offshore outsourced arrangement will not be trivial or possible to achieve 'overnight'. Client-specific knowledge such as contextual business knowledge (awareness of the client's overall business strategy, external competitive environment, existing and planned products and services, internal organizational structure), as well as project specific specialist knowledge – such as system architecture in software development (Williams, 2011), all get transferred over time, not just over distance. Decisions to transfer client knowledge to vendors at greater speed can face resistance and possible performance problems because of vendor absorption constraints.

Furthermore, as offshore outsourcing projects differ in terms of their characteristics and goals, issues relating to project transitions are likely to differ among project teams (Kedia and Lahiri, 2007), even within a single client – vendor relationship. Offshore outsourcing contracts between client and vendor firms are underpinned by discrete projects involving the formation of

new teams, staffed partly from the client firm, and partly from the vendor firm (Lacity and Rottman, 2009). Knowledge at risk at team level occurs when a client team's expectations of vendor team performance exceed the reality of what the vendor team can do. A client team's knowledge is at risk in this situation because it would have gone through the process – over time - of articulating tacit knowledge for new requirements and requests in the expectation that the vendor team will be able to work on them, only for work on such requests to be put on hold or delayed. At some future point when the vendor team is able to process and deliver on the request, the assumptions underlying the requirement may have changed, key personnel on the client side may have left the team as a consequence of downsizing, and vendor personnel that understood the client situation at the time the request was made may have moved on to new projects in other teams. It is also possible that the competitive forces in the client's industry have changed such that the specification of the original request has become 'out of date'. In essence, the delay caused by the vendor team's absorption constraints puts the client in a vulnerable position and its knowledge at risk.

### *Ongoing Decisions within an Offshore Outsourcing Transition*

The literature review on knowledge at risk and time compression diseconomies suggests a number of key decisions need to be made by the client –with support and input from the vendor – during an offshore outsourcing transition. The four areas identified here assume two important decisions have already been made. These are: (1) to engage in offshore outsourcing for a specific project / system development activity, and (2) to use a specific vendor in an offshore location for this work (Chadee and Raman, 2009; Liang et al., 2016). However, subsequent decisions will still need to be made on an ongoing basis, relating to: (1) the evolving role that the client-side

onshore team will have in transition governance (Aydin et al., 2010; Beulen et al., 2011; Lacity and Rottman, 2008; Mishra and Mahanty, 2016; Tiwari, 2016); (2) the evolving role that the vendor-side offshore team will have (Mishra and Mahanty, 2016; Williams, 2011); (3) relational governance and how the client and vendor teams will interact and share knowledge, in particular, how much rotation of vendor staff between offshore and onshore locations will take place in order to overcome communications challenges (Lacity et al., 2009; Niazi at al., 2016; Ranganathan and Balaji, 2007; Williams, 2011); (4) the lead person(s) in the vendor team responsible for overseeing knowledge absorption of the vendor team as well as ongoing allocation of tasks offshore (Chang and Gurbaxani, 2012; Liang et al., 2016; Niazi at al., 2016). The literature suggests that ongoing decisions in these areas will be needed to manage knowledge at risk and help ensure an optimum outcome from the original decision to enter into the offshore outsourcing arrangement. A vendor's suboptimal performance may be due to a variety of factors, including lack of absorptive capacity, insufficient time to process information, new and inexperienced team members joining the team, and language and translation issues. Knowledge at risk that emerges as a result of this is not truly captured by prior knowledge at risk literature (Table 1) and is the focus of our exploratory empirical work.

## Methodology

We conducted a longitudinal exploratory case study to explore ongoing decision making and knowledge at risk during the transition of an IS development project that required knowledge to be transferred from a client project team in Europe to an offshore vendor project team in India. The case study approach is ideal due to the process nature of the phenomenon under investigation (Buchanan, 2012; Eisenhardt, 1989; Niazi at al., 2016; Tiwari, 2009; Willcocks et

al., 1999) and our interest in decisions that could put knowledge at risk as a result of time-compression and absorption constraints. The data was triangulated (Yin, 2009) and included (1) archival records (Bryman, 2012) in the form of project status reports – this was the principal data source and gave us insight into the severity of knowledge at risk over time; (2) written comments we received from five vendor engineers and a client project manager – providing insight into ongoing decisions and why knowledge at risk changed when it did; and (3) additional information from the vendor on offshore team composition and leadership – providing additional insight into ongoing decisions on how the vendor coped with the evolving situation. This mix of qualitative and quantitative data sources allowed us to illuminate the central construct (Welch, Rumyantseva and Hewerdine, 2016), in this case of knowledge at risk in the context of IS offshore outsourcing. The assumptions behind our data coding and analysis are given below and the limitations highlighted in the Discussion section.

The client firm was an international information services and consulting company with annual sales greater than $1B. The vendor firm was an Indian provider of IT services with over 40,000 employees. The client and vendor companies were not competitors in the same industry space and had 3 years of experience of cooperation in other projects. Access was established through professional contacts to identify a client engagement manager working for the vendor firm. This manager provided access to one discrete team in the vendor company that had been set up to service a new contract with the client. In other words, this was a new project for the vendor. The project was of strategic importance for the client as it enabled the client to generate substantial revenues from multiple countries. The scope of work involved all software development, testing and ongoing maintenance. At the outset of the project the goal was stated as being all development work conducted by the vendor in India and for all client employees and

onshore contractors utilized in coding and testing work to be re-deployed or made redundant in order to save costs. The point in time at which all development work was to be conducted by the vendor team was not explicitly defined at the outset. The reason for this was the expectation for growing client demands (new work requests) on the combined team. The challenge was therefore twofold: (1) continue to deliver software development service at a high standard, while (2) transitioning the project to the vendor in India. Support arrangements were part of the wider service level agreement at company level and were not covered in the current analysis.

