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Instant Messenger in Offshore Outsourced Software Development Projects: Experiences From a Case Study

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Abstract

IT offshoring has become an accepted strategy for many companies, although the inherent risks—such as language and cultural differences—make the communication, coordination, and collaboration processes between clients and vendors more challenging. In this exploratory work, we analyze the usage of instant messenger (IM) to bridge culturally based power distance in offshore-outsourced software development (OOSD) projects. We employed the case study method with a German-Indian partnership in order to collect qualitative data so as to analyze the prevalent usage of IM in OOSD projects. The empirical data was further analyzed through the lens of theoretical concepts in IS, which provided a sound explanation regarding the usage of IM in OOSD projects. These concepts include virtual teams, communication and media selection, cultural distance, and early warning signs. Even though the project itself was considered a failure, we were able to obtain valuable research data.

1. Introduction

Information technology has enabled the dispersion of work activities across the globe [1] and opened up a global market for IT services. IT outsourcing has become an accepted strategy for many companies in high-cost countries. For the past ten years, it has become increasingly common for IT projects to be sent to geographically and culturally distant countries that offer lower production costs and greater availability of resources. This practice, known as IT offshoring, has thus become a notable area of focus in the IT industry. Beulen et al. define *IT offshoring* as "the transfer of IT service delivery responsibility to a provider operating from a continent different from the recipient" [5, p. 207]. While many of the issues raised in this paper can and do apply to domestically outsourced projects, the case study in question raised significant issues due to the geographic and cultural distance between client and vendor.

Offshore outsourced projects are more prone to failure than in-house and domestically outsourced projects because there are greater risks involved [20]. Therefore, we concentrate on offshore outsourcing in this research, although our conclusions are likely applicable to other (e.g., onshore) outsourcing situations. In contrast to captive offshore outsourcing, which involves outsourcing of activities within the same company in geographically distant countries, offshore outsourcing involves different environment settings. In offshore outsourcing, the governance structure, organizational rules, and project management styles of project partners could differ widely and thus affect the project significantly.

The inherent complexities of software projects make the development of software, even within collocated companies, challenging [41]. The uncertainty involved in software projects from the very beginning makes planning a difficult task. Geographical time zones, culture, and language are some of the underlying factors that differentiate offshore projects from domestic outsourcing projects [15]. These factors further exacerbate the problems with communication, coordination, and collaboration between vendors and clients and affect various levels of offshore outsourced software development (OOSD).

Some of the known challenges presented by offshore projects are knowledge transfer and cultural differences; in this exploratory research, we will investigate these challenges in relation to software development.

Knowledge transfer in offshore outsourcing can be defined as the communication of knowledge from the client organization so that it is learned and applied by the offshore vendor [23]. This includes both explicit knowledge (e.g., specifications, figures) and implicit knowledge of how to do things (e.g., client-specific workflows, technical background, rules), the latter being more difficult to codify so it must be transferred

via frequent communication and interaction [45]. The risk of blocked knowledge transfer increases with the amount of client-specific knowledge that is required by the vendor [11]. Therefore, communication is critical to the success of software projects. While communication is difficult even in collocated settings, it becomes even more problematic in OOSD projects, where teams work in separate locations [6]. In addition to distance, which has been shown to radically decrease communication [6], other issues such as cultural and time zone differences and infrastructure availability increase the challenge [16]. Communication issues have been shown to significantly slow down OOSD projects.

OOSD communication is characterized by information communication technology (ICT) with a variety of media channels (e.g., video chat, telephone, teleconferencing, email, and instant messaging) [16, 48]. The extant research finds that meta-communication in a team environment is critical [44] and that team relationships are built much slower using ICT-based communication [39].

Despite this fact, increasingly more team communication is taking place via ICT-based media. It is notable that instant messaging (IM) is becoming mainstream in business contexts [16, 17, 31]; it can be considered an important communication technology for OOSD projects. Because of this, it is important to study the relative advantages and disadvantages of IM in a team communication context.

Although IM has been studied previously, most earlier studies have been either quantitative in nature [3, 32], providing an understanding of organizational effects and utility in OOSD environments, or they have been performed in artificial settings [7].

There is a need for more qualitative studies on the use of IM in OOSD projects. We believe that IM has become established as an indispensable tool for communicating [2] between team members in OOSD projects. The importance of IM as a tool for formal and informal communication has motivated us to investigate its usage in a real-world context. This exploratory study aims to answer the following research question: *How is IM actually utilized to facilitate communication in an OOSD project?*

2. Research Methology

The exploratory nature of the research question called for a qualitative research approach to investigate the usage of IM in OOSD projects. We employed case study research, as it was the most appropriate method for studying the usage of IM within this unique onshore-offshore environment. This method allowed us to investigate a contemporary phenomenon within its real-life context, where the relevant behavior cannot be manipulated [49].