### *Data Collection*

The main source of data we used was the archival records in the form of anonymized project status reports recorded by the vendor team at weekly intervals over a four-year period. This approach follows a stream of research in the field of offshore outsourcing using the offshore vendor as a source for data collection (Rajkumar and Mani, 2001; Williams, 2011). In their literature review, Gonzalez et al. (2006) observed a growth in research into global outsourcing from the perspective of the vendor, although at levels lower than research conducted from the perspective of the client. We also note that other researchers in the IS field have analyzed links between project status reports and various aspects of business risk. For instance, Beeson et al. (2002) documented the process of project status report production, highlighting the role that this process plays in allowing IS projects to continually adjust in dynamic business environments. According to Aubry (2011), a project status report is an artefact of the project management function, a common deliverable that results from multiple information paths and "rich networks crossing many boundaries" (p. 442) in the organization. Furthermore, "a project status report is a means by which the state of health and performance is communicated to those involved" (Aubry

2011, p. 443). In our case, parties from both sides referred to the reports during ongoing project management.

There are multiple advantages of using project status reports for our research. Firstly, the status reports provide chronological structure to the phenomenon over a longer period of time than we would have been able to capture through alternative sources. We could not be present in both onshore and offshore locations over four years (either as direct or participant observers) as transition decisions were made. Interviews suffer from recall bias (Yin, 2009) and can be problematic in settings such in this one, where key personnel frequently rotate in and between organizations or even leave the organizations, and are often difficult to trace (Quan and Cha, 2010). Secondly, the project status reports started from a point in time shortly after the initial contract had been signed but before offshore resources were used for software coding work, meaning our data starts right at the beginning of the transition period (Beulen et al., 2011). Thirdly, project status reports enabled us to reveal temporal patterns during the transition period, something that has evaded scholars to date (Lee, 2012). Fourthly, project status reports are important documents in offshore outsourcing, required by client project managers for transparency on progress and delays in the transfer and uptake of work in the vendor location (Lacity and Rottman, 2008).

We also triangulated this data with additional information from the vendor relating to the composition of the offshore team. There were two important pieces of information here. The first was the overall size of the team, allowing us to calculate the percentage of the combined client-vendor team that was offshore. The second was the characteristics of the person who was leading the offshore team. Both of these sets of variables were found in prior literature to change over time (Tiwari, 2009). Additionally, we also collected: (1) textual written comments from key

vendor staff on their perception of knowledge transfer with the client over time; (2) textual written comments from a client project manager on his/her observations of the different phases of the transition that emerged from our analysis of the project status report data.

### *Data Coding and Analysis*

We obtained 181 status reports, each of which was date-stamped and contained details of IS work packages. There were multiple work packages to each status report. Each work package had a unique tracking number and was a discrete unit of work with a specified deliverable or programming change to be carried out by the vendor team. Each work package represented a decision to codify knowledge articulating the business justification for the software development request as well as the technical specification and testing plans. Work packages therefore contained proprietary, private and confidential information (Currie et al., 2008; Raiborn et al., 2009; Ahmad et al., 2014), commercially sensitive information (Hoecht and Trott, 2006a), knowledge of how systems underpin business strategy (Beeson et al., 2002), and knowledge of the client's critical resources and IP (Quélin and Duhamel, 2003; Hoecht and Trott, 2006b). In essence, work package information represents important decisions made by the client firm in terms of 'what' is transitioned to the vendor and 'when' this transition is to take place.

As summarized in Table 1, scholars have shown how this type of information can become a liability for the client in circumstances such as purposeful acts of betrayal and accidental disclosure (Baccara, 2007; Hoecht and Trott, 2006b). In our case, we are particularly interested in how time-compression diseconomies and attempts to transfer explicit knowledge encapsulated in work packages over time can put this knowledge at risk. We therefore used the

project status reports to assess changes in the pattern of work packages processed by the offshore vendor team chronologically.

We used the following mechanism to assess the pattern of work over time. In agreement with the client, the work packages on each status report were recorded by the vendor team in three categories: (1) *planned* work packages in a given week that have been discussed and agreed by the vendor team to be completed by the specified date, (2) *completed* work packages in a given week, (3) *open* items (work packages requested by the client but unable to be fulfilled by the vendor). We counted the number of work packages in these three categories for each week of data we obtained. We also recorded changes in the vendor team leader, extent of staff rotations (from offshore to onshore), and the percentage split between onshore client and offshore vendor personnel. There were 29 weekly reports that were not provided. Through discussions with vendor representatives, we learned these were immaterial – most were not produced (e.g., over holiday periods) or were merged with other reports. The effect of these missing values was managed in two ways: (1) t-tests and ANOVA-tests across phases treated sufficiently large sub-groups of the dataset to reduce the impact of a small number of missing weeks per sub-group, (2) eight week moving averages for key variables were plotted in order to smooth the effect of peaks and troughs in work package counts to reduce the effect of missing weeks when visualizing the longitudinal data.

We assessed client knowledge at risk in the following way. Our literature review suggested two basic scenarios in which it is possible to assess the client's knowledge at risk once a contract between client and vendor is put into force. Firstly, there is a scenario in which knowledge transferred by the client to the vendor *is* effective and sufficient to enable the vendor to deliver work activities as required and as planned. There is low knowledge at risk in this

scenario as the client is achieving what it set out to achieve as guided by the contract with the vendor. Secondly, the literature suggested a scenario in which the attempt at transfer by the client is insufficient in itself to enable the vendor to deliver work activities as required by the client. Knowledge has been shared but not yet internalized and utilized by the vendor (e.g., Mishra and Mahanty, 2016). The client intends for certain work to be carried out by the vendor that the vendor is unable to deliver. We found support from this in comments from the vendor side:

"*I work within an offshore unit in India and the most challenging part here is knowledge transition as most of the documents sent by the client are in [non-English language]. We do have an in-house translation team but overall this language barrier costs us more time and efforts than I was used to at my previous employer (which primarily served to US based clients).*" (a vendor engineer)

Building on these two scenarios, we assume that with low numbers of open items, and a balance (i.e., equal split) between numbers of planned and completed tasks, there is *low knowledge at risk*. The vendor team is performing as expected and in-line with contractual obligations. In this scenario, it is reasonable to assume that the distance problem common in geographically distributed groups has not been sufficient to cause misunderstandings in communication (Niazi et al., 2016). It is also reasonable to assume that the flow of knowledge that has been transferred over time through work packages between client and vendor team has not been so rapid such that vendor team members have been unable to learn and assimilate their new experiences of the client environment (Cohen and Levinthal, 1990). In other words, the stock of knowledge assets in the vendor team has been accumulated at a pace that has not led to performance problems (Dierickx and Cool, 1989).

However, with increasing numbers of open items, but still a balance between planned and completed work packages, we interpret a moderate level of knowledge at risk. Likewise, with

low numbers of open items, but a positive difference between the numbers of planned and complete work packages (i.e., more planned work packages in a given week than completed ones), we interpret *moderate knowledge at risk*. In these situations, client knowledge has been articulated in the form of work package requests but decisions are made to postpone them (in the case of increasing open items) or to start them but then incurring delays (in the case of planned work exceeding completed work). Here, a significant volume of work packages has been codified but the vendor team is not able to absorb the work. According to the principle of postponement (Bucklin, 1965), there is a "shifting of risk forward to the buyer" (Bucklin, 1965: 27) when a supplier cannot fulfil an order. In our case, we argue that vendor postponement shifts risk forward to the client in the form of increasing client knowledge at risk; there is increased dependency on the vendor in the short term (Quélin and Duhamel, 2003; Adeleye et al., 2004), and, as noted below, potential for loss of client productivity (Ahmad et al., 2014), and reduced client competitiveness (Hoecht and Trott, 2006b) because the individuals from the client side involved in writing the work packages are themselves under threat of being relocated away from the project or made redundant as part of the offshoring strategy. Finally, and extending the previous logic, in situations where there is a high number of open items running concurrently with a positive difference between planned and complete tasks, we interpret a *high level of knowledge at risk*. We assume that the flow of knowledge through the codified work packages has been too fast for the vendor team members to learn effectively (Cohen and Levinthal, 1990). The vendor's stock of knowledge assets concerning the client organization, systems and commercial environment has not been accumulated efficiently (Dierickx and Cool, 1989; Mishra and Mahanty, 2016) and they are not able to perform to a level expected of them by the client.

We examined the description of work packages that were in open status. These included work items related to performance tuning, optimization of database indices, improving the way data was integrated and aggregated, automation of 'feeds' of data between systems, mechanisms for reformatting data, tests to new upgrades for graphical user interfaces and certain types of documentation for client use. Both technical knowledge underlying these requests as well as the business rationale for them was knowledge that was held by non-vendor technical experts within the client organization. These individuals faced the prospect of role re-deployment (to another part of the client organization) or redundancy as per the stated goal of the offshore outsourcing arrangement. Postponing these work packages at a time where the individuals with the technical and business knowledge underpinning the work packages were themselves at risk of leaving the project constitutes a situation of knowledge at risk according to our definition. In other words, it becomes more likely (as opposed to less likely) that knowledge of what can contribute to competitive advantage for the client will be lost (Ahmad et al., 2014). It becomes more likely (as opposed to less likely) that there will be a loss of client productivity (Ahmad et al., 2014), reduced client competitiveness (Hoecht and Trott, 2006b) and poor responsiveness to market changes (Bhali and Rivard, 2005; Gewald and Dibbern, 2009).

## Results

### *Identifying Transition Phases*

Our first finding is that the transition period is a non-linear process of knowledge transfer and increasing take-up of responsibility by the vendor's offshore team. This process is split by a decision point in time we refer to as the 'ramp-up' point. This is the point in time at which the decision has been taken for a complete take-over of ownership for the core knowledge-intensive

activity by the vendor team, and arguably represents the most important decision during the transition. In our case, and unlike Kotlarsky et al. (2014) and Tiwari (2009) which were much earlier, this ramp-up point occurred at the start of the third year of the transition. Prior to the ramp-up point, we note an initial penetration and settling into the client- and project-specific technology and business context by the vendor team. Four phases of the transition are identified, the main characteristics of which are summarized in Table 2. The phases are defined and delineated by a significant change to the team composition, including the offshore team leader, as indicated to us by the vendor.

*** INSERT TABLE 2 HERE ***

In the *penetration* phase, offshore vendor resources were introduced into the project for the first time (in this case less than 30% of total team composition), an onshore placement from the offshore vendor was established and physically located in the client team, regular status reports were set up for articulating the vendor's understanding of work requests and offshore team output. The majority of programming work was, however, still carried out by the client team. According to our key informant on the client side of the project, in the *penetration* phase:

"*When the team is just starting up then issues may arise due to poor understanding of client requirements, due to lack of face-to-face interactions and different styles of communication and this issue is magnified if there is little on-shore resource from offshore vendor*" (client project manager).