Our goal was to analyze and provide a theoretical application for the usage of IM in different cultural settings [12]. The case study approach gave us full access to a project both on-site and off-site, with the possibility of collecting as much data as necessary up to the point of "theoretical saturation" [12]. The case we selected offered exclusive insight into knowledge transfer tasks and the selection of communication media in a cross-cultural (German-Indian) environment. The eventual cancellation of the project that was studied allowed us to further explore the early warning signs in conjunction with the usage of IM in the project.

The research was exploratory in nature and relied on an interpretive in-depth case study [49]. We used interviews as the primary data source. The secondary data sources included email and instant messenger log files, which contained documents and notes regarding the software development project [49].

The first round of interviews was conducted primarily between June and August 2008. Each interview lasted from 45 to 90 minutes and involved both the client (4 interviewees) and the vendor (7 interviewees). In total, we interviewed 11 people. The interviews were semi-structured to allow for flexibility and to ensure that the researchers captured any interesting phenomena [49]. The questions were formulated according to perceived performance of the knowledge transfer, cultural differences, the quality of the relationship, the trust between the partners, the project communication, the standards and details of the development process, and the appearance of context-relevant information. The interviews were conducted with the senior management, project managers, and developers of each company alongside a review of project documentation, emails, IM logs, and formal presentation material. During this round of interviews, we visited the vendor in India and conducted interviews with managers and developers on site. This visit gave us additional insight into the research material because we were able to observe and talk to the developers in real-life conditions.

Additionally, we conducted a second round of interviews during November 2008 when, as a result of our analysis, we realized that we needed additional data and an increased focus on the identified concepts and categories. During the second round, we visited the vendor's UK office to discuss with the managers the themes and categories raised during the first round of analysis. In total, the data gathered from clients and vendors included approximately 40 hours of interviews, most of which were transcribed. The

transcripts, together with the field notes and secondary data (ca. 7,000 lines of IM logs, 19 emails, and more than 100 pages of project documents), established a rich basis for this research project.

In the first phase of analysis, we sorted the interviews, personal notes, and secondary data from the first round of interviews in order to write contact summary sheets and create a chronology of the project. With the help of the summary sheets, we classified and coded the interviews and secondary material (e.g., documents, emails, and IM logs). After coding the material, we analyzed the codes and tried to build themes and categories around them. Upon completion of the first round of analysis, we entered a sequence of analysis cycles with which we looked into the data (field notes, coding, displaying data, conclusions) and searched for extended literature from related fields to find relevant concepts and categories. As a result of the analysis process, five categories became apparent: virtual teams, communication, media selection, cultural distance, and early warning signs. Based on these categories, we narrowed our interview guidelines for the second round of interviews to specifically concentrate on the usage of IM in OOSD projects.

With the results from the second round of interviews, we entered the analysis cycle again and alternated between data analysis and possible theoretical concepts. While studying the data, it was important that we cross check the interpretations with the theoretical definitions [12], which we discuss in Section 3.

In the last phase, we re-evaluated our findings in order to achieve an adequate level of validity. We used multiple sources of evidence, and key interviewees (from both sides) functioned as reviewers. The identification of critical phenomena and causal chains was guided by theory as well as real-world observations [12]. As a result, we present our work in the tradition of exploratory and interpretive research, analyzing our interpretations of observed phenomena through the lens of theoretical concepts [47]. (Interested readers may contact the authors for further details about data collection or case material.)

3. Theoretical Background

3.1. Virtual Teams

Offshore software development projects are characterized by distributed teams which work together toward a common goal, and these teams consist of people from various countries and cultures who speak various languages and are separated by time and distance [36]. Nunamaker et al. define *virtual teams* as teams with members from multiple organizations, locations, time zones, and cultures [34]. Therefore, offshore software development teams can be seen as a special form of virtual teams [42]. The benefit of defining offshore software development teams as virtual teams is that a great body of knowledge exists about virtual teams.

Managing a global virtual team containing both offshore and onshore members is more complex than managing a local virtual team. Virtual workers rely on their virtual co-workers to complete their tasks; global co-workers can experience difficulties in relationship building resulting from cultural differences. Relationship building is an important success factor for virtual teams. Research shows that the development of personal relationships among virtual team members is an important factor in effective working relationships. Virtual teams often struggle to establish the relationships necessary for them to achieve their objectives [30, 35].

Virtual teams can coordinate only via electronic communication, and they experience a form of "swift" trust—but such trust is fragile and temporary [10]. The success and failure of virtual teams is contingent upon trust, the basis for relationship building. Trust functions as the glue that holds and links virtual teams together. Several researchers have studied virtual teams and found that trust among team members plays an important role in relationship building [21]. Further, trust relies on information, so it develops through communication among team members [25].