Vendor engineers also noted a lack of communication from the client in this phase:

"*We get very few feedbacks/comments from the client expressing their happiness or complaints about the deliverables or quality of work*" (a vendor engineer).

In the *embedment* phase, the offshore composition of around 30% was maintained. However, this phase was distinct from the previous phase in two key respects: (1) while the majority of complex development tasks were still performed by client development staff the client decided that an increasing number of these more advanced tasks should be assigned to the vendor team, and (2) high performing vendor team members were identified and hand-picked to be placed onshore with a key role of acting as coordination points between client project management and vendor personnel. According to our key informant on the client side, in the *embedment* phase:

"*The offshore vendor maintained a 'bench' where [a] talent pool was kept to mitigate risk of staff turnovers and also ability to deploy high performing individuals to profitable projects, the offshore team tried to keep to the schedule by putting extra hours"* (client project manager).

One of the offshore engineers noted how the vendor team came under increasing scrutiny from the client as increasingly complex work packages were assigned to them:

"*Key challenge …. is, [the] client is always look for more visibility in offshore work*" (sic) (a vendor engineer).

In the *ramp-up* phase the decision was made to assign a majority of development tasks (as opposed to a minority fraction) to be undertaken offshore by the vendor. This phase was different to the previous phase in three ways: (1) the client team became completely dependent on the vendor team in order to satisfy work requests; the client team no longer had sufficient resources to carry out the core activity that the vendor team was brought in to undertake (i.e., software development), (2) over 50% of the combined team was made up from offshore vendor staff for the first time, and a re-allocation or termination of employment for onshore client staff engaged in software coding was started; remaining client staff re-focused on work scheduling, throughput control and quality checking, and an increase in the number of vendor staff were deployed onshore to the client's offices, (3) the offshore team was encouraged to undertake a broader

scope of tasks in the software life-cycle beyond coding. These included writing task specifications, integration testing and user documentation.

Our key informant on the client side of the project raised the following issue from the client's perspective in the *ramp-up* phase, highlighting the importance of onshore coordination as the dependency on the vendor increases:

"*If all the technical resources are based offshore, then there is a missing bridge between the project manager and technical team when there is no onshore coordinator who can dissipate client needs to the technical staff in their 'language'*" (client project manager).

Extending this, a vendor engineer noted how the vendor team had taken on more advanced roles (e.g., the "chief architect" role) that were based onshore and interfaced directly with the client:

"*Our onshore team consists of chief architects and they directly interface with the client regularly while we as offshore unit serve to our onshore team.*" (a vendor engineer)

Finally, in what we label the *stabilization* phase, the following distinctive features were observed: (1) the decision was made for an increase to over 70% of the team being made up of offshore vendor staff, (2) all software development work was conducted using vendor resources for the first time, and client team members were responsible for capturing and articulating requirements from the client business organization, communicating and requesting estimates for work, prioritizing and scheduling work and monitoring performance and quality checking of deliverables, (3) the non-coding work now being conducted by the offshore vendor team was maintained and this became a core activity of that part of the team. According to our key informant on the client side of the project, the *stabilization* phase had the highest level of dependency on the vendor although this was offset with an optimal balance of rotated staff:

"*A near-100% off-shore software development model is risky and finding the right onshore – offshore mix is critical for the team's success and continuous and consistent quality deliverables"* (client project manager).

A vendor engineer also made reference to turnover of vendor staff in this phase where dependency of the client on the vendor is at its peak:

"*How well we manage the replacement of an experienced existing person with new person without affecting the client business is important"* (a vendor engineer).

***Variance in Knowledge at Risk over Time***

The second main finding relates to evidence that knowledge at risk varies relative to the decision to enter the ramp-up phase, and is at its highest during the embedment phase. Tables 3 and 4 show how volumes of planned, completed and open items changed pre- and post-ramp-up. T-tests show the mean number of work items planned *and* completed by the offshore team per week to be significantly higher post ramp-up ($p<0.001$). The backlog distribution of open items is not significantly different between pre and post ramp-up. ANOVA tests by phase support the identification of the four distinct phases: post-hoc Scheffe's test reveals the four groups to be distinct for both planned tasks ($F=168.40$, $p<0.001$) and completed tasks ($F=264.62$, $p<0.001$). For open items, the ANOVA test reveals homogeneity between phases two, three and four.

*** INSERT TABLES 3 & 4 HERE ***

Figure 1 shows eight week moving averages for all coded tasks, along with the emerging phases during the transition period. The overall volume of work packages handled by the offshore vendor team increases over time, with the peak performance being in phase 3: ramp-up, when the decision was made to direct all coding activity to the offshore team. During this phase the volume of planned and completed tasks grows initially in tandem, but then planned tasks drop in advance of completed tasks, with the net effect of a gap re-emerging between planned and

completed tasks (Figure 1). Figure 2 depicts another view on the data, showing the vendor team task throughput over the four years (completed – planned tasks) relative to the ramp-up point. This pre-ramp up pattern resembles a "go-stop" cycle as caused by absorption constraints within time compression diseconomies theory (Cool et al., 2012). Table 2 indicates how offshore team lead had limited experience in the current project during this phase, although they did have onshore experience with the client in a separate project.

*** INSERT FIGURES 1 & 2 HERE ***

The mean of planned and completed tasks per week (Table 4) confirms the ramp-up phase had the highest throughput in terms of numbers of work packages executed: the means are higher in the ramp-up phase than in any other phase. Furthermore, there was a larger offshore vendor team and team lead responsibilities became shared between two people. The two people running the vendor team in this phase had gained over 18 months onshore experience with the client on the current project (Table 2). This changed set-up managed to reduce the backlog during the ramp-up phase, with the number of open items reducing to zero during the fourth year. In terms of the difference in planned and completed tasks, the rate of change of this is significantly higher post ramp-up than pre ramp-up ($t=4.687$, $p<0.001$) and ($t=4.784$, $p<0.001$) respectively. According to the ANOVA and post-hoc Scheffe's test, these differences were at their mean highest during the immediate post ramp-up phase ($F=16.764$, $p<0.001$) and ($F=16.324$, $p<0.001$) respectively.