Therefore, our research focuses on communication among team members, especially the types of media they select to communicate with and the influence of cultural differences on virtual teams like OOSD teams. Persson et al. name cultural distribution, collaboration structure, and communication infrastructure as risk factors which may hinder virtual teams' success [36]. Since rich synchronous and medium-rich synchronous communication media are used as substitutes for F2F interactions in OOSD projects, research is needed to determine the effectiveness of using these media.

3.2. Communication and Media Selection

Effective communication is the key to successful virtual teams, and one determinant of effective communication is how well the team members are able to build and maintain their personal relationships. Other research emphasizes the role of information and communication techniques within global software teams [4].

For geographically dispersed teams, the ongoing selection of communication medium channels (media selection) is of crucial importance for effective task

performance [43]. A series of researchers have already investigated this area, and the study of media selection has a long tradition in the field of information management [27, 38]. Most of the studies explain media selection by using Daft and Lengel's media richness theory (MRT) [8], which explains how the richness of information conveyed through the media helps people to engage in communication activities, thereby reducing the uncertainty and ambiguousness associated with their assigned tasks. For instance, Pauleen and Yoong discuss the importance of information and communication technologies for relationship building in virtual teams. They utilize the MRT to explain that some media channels may encourage informal communication and relationship building [35].

However, we believe that in order to investigate media selection further, it is important to achieve a better understanding of communication processes. McGrath's Time, Interaction, and Performance (TIP) theory describes work groups (like virtual teams) as social systems which are time-based and multifunctional. Effective group communication is engaged continuously in three simultaneous functions: production (problem solving and task performance), member support (participation, loyalty, commitment), and group well-being (interaction, members, roles, power). Additionally, McGrath notes that member support and group well-being relate directly to relationship development. Communication media could have both positive and negative effects on a work group's production, well-being, and member support functions. This issue is even more important for virtual teams because they are completely dependent on communication media [28].

Regarding the importance of communication processes and group relationships, the Media Synchronicity Theory (MST) developed by Dennis et al. argues that, in general, communication consists of information transmission and information processing. The capabilities of the medium will influence the use or misuse of the medium and, in the end, will have a direct effect on communication performance [9]. Furthermore, the theory refers to a set of media features rather than to specific media tools. For example, IM is often described as a text medium, yet many new IM tools now provide audio, video, image sharing, and even application sharing. Most importantly, the researchers note that one medium is not "better" than another; most tasks are composed of a series of communication processes that require different media capabilities over time.

Furthermore, they define *media synchronicity* as "the extent to which the capabilities of a communication medium enable individuals to achieve synchronicity" [9 p. 581]. Dennis et al. also contend that certain media capabilities influence the way that individuals transmit and process information and the degree to which they work—i.e., their level of synchronicity. Thus, there is a connection between communication process and media capability that facilitates better knowledge acquisition and leads to better outcomes. It is not solely the medium or its capabilities that directly influences communication performance, but also the way in which it is used [9]. Dennis et al. also argue that, as familiarity with the task, counterparts, and communication media increases, the need for synchronicity is reduced.

3.3. Cultural Distance

Understanding and dealing with cultural differences is often named as an important factor in determining the success of international software development teams, and it is one of the motivations for our research [13]. A number of researchers have already investigated cross-cultural offshore projects [13, 24, 46] and they suggest that the cultural approach in IT research needs to take a broader view of culture.

In view of the fact that contact and communication between different cultures is an inherent aspect of offshoring, research on cross-cultural issues in this area is gaining greater emphasis. Motivated by the potentially negative influence of cross-cultural issues on performance and relationship building in software development projects [6], even information systems research is beginning to focus on culture. The common understanding of culture is that it is learned, associated with values and behaviors, shared by a group, and passed from one generation to the next [26].

In order to explain cultural differences, researchers utilize dimensions of national cultural variations. These dimensions are the specific aspects of a culture that can be measured in relation to other cultures [19]. Hofstede provides an overview of the known cultural dimensions: power distance, individualism, uncertainty avoidance, masculinity/femininity, and long-/short-term orientation. Referring to these dimensions helps researchers to understand people's values and explain why people from different cultures might behave and think differently. Hofstede's work on culture has, however, been the subject of some criticism.

According to McSweeney, Hofstede views culture as a stable, monolithic concept; cultural groups are seen as homogeneous, thus excluding the possibility of subcultures, and actors only interact in one culture at a time with no adaptation or development over time [29]. Although these points might have some validity, other scholars argue that managers and groups tend to

identify strongly with their national values, so this important source of culture cannot be ignored [41, p.179]. We understand the criticism of Hofstede's work, but we find that he provides a useful framework with which to compare cultures. This helps us to understand and analyze why communication between team members from different cultures can be so complicated. Whether or not his specific indices are applicable to reality is debatable and not within the scope of this paper.

In software projects like the one studied, a multitude of decisions must be made. Sagie finds that, in team situations, hierarchy plays a significant role in decision making [40] and is intertwined with the power dimension [18]. Since the two teams involved in this project not only began with a well-defined relationship (i.e., client and vendor) but also came from disparate cultures, we found it appropriate in our analysis to focus on Hofstede's concept of power distance. In this first step, the cultural influence on decision making seemed most important; therefore, we focused on the power distance instead of any of Hofstede's other four dimensions (those will be addressed in future research). Perhaps the biggest challenge for virtual teams is the merging of the individual cultures of the team members into a single team culture in order to promote effective decision making.

3.4. Early Warning Signs

Software projects often fail because of their inherent complexities. Postmortem examinations of failed IT projects have shown that, in the early project stages (i.e., before the failures occurred), there were significant symptoms, indications, or warning signs of trouble [22]. An *early warning sign* (EWS) is defined as "an event or indication that predicts, cautions, or alerts one of possible or impending problems . . . in the first 20 percent of the project's initial calendar" [22]. An example could be the communication difficulties between onsite and offshore team members that may affect the project performance. The concept of EWSs gains more relevance for OOSD projects since they are exposed to more risks than in-house or domestically outsourced projects.

Project troubles experienced before a failure are hardly ever detected early enough in the IT industry [14]. Identifying and managing such troubles is an effective solution that can be utilized to save project efforts and resources, especially in the early project stages.

Most of the major empirical works that study the concept of EWSs [14, 22, 33, 37] concentrate on IT projects, whereas one study [33] is based on industrial construction projects. In contrast to the works that study EWSs over the course of the whole project lifecycle [14, 33], Kappelman et al. and Philip et al. focus on the first 20 percent of the project lifecycle. The early project stages are critical because the management of EWSs in these stages, provided that corrective actions are taken, would allow the projects to be completed within the original time estimates. In our case study, we analyzed the warning signs that emerged in relation to the usage of IM during the first 20 percent of the project.

Philip et al. identified four categories of EWSs in the context of OOSD projects—namely, formal processes, formal output, communication, and people. Our research concentrated on the categories of communication and people because they had the potential to provide early hints regarding the usage of IM in the case study. Our analysis concentrated on the factors that gave early indicators of the impending failure.

4. Case Description

The project took place in late 2007 and involved a German software company (**client**) who contracted a Web development project to a service provider (**vendor**) located in Bangalore, India. The client had decided to explore the possibilities of outsourcing, so it chose the extension of an existing proprietary software system as a pilot project with the new vendor. This was the client's first attempt at outsourcing. The goal was to develop a new sub-module to add more flexibility to an existing system. The vendor saw it as a good opportunity to establish a potential long-term relationship via a smaller scope project.

The two teams were divided into typical software development team roles: manager, project manager, and developer. Table 1 shows the roles and size of each team. Although the purpose of the project was Web development, it was based on the modification of an existing system; therefore, the client team provided a developer to support the vendor team.

Table 1. Roles in the project

	Manager	Project Manager	Developer	∑
Vendor	2	1	4	7
Client	1	1	2	4

Before the project started, the client manager (**CM**) and client project manager (**CPM**) travelled to the UK to meet with the vendor's key account manager (**VK**). During the meeting, the client and vendor established the scope of the project and the client agreed to send the source code to the vendor so they

could submit a bid on the project. The vendor was not yet familiar with the software system.

The **CPM** emailed the source code to the vendor project manager (**VPM**) in Bangalore, and they exchanged a few emails regarding the preferred composition of the vendor team. After the team was selected, the client developer (**CD**) assisted the vendor developers (**VDs**) with installing the system. After the system was installed, the CD and VDs took part in an informal training session regarding basic usage of the system, during which the VDs asked questions which were answered by the CD.

Two weeks later, the VPM provided the CPM with an analysis of the existing system. The vendor then responded with a fixed-price bid for the project and a timeline of three months. There were no clarification questions submitted by the vendor at this time. Both parties agreed that the CD would support the VDs when they had any questions.

During the first two months of development, the CD received a few clarification questions from the VDs, but there was otherwise little communication in either direction. At about the two-month point, the vendor provided the client with a login to their internal system, and the client was able to check the process of the sub-module. To the client's dismay, the testing determined that the module was barely functional; they began to have serious doubts about the success of the project. Due to the results of this testing, the vendor decided to push back the final release of the project to an undetermined date, despite the client's desire to have a specific timeframe.

During this phase, which lasted about three extra months, the VDs submitted a large number of questions directly to the CD. The vendor prepared a second release, which continued to suffer from technical problems.