Quotes from our key informants provide additional insight into why work packages were delayed prior to ramp-up, and how they were brought down after ramp-up. According to the client project manager, prior to ramp-up, and despite the vendor's use of a 'bench':

*"… quality of delivery was an issue due to sometimes use of junior team members who did not understand the criticality of particular features or lacked necessary data analysis skills to identify complex data issues or data scenarios"* (client project manager).

However, concerns were seen on both sides: vendor engineers also lamented, that prior to ramp-up:

"*The on-site /off-shore communication is not so effective. We, at off-shore do not know the status of the deliverable once it is delivered to on-site*" (a vendor engineer)

Post ramp-up, the client project manager pointed to the importance of an expanded set of capabilities within the vendor team. This did not only involve locating vendor staff onshore with "chief architect" responsibility (as noted above), it also involved establishing and embedding a testing capability offshore:

*"Someone onshore must perform a round of testing before the user acceptance tests else there is serious risk that the user may discover few basic functionalities which may erode clients' confidence in the software*" (client project manager).

Meanwhile, a vendor engineer pointed to the continued use of a bridge in the onshore location for the effective functioning of the team post ramp-up:

"*on-site person act as a bridge and this is a very important / critical role for the success of the project / application*" (a vendor engineer).

## Discussion and Conclusion

The present study provides new insight into the transition phase in IS offshore outsourcing (Tiwari, 2009; Beulen et al., 2011) by examining how ongoing decisions with implications for knowledge at risk can change over time as the offshore outsourcing arrangement unfolds. One type of decision is at the team level, and relates to the overall composition of the team, how many staff are located onshore and who is leading the team (Table 2). These types of decisions

occur relatively infrequently and set the overall structure for international project work over many months, sometimes years. Another type of decision we find is at the work package level (Figure 1). There is a one-to-many relationship between a project status report and work packages. Decisions are made by the vendor team to 'accept' a new work package for scheduling (we capture this as a 'planned' status). As we also found out, decisions are made by the vendor team to put certain work packages into an 'open' status, unable to be scheduled. This level of decision making occurs on an ongoing basis and is reported in weekly status reports. Our approach departs from prior research on transitions in offshore outsourcing and use hard project status data over a four-year period to gain insight into client – vendor engagement at team-level and augment this with data from the vendor on the team composition, as well as comments from both the vendor and client sides. Our study provides greater depth of insight into the transition period than previous work that looks at whole waves of capability transfer (e.g., Kotlarsky et al., 2014). While we do see continuity of the project transfer from client to vendor, we also see markedly different characteristics across the phases, not just in terms of decisions made about team structure and organization (which supports Tiwari (2009)) (Table 2), but also in terms of different patterns of completed, planned and on-hold work packages (Figures 1 and 2) (which extends the contributions of Tiwari (2009) and Beulen et al. (2011)). Results suggest knowledge at risk varies according to the amount of codified knowledge that the client attempts to pass over to the vendor in a given time period, relative to the vendor's readiness and ability to absorb and utilize this knowledge as the client intended, i.e., the absorption constraints. These client attempts at transferring knowledge are ongoing decisions at the level of the individual work package within a given team, and depending on the complexity of the requests and the absorption constraints of the vendor team, they are met with varying levels of resistance over time.

Our analysis extends the body of literature concerned with risks in offshore outsourcing (e.g., Willcocks et al., 1999; Hoecht and Trott, 2006a) by putting a spotlight on the role played by the compression of activity over time, rather than solely over various forms of international distance and various client and vendor capabilities (Lacity et al., 2016). Our study suggests that theory of time-compression diseconomies (Dierickx and Cool, 1989; Cool et al., 2012; Chen et al., 2012) has a useful place in the field of research on IS offshore outsourcing, in particular concerning how decisions are made that impact knowledge flows and the extent to which client firms become exposed to liabilities that did not exist before the offshore outsourcing contract began (the pre-ramp-up downward slope in Figure 2 would not have occurred in a captive and co-located model). The analysis also extends work on decision-making in offshore outsourcing by shedding light on subsequent, ongoing decisions that take place at team level following the initial decision to enter into an offshore outsourcing arrangement with a vendor in a specific location (Chadee and Raman, 2009; Liang et al., 2016).

The case highlights how, during the transition period, teams from both the client and vendor firms need to adapt and re-construct their roles (which supports Tiwari (2009)), but that their learning and performance will not remain constant. While we provide some support to previous studies that suggest an optimal performance in an offshore outsourced team is not possible to achieve quickly (Beulen et al., 2011; Martinez-Noya et al., 2013; O'Donoghue and Croasdell, 2009), our findings extend this literature by highlighting a critical decision in terms of the decision to enter a 'ramp-up' phase; the juncture of this point can be used to dramatically alter the extent to which knowledge at risk is present within the project. Moreover, our findings contribute to the recent focus on transition management capability (Lacity et al., 2016) vis-à-vis

the capabilities need by both parties to facilitate the decision to enter the all-important 'ramp-up' phase.