Despite the project setbacks, IM had become an essential tool for communication and information exchange between the vendor and the client, as it allowed the two teams to discuss and diagnose the technical problems. For instance, in an interview, the CPM related the following about the information communicated via IM: "Every week I receive the IM-logs… I have analyzed the logs to detect problems as early as possible." According to the VD, IM functioned to disperse information within the company: "I have submitted the chat-logs from time to time to our intranet, so my colleague could see what we have solved." IM allowed the CPM to build up something like a project memory, as it also had the function of logging the communication for further analysis and judgment.

After the second release, the CPM began to apply increasing pressure on the VPM, expressing serious concerns about the ability of the vendor to finish the project at all. The vendor then extended the deadline once more. After an additional three months, the vendor general manager stepped in and signaled their inability to finish; both parties agreed to cancel the project.

5. Analysis and Discussion

Table 2 shows the distribution of media channels analyzed in the case study. In total, there were 67 communication sessions. We counted IM sessions per day; normally, these chat sessions were opened once and kept online the whole day. Thus, one chat session consists of several communication sessions dealing with different topics. With 37 total sessions, IM was the primary medium selected for communication between client and vendor team members.

Table 2. Chosen media channels during the project

Media	**No. of sessions**
F2F	2
Video chat	2
Phone	7
IM	37
Mail	19
Total:	**67**

We categorized the media selection according to each medium's capability to hold synchronous communication. Channels with a "high" synchronicity are F2F meetings, video chat sessions, and phone calls. IM was categorized as "medium" in terms of its synchronicity, and other channels such as mail and documents had no synchronous communication, so they were categorized as "low." Besides differentiating between high and low synchronicity, we also categorized the media channels according to their symbol set. Media like F2F meetings or video chat provide a "rich" symbol set and media like email have a "lean" symbol set. IM was found to be "medium" rich in terms of conveying information.

Although IM has been classified primarily as a "medium" synchronous channel, it must be noted that IM can also have high synchronicity when it is utilized with audio and video chats. However, our analysis primarily focused on the communication of textual information through IM.

The MRT provides some insight into the selection of IM as the communication medium for certain circumstances (e.g., the client team chose rich media for the purpose of negotiation and escalation). On the other hand, the MRT does not explain why the vendor

team chose lean media over rich media for problem solving and clarification. Most importantly, the MRT does not explain the influence of culture during the communication.

We found signs (e.g., change of media over time, increased use of synchronous media in the beginning when the team members were unfamiliar with each other, use of lean media for conveying information, etc.) in the data that support the MST; it appears to be much more powerful than previous theories in explaining the use of IM for knowledge transfer in offshore outsourced IT projects. The use of synchronous media channels was found to change over time as the trust between partners increased. IM was found to be used more often between developers than between project managers, as the latter had much less of a cohesive group dynamic. Developers used medium synchronous IM during the convergence processes, as the need for highly synchronous communication was reduced. However, the MST does not explain the cultural aspects that affect the communication processes in OOSD projects.

The TIP theory helped us to understand and categorize the group processes during the project. With this theory we were also able to analyze the team communication and information exchange using IM; we found evidence for all three functions (production, group well-being, and member support) in the case study. IM enabled better or instant production by facilitating transparent knowledge flow between the CD and VDs without the need to get information from the managers. This direct communication further supported the process of trust-building between team members. IM offered member support as a form of rich medium in order to transfer information. For instance, the following conversation illustrates how quickly member support was supplied via IM. This snippet is part of an IM conversion that took place between the VD and CD during the development phase. The IM session was not scheduled beforehand and the answer came almost instantly after the question had appeared:
[VD] ...what i am keen to know if there is any dependencies on $this->connection variable… because now it is going to be an object [CD] this should be only used within the connector and not from outside… so it should be safe to change that. [VD]…thanks for your support

The speed and flexibility of IM in such a situation is truly an advantage. The developers can ask questions in the midst of the process and the medium provides enough flexibility to exchange code snippets, but it is less formal than email and much quicker.

Furthermore, various functions of IM like the ability to view the status of a fellow team member (e.g., busy, idle) give cues to the member's availability on the channel. Intrusion into another person's work time (such as would be caused by a telephone call) could be avoided if the IM user was found to be busy. The possibility of conveying moods through the use of free text in IM could further relay information about the user and his or her tasks.

In this case study, IM was able to provide an instant sense of group well-being, as the team members always kept in touch through a direct connection. The developers also forged their own group dynamics, creating a subculture within the project organization. The members chose whether to answer the messages right away or at some later point. Further, IM offered team members the possibility to chat informally and exchange unofficial information about each other, which supported team building and enhanced the group well-being of team members.

Although the TIP theory can explain the usage of IM in a global team, it cannot explain the effect of the cultural issues involved in the usage of IM during the project execution.

We analyzed the development of power distances in relation to the usage of IM in OOSD projects. Hierarchical distances are known to hinder the flow of information, and thus the productivity, in a team [36]. One of our main observations was that IM allowed the team members to communicate with each other in a more open manner than did formal channels like e-mail. The hierarchies in communication, especially on the Indian side, were bridged to some extent through the free use of IM. This particular bridging of communication gaps by way of IM between client and vendor developers (CD and VDs) is illustrated in Figure 1. The informal talk that IM facilitates in OOSD projects aids in tracking the social relationships between developers. The project management may not take note of the communication between developers when it occurs, but they can analyze the logs at a later time.

In a typical hierarchy, the link between individual developers (referred to as "d" in the figure) might not be allowed by policy, even though they tend to be the most active members of the project. With the use of IM in this project, developers were allowed to communicate directly with each other. Links "a, b, c"—i.e., communication via the project managers—were typical for an OOSD project.

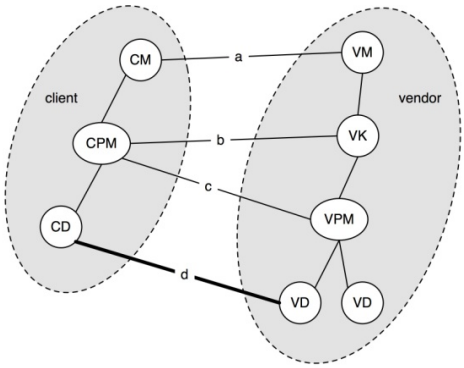

Figure 1: IM bridges relationships between developers

After analyzing the IM logs for EWSs, we found several instances in which the developers themselves expressed doubt about the project. The same technical questions were asked repeatedly by the VDs, thus signifying a lack of basic understanding of the problem. An open admission by the VDs about their level of understanding could have helped the CD to address this issue promptly. These warning signals, despite being available for anyone to see in the logs, were ignored by project management in the initial phases of the project, although later it was these same warning signs that led to the project's cancellation. IM allowed for open and informal communication between developers, which resulted in stronger trust and the creation of a group subculture; however, the cultural differences that were present hindered the communication process in the beginning, such as when the VDs were reluctant to admit their problems.

In this case, IM provided an invaluable means for logging the most important "tactical" communication between the developers. It was this ability to "look back in time" that helped the project managers to cancel the project before even more time was wasted. We assume that without this form of direct communication and its logging capability, the project management might not have realized the true state of the project until much more time had passed. Indeed, during an interview, the CPM commented on the usefulness of IM in this project: "I was very happy that we had a direct connection to the developer. So we knew exactly where the development was. . . . This helped us also for the decision to terminate the project."

6. Conclusions and Limitations

We aimed to analyze how IM is actually utilized to facilitate communication in an offshore outsourced software development project (OOSD). This exploratory research relied on a case study in order to examine the interactions between vendors and clients that took place through IM, a medium which is rich in terms of content and has a medium level of synchronicity. Although a single case study has its limitations in terms of drawing theoretical conclusions, this exploratory study has provided a rich data set with which to analyze IM from various theoretical perspectives. The short project duration is a weak point of this research. However, this project counts among the few failed OOSD project cases that have been documented in IS research.

Media richness theory and media synchronicity theory provide partial explanations regarding the usage of IM as the medium of communication and knowledge transfer in certain circumstances. In this case, the developers used medium synchronous IM during the convergence processes, since their need for highly synchronous communication was reduced. Using the Time, Interaction, and Performance theory, we were able to analyze the team's communication and information exchange using IM, and we found evidence of all three functions (production, group well-being, and member support) in the case study. However, these theories could not explain the influence of culture during the communication.

IM facilitated the exchange of information between developers, who forged a better bond through both the formal and informal usage of IM. Indeed, it served as a bridge to help team members overcome the hierarchy of Hofstede's power distance dimension. It was further found to improve trust and team dynamics among developers. In addition, IM logs could have been used as a source of early warning signs for the managers. However, in this case, the managers chose to use a more synchronous medium such as the telephone, as they were apparently less familiar with IM.

IM is an often overlooked alternative to other, more established media channels. It provides a unique blend of synchronous and non-synchronous communication modalities, and users of IM have the ability to interact and communicate without immediately disturbing their communication partner. This medium also allows users to communicate at differing speeds and with varied group sizes. It has the potential to mitigate cultural differences by allowing two communication partners to "warm up" their conversation and form their own team culture.

One of the most obvious factors in need of careful examination is the effect of multiple boundary crossing in virtual teams. Future research will focus on the intersection of culture, communication, and media selection—specifically, on how this interplay affects the performance of virtual teams and how media can be

proactively selected in order to facilitate the communication process.

Our findings in this paper are drawn from a single exploratory case study; however, the results appear to be applicable to a wider range of OOSD projects. Future research should validate the findings using additional case studies and seek to develop a framework for utilizing media channels (e.g., IM) to facilitate intercultural communication in virtual teams. Furthermore, we will closely study the EWSs of failed OOSD projects using expert interviews in order to better understand OOSD project failures.