We believe that a more careful treatment of the role played by points in time such as this can expand on recent work that integrates knowledge management and risk management (e.g. Trkman and Desouza, 2012; Massingham, 2010; Neef, 2005). The subject of knowledge at risk refers to how knowledge and its transfer between senders and receivers can constitute a liability from the perspective of the party disseminating the knowledge. In the worst case the latter relinquishes its "capacity for effective action or decision making in a specific organizational context" (DeLong, 2004, p. 21). In contrast to knowledge leakage, which is "the extent to which the focal firm's private knowledge is intentionally appropriated by or unintentionally transferred to partners" (Jiang et al., 2013, p. 984) (i.e., the actual loss of knowledge); knowledge at risk occurs in a time period before that loss and within a sequence of decisions made by participating firms. Given this definition of knowledge at risk, we believe that practitioners can benefit by examining how key events within the organizational context of knowledge transfer transpire over time. In our case, we see signs of an 'amplified' knowledge at risk during the embedment phase – a period in which the vendor team struggles to keep up with increasingly complex client requests, and a dampening of knowledge at risk after the ramp-up point – when the vendor team is able to finally get a handle on client requests. It also stresses that the different phases of transition call for different approaches to managing knowledge at risk. Thus firms will need to hone their knowledge management capabilities for offshore outsourcing (Ranganathan and Balaji, 2007) according to the specific phase within the transition period in which a given project finds itself. We join others (e.g., Ranganathan and Balaji, 2007; Lacity et al., 2016) who call for further research on development of capabilities for operational execution that go beyond human

resource management and that also include recognizing the dynamic nature of such capabilities over time.

From a managerial perspective, our study suggests client firms need to be aware that project teams engaged in offshore outsourcing will undergo a time-compressed learning process in which both client and vendor teams will need to dynamically develop new capabilities for managing knowledge at risk. As others have noted, client teams will need to improve their cultural competence, socialization and communication capabilities over time, aspects commonly seen as rooted in the various forms of international distance between client and vendor (Cheng et al., 2016; Niazi et al., 2016). But they will also need to develop skills in assessing the balance between work package requests on the one hand and vendor absorption constraints on the other. This balance will inform decisions about increasing the complexity of tasks for the vendor to work on. Without an understanding of this balance, our study suggests work requests will end up postponed, and the gap between planned and completed work will grow larger. Clients will need to find ways to understand vendor absorptive capacity over time and evaluate the constraints on which vendors can process new work. Vendor firms, likewise, need to be aware that a project-level transition is a process of learning in which expertise and knowledge flow from client to vendor staff organized in teams. There may be periods of time during a transition in which a vendor team is able to assimilate, internalize and act on client knowledge in ways in which the client expects. Conversely, there may be other periods of time in which the vendor team's ability to process new client knowledge is hindered. Vendors should be sensitive to this, as it will signal increasing knowledge at risk from the perspective of the client, with potentially negative consequences for the longer term client – vendor relationship. Understanding the consequences of ongoing decision-making in terms of knowledge at risk in different phases of an offshore

outsourcing transition can lead to a better allocation of resources within the project management framework. Vendors should prepare their teams for the possibility of needing to respond to the issue of client knowledge at risk, at least in certain phases of a transition with new clients, and they should be ready to inform and influence clients that more malleable joint-team structures with an appropriate fit between task content, communications and socialization be considered to minimize the likelihood of knowledge at risk arising. The findings also point to the usefulness of having project management systems that identify and report on knowledge at risk during IS offshore outsourcing through all the phases of the transition. We believe 'hard' project status data, such as that used in the current analysis is extremely useful for this.

Future work can address the limitations of our study as well as investigate new questions that arise as a consequence of our analysis. In terms of limitations, firstly, our study is based on a single offshore outsourcing arrangement. The dynamics of ongoing decision making in the current case may be different from the dynamics in other offshoring agreements in different industries or involving different companies and countries. Future research could compare and contrast accumulation of resources and project status data across different projects, such as projects in which transitions were 'rushed' versus ones that were deliberately executed at a slower pace. Secondly, our research design utilized the perspective of the vendor team. While the vendor's project status reports represented the result of cooperative work between client and vendor, and the work packages reported were originally specified by the client, not the vendor, additional insights still could be gained by more explicitly including the perspective of both parties, including a comparison between client plan and expectation for the overall transition phase with the reality of what actually happened. This would be useful as it could illuminate the actual decision process in terms of how stakeholders interacted and what information they used

when deciding which work packages to submit to the vendor and when. Thirdly, while we examined important decisions made by the client during the transition period, we were not able to capture every type of decision. Future work can explore the micro-level decision making processes within these transitions. Fourthly, we made an assumption that the presence and severity of knowledge at risk in IS offshore outsourcing can be established by examining changes in the number of open work items and changes in the difference between planned and completed work items over time. We did not identify or capture alternative determinants of this effect[1] or other adverse consequences (such as worsening client market performance or erosion of shareholder value) and link these to the concept of knowledge at risk over time. Finally, we did not examine how the congruence between type of interpersonal ties, the nature of knowledge, the organizations and their characteristics contributes to the effectiveness of knowledge transfer in offshore outsourcing arrangements.

Future research could address these issues with alternative research methods and data collection instruments. Furthermore, we believe there are new research avenues that can build on the present study. For instance, there is merit for future research to pursue longitudinal studies of both tacit and explicit knowledge dynamics in offshore outsourcing arrangements to establish how problems of time-compression diseconomies may occur between these fundamental types of knowledge. Future research could also examine scenarios in which ongoing decisions (such as when to invoke the ramp-up point) are either brought-forward or postponed to see the impact that different timings will have on ultimate performance. Another question that could be explored is how different forms of client-vendor distance (geographic, administrative, cultural, economic) interact with time-compression variables such as absorption constraints in explaining knowledge

[1] As Welch, Rumyantseva and Hewerdine (2016: 126) argue, case research needs to be "alert to what a concept obscures as well as illuminates"

transfer. Referring to recent work on capabilities in offshore outsourcing (Ranganathan and Balaji, 2007; Lacity et al., 2016), future research may also focus on the development of offshore outsourcing skills over time aimed at decision making under knowledge at risk. We hope the current study can open the path for researchers to investigate knowledge at risk in international IS projects involving multiple parties and to use exploratory research designs that capture the changing nature of decision-making over time.