7. References

[1] U. Apte and R. Mason, "Global Disaggregation of Information-Intensive Services," Management Science, 41(7), 1995, pp. 1250-1262

[2] D. Avrahami and S. Hudson, "Communication Characteristics of Instant Messaging: Effects and Predictions of Interpersonal Relationships," in Proceedings of ACM Conference on Computer Supported Cooperative Work (CSCW), 2006

[3] D. Avrahami and S.E. Hudson, "Characteristics of Instant Messaging: Effects and Predictions of Interpersonal Relationships," in Proceedings of ACM Conference on Computer Supported Cooperative Work (CSCW), 2006

[4] K. Bagchi and P. Kirs, "The Impact of Schwartz's Cultural Value Types on Ict Use: A Multi-National Individual-Level Analysis", International Conference on Information Systems (ICIS), 2009

[5] E. Beulen, P. Ribbers, and J. Roos, Managing It Outsourcing Governance in Global Partnerships, Oxford, UK: Routledge, 2006

[6] E. Carmel and P. Tija, Offshoring Information Technology : Sourcing and Outsourcing to a Global Workforce, Cambridge: Cambridge University Press, 2005

[7] D. Cubranic, G.C. Murphy, J. Singer, and K.S. Booth, "A Comparison of Communication Technologies to Support Novice Team Programming," in Proceedings of International Conference on Software Engineering (ICSE), 2006

[8] R.L. Daft and R.H. Lengel, "Organizational Information Requirements, Media Richness and Structural Design," Management Science, 32(5), 1986, pp. 554-571

[9] A.R. Dennis, R.M. Fuller, and J.S. Valacich, "Media, Tasks, and Communication Processes: A Theory of Media Synchronicity," MIS Quarterly, 32(3), 2008, pp. 575-600

[10] G. DeSanctis and P. Monge, "Introduction to the Special Issue: Communication Processes for Virtual Organizations," Organization Science, 10(6), 1999, pp. 693-703

[11] J. Dibbern, J.K. Winkler, and A. Heinzl, "Explaining Variations in Client Extra Costs between Software Projects Offshored to India," MIS Quarterly, 32(2), 2008, pp. 333-366

[12] K.M. Eisenhardt, "Building Theories from Case Study Research," Academy of Management Review, 14(4), 1989, pp. 532-550

[13] M. Gallivan and M. Srite, "Information Technology and Culture: Identifying Fragmentary and Holistic Perspectives of Culture," Information and Organization, 15(4), 2005, pp. 295-338

[14] D. Havelka and T. Rajkumar, "Using the Troubled Project Recovery Framework: Problem Recognition and Decision to Recover," E-Service Journal, 5(1), 2006, pp. 43-73

[15] R. Heeks, S. Krishna, B. Nicholsen, and S. Sahay, "Synching or Sinking: Global Software Outsourcing Relationships," Software, IEEE, 18(2), 2001, pp. 54 - 60

[16] J.D. Herbsleb and A. Mockus, "An Empirical Study of Speed and Communication in Globally Distributed Software Development," IEEE Transactions on Software Engineering, 29(6), 2003, pp. 481-494

[17] J.D. Herbsleb and D. Moitra, "Global Software Development," Software, IEEE, 18(2), 2001, pp. 16 - 20

[18] G. Hofstede, Cultures Consequences : International Differences in Work-Related Values, Cross Cultural Research and Methodology, Vol. 5, London: Sage Publications, 1984

[19] G. Hofstede and G.J. Hofstede, Cultures and Organizations: Software of the Mind: Intercultural Cooperation and Its Importance for Survival, New York: McGraw-Hill, 2004

[20] C. Iacovou and R. Nakatsu, "A Risk Profile of Offshore-Outsourced Development Projects," Communications of the ACM, 51(6), 2008, pp. 89-94

[21] S.L. Jarvenpaa, K. Knoll, and D.E. Leidner, "Is Anybody out There? Antecedents of Trust in Global Virtual Teams," Journal of Management Information Systems, 14(4), 1998, pp. 29-64

[22] L. Kappelman, R. McKeeman, and L. Zhang, "Early Warning Signs of It Project Failure: The Dominant Dozen," Information Systems Management, 23(4), 2006, pp. 31 - 36

[23] D.-G. Ko, L. Kirsch, and W.R. King, "Antecendents of Knowledge Transfer from Consultants to Clients in

Enterprise System Implementations," MIS Quarterly, 29(1), 2005, pp. 59-85

[24] S. Krishna, S. Sahay, and G. Walsham, "Managing Cross-Cultural Issues in Global Software Outsourcing," Communications of the ACM, 47(4), 2004, pp. 62-66

[25] J. Lewis and A. Weigert, "Trust as a Social Reality," Social Forces, 63(4), 1985, pp. 967-985

[26] E. MacGregor, Y. Hsieh, and P. Kruchten, "Cultural Patterns in Software Process Mishaps: Incidents in Global Projects," in Proceedings of Hawaii International Conference on System Sciences (HICSS), 2005

[27] A. Majchrzak, C.M. Beath, R. Lim, and W.W. Chin, "Managing Client Dialogues During Information Systems Design to Facilitate Client Learning," MIS Quarterly, 29(4), 2005, pp. 653-672

[28] J.E. McGrath, "Time, Interaction, and Performance (Tip) a Theory of Groups," Small Group Research, 22(2), 1991, pp. 147-174

[29] B. McSweeney, "Hofstede's Model of National Cultural Differences and Their Consequences: A Triumph of Faith - a Failure of Analysis," Human Relations, 55(1), 2002, pp. 89-118

[30] M. Montoya-Weiss, A.P. Massey, and M. Song, "Getting It Together: Temporal Coordination and Conflict Management in Global Virtual Teams," Academy of Management Journal, 44(6), 2001, pp. 1251-1262

[31] B.A. Nardi, S. Whittaker, and E. Bradner, "Interaction and Outeraction: Instant Messaging in Action," in Proceedings of ACM Conference on Computer Supported Cooperative Work (CSCW), 2000

[32] T. Niinimäki and C. Lassenius, "Experiences of Instant Messaging in Global Software Development Projects: A Multiple Case Study", International Conference on Global Software Engineering (ICGSE), 2008

[33] I. Nikander and E. Eloranta, "Project Management by Early Warnings," International Journal of Project Management, 19(7), 2001, pp. 385-399

[34] J.F. Nunamaker JR, B.A. Reinig, and R.O. Briggs, "Principles for Effective Virtual Teamwork," Communications of the ACM, 52(4), 2009, pp. 113-117

[35] D. Pauleen and P. Yoong, "Facilitating Virtual Team Relationships Via Internet and Conventional Communication Channels," Internet Research: Electronic Networking Applications and Policy, 11(3), 2001, pp. 190-202

[36] J.S. Persson, L. Mathiassen, T.S. Madsen, and F. Steinson, "Managing Risks in Distributed Software Projects: An Integrative Framework," IEEE Transactions On Engineering Management, 56(3), 2009, pp. 508-532

[37] T. Philip, G. Schwabe, and E. Wende, "Identifying Early Warning Signs of Failures in Offshore Software Development Projects - a Delphi Survey", American Conference on Information System (AMCIS), Lima, 2010

[38] S. Ramachandran, "E□ect of Cultural Norms on Media Choice in Global Virtual Teams", American Conference on Information System (AMCIS), OMAHA, 2005

[39] L.P. Robert, A.R. Dennis, and Y.-T.C. Hung, "Individual Swift Trust and Knowledge-Based Trust in Face-to-Face and Virtual Team Members," Journal of Management Information Systems, 26(2), 2009, pp. 241-279

[40] A. Sagie and Z. Aycan, "A Cross-Cultural Analysis of Participative Decision-Making in Organizations," Human Relations, 56(4), 2003, pp. 453-473

[41] S. Sahay, B. Nicholson, and S. Krishna, Global It Outsourcing: Software Development across Borders, Cambridge, UK: Cambridge University Press, 2003

[42] S. Sakthivel, "Virtual Workgroups in Offshore Systems Development," Information and Software Technology, 47(5), 2005, pp. 305-318

[43] D. Staples and S.L. Jarvenpaa, "Using Electronic Media for Information Sharing Activities: A Replication and Extension," in Proceedings of International Conference on Information Systems (ICIS), Brisbane, 2000

[44] K. Suh, "Impact of Communication Medium on Task Performance and Satisfaction: An Examination of Media-Richness Theory," Information & Management, 35(5), 1999, pp. 295-312

[45] G. Szulanski, "The Process of Knowledge Transfer: A Diachronic Analysis of Stickiness," Organizational Behavior and Human Decision Processes, 82(1), 2000, pp. 9-27

[46] G. Walsham, "Cross-Cultural Software Production and Use: A Structurational Analysis," MIS Quarterly, 26(4), 2002, pp. 359-380

[47] G. Walsham, "Doing Interpretive Research," European Journal of Information Systems, 15(3), 2006, pp. 320-330

[48] E. Wende, G. Schwabe, and T. Philip, "Exploring the Media Mix During It-Offshore Transition Phase – an Opportunity for a Better Knowledge Transfer", Global Sourcing Workshop, Zermatt, 2010

[49] R.K. Yin, Case Study Research: Design and Methods, Third Edition, Applied Social Research Methods Series, Vol 5, 3rd ed., Thousand Oaks, CA: Sage Publications, 2002