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Table 1 – Relevance of Selected Literature on Knowledge at Risk to Offshore Outsourcing

| Key question | Subject of analysis | Contributions |
|---|---|---|
| 1. What types of knowledge are at risk? | - proprietary, private and confidential information | - Currie et al., 2008; Raiborn et al., 2009; Ahmad et al., 2014 |
| | - diffusion of best practice | - Hoecht and Trott, 2006b; Baccara, 2007 |
| | - know-how, competencies, critical resources, capabilities and IP | - Willcocks et al., 1999; Quélin and Duhamel, 2003; Hoecht and Trott, 2006b; Ranganathan and Balaji, 2007; Gewald and Dibbern, 2009; Chou and Chou, 2009 |
| | - relationship knowledge (relational/social capital) | - Quélin and Duhamel, 2003; Adeleye et al., 2004 |
| | - key areas of expertise | - Hoecht and Trott, 2006a |
| | - commercially sensitive information | - Hoecht and Trott, 2006a |
| | - knowledge of how tasks, business units or functions are connected | - Bahli and Rivard, 2005 |
| 2. How could this knowledge be put at risk during a transition period? | - close relationship between the partners | - Baccara, 2007 |
| | - purposeful acts of betrayal | - Hoecht and Trott, 2006b |
| | - accidental disclosure | - Hoecht and Trott, 2006b |
| 3. What is the potential impact of knowledge at risk on clients during offshore outsourcing? | - increased dependency on vendor (the client becomes "locked-in") | - Willcocks et al., 1999; Quélin and Duhamel, 2003; Adeleye et al., 2004; Osei-Bryson and Ngwenyama, 2006; Chou and Chou, 2009 |
| | • competitive advantage becomes more dependent on vendors | - Hoecht and Trott, 2006a |
| | • ex-post exploitation because of asset specificity | - Bahli and Rivard, 2005 |
| | • relatedness, i.e. the performance of one piece of work depends on the completion of other pieces of work | - Bahli and Rivard, 2005; Belcourt, 2006 |
| | - reduced quality concerning the outsourced business activity | - Quélin and Duhamel, 2003; Bahli and Rivard, 2005; Belcourt, 2006; Currie et al., 2008; Gewald and Dibbern, 2009 |
| | - loss of productivity and/or innovativeness | - Ahmad et al., 2014 |
| | - decreased reputation: company´s goodwill is endangered | - Adeleye et al., 2004; Bahli and Rivard, 2006; Currie et al., 2008; Gewald and Dibbern, 2009; Ahmad et al., 2014 |
| | - increased financial costs | - Adeleye et al., 2004 |
| | | - Hoecht and Trott, 2006a, 2006b |

| Key question | Subject of analysis | Contributions |
|---|---|---|
| | - reduced competitiveness: loss of future ability to innovate and compete in fast-moving and unpredictable markets | |
| | - degradation from leading edge expertise to industry standard | - Hoecht and Trott, 2006a |
| | - loss of absorptive capacity required to recognize and exploit new business opportunities | - Hoecht and Trott, 2006a |
| | - loss of revenue and reduced capacity to generate profits | - Belcourt, 2006; Raiborn et al., 2009; Ahmad et al., 2014 |
| | - strengthening of existing competitors or development of new competitors | - Belcourt, 2006; Baccara, 2007 |
| | - knowledge base is endangered – risk of forgoing the development of the knowledge base | - Hoecht and Trott, 2006a, 2006b |

Table 2 – Chronological Structure and Key Decisions during the Transition Period

| Key Decision | Pre Ramp-up | | Post Ramp-up | | Interpretation |
|---|---|---|---|---|---|
| | Phase 1: Penetration (8 months) | Phase 2: Embedment (17 months) | Phase 3: Ramp-up (15 months) | Phase 4: Stabilization (8 months) | |
| Decision on client onshore team (% of combined client-vendor team) | >70% | >70% | <50% | <30% | Becoming increasingly focused on remote team management, quality monitoring and performance improvement of the offshore team |
| Decision on vendor offshore team (% of combined team) and principal responsibility | <30% Coding | <30% Coding | >50% Task specifications, coding, user documentation | >70% Task specifications, coding, user documentation | Becoming increasingly responsible for knowledge-intensive work and action, including internalization of tacit knowledge |
| Decision on extent of staff rotation | Little rotation of offshore vendor staff | Increasing on-/offshore rotation; Introduction of quarterly video conferences and weekly teleconferences | Highest level of on-/offshore rotation; rotation of junior members during periods of vacation and absence | Decreasing level of on-/offshore rotation; face-to-face visits by client managers to offshore teams | Increasing cultural competence and understanding of the client's business issues |
| Decision on offshore team leader(s) | Single leader with little onshore or client experience but generic skills in project technology | Single leader with moderate onshore client experience (but in a separate project) and generic skills in project technology | Multiple leaders who were present in both previous phases: in-depth onshore experience with client and specific skills in project technology | Single leader with significant onshore client experience and specific skills in project technology | Team leader's increasing ability to make recommendations to client and attempt to innovate for client |
| Interpretation of knowledge at risk | Low: no open items and tasks completed exceed tasks planned | Moderate -> High: increasing open items and shift towards more planned tasks than completed | Moderate -> Low: reduction in open items and shift towards completed tasks exceeding planned | Low: no open items and resolution of planned tasks exceeding completed | Client knowledge at risk highest in the embedment phase, pre-ramp-up |

Table 3 – Comparison of Status Data Pre- and Post- Ramp-up

| | Pre Ramp-up Decision | | Post Ramp-up Decision | | t-test (equal variances not assumed) |
|---|---|---|---|---|---|
| Indicator | N | Mean per week (s.d.) | N | Mean per week (s.d.) | |
| Tasks planned | 106 | 7.51 (3.39) | 75 | 15.93 (3.72) | -15.557*** |
| Tasks completed | 106 | 8.39 (2.62) | 75 | 19.53 (5.15) | -17.224*** |
| Open items | 79 | 6.77 (4.43) | 43 | 7.00 (1.93) | -0.394 |

***p<0.001 **p<0.01 *p<0.05

Table 4 – ANOVA by Phase

| | Pre Ramp-up Decision | | Post Ramp-up Decision | | F statistic | Post-hoc (Scheffe's test) |
|---|---|---|---|---|---|---|
| Indicator | Penetration N / Mean (s.d.) | Embedment N / Mean (s.d.) | Ramp-up N / Mean (s.d.) | Stabilization N / Mean (s.d.) | | |
| Tasks planned | 30 / 3.77 (1.74) | 79 / 9.01 (2.64) | 33 / 17.70 (4.03) | 39 / 14.92 (2.49) | 168.40*** | 1,2,4,3 |
| Tasks completed | 30 / 5.90 (1.423) | 79 / 9.38 (2.31) | 33 / 23.18 (4.34) | 39 / 17.21 (3.27) | 264.62*** | 1,2,4,3 |
| Open items | 13 / 0.38 (0.506) | 69 / 7.96 (3.64) | 33 / 7.42 (1.99) | 7 / 5.29 (0.49) | 24.96*** | 1, (4,3,2) |

***p<0.001 **p<0.01 *p<0.05

Figure 1 – Longitudinal Project Status Data and Team Composition

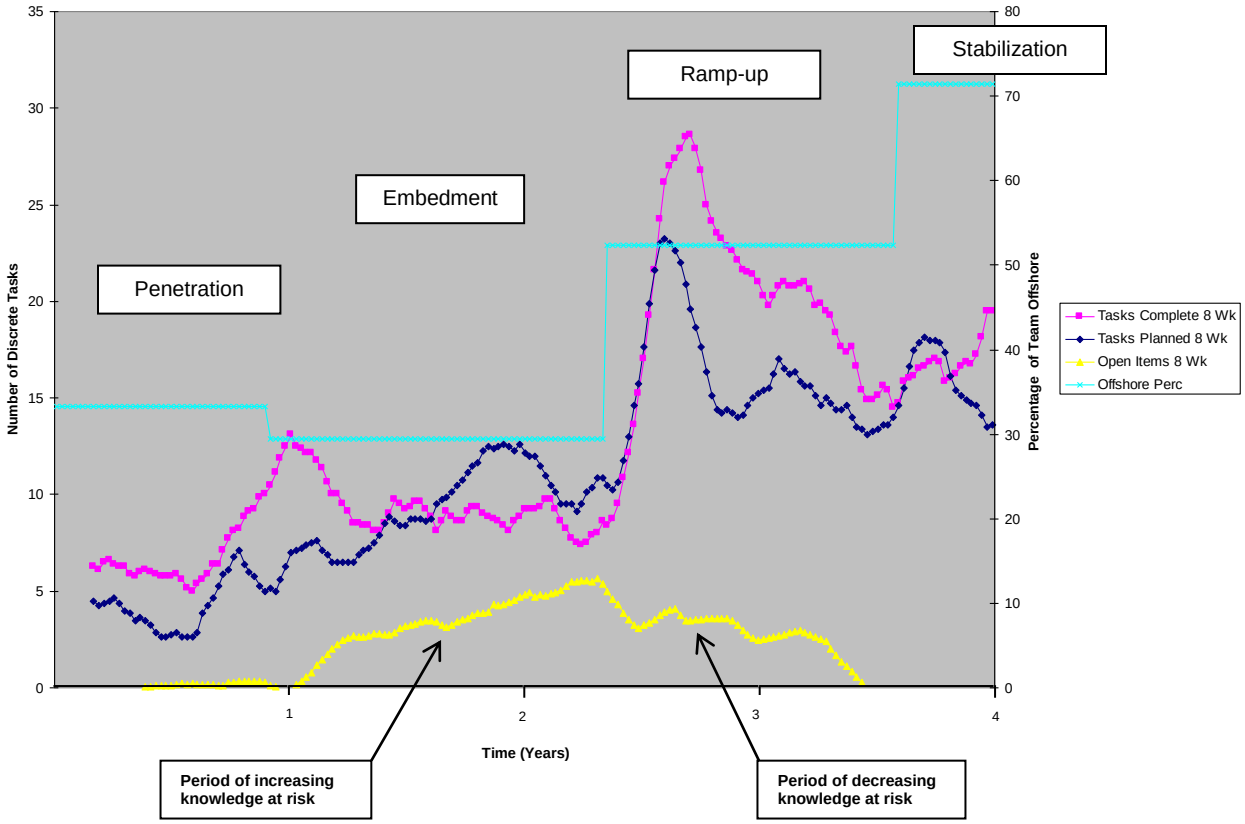

Figure 2 – Longitudinal View of Vendor Team Task Throughput