The Effects of Outsourcing on Knowledge Transfer Among Software Engineers

by

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Table of Contents

List of Figures

List of Tables

Abstract

This paper examines the effects of outsourcing on knowledge transfer among software engineers. It investigates data gathered from interviews and surveys of software engineers who took part in outsourcing and then analyzes the resulting data utilizing both qualitative and quantitative analysis strategies. Five themes emerged from this analysis: Morale, Communication, Locale Differences, Rationale, and Planning. The paper describes the five themes and how they affect knowledge transfer between local and contractor teams. The effects of outsourcing on knowledge transfer among software engineers depends how 'software engineer' is defined. If software engineer is defined as the domestic programmer working for the company outsourcing the work, the effects are minimal. However, if software engineer is defined as the combination of the local engineering team and the outsourcing contractor team, the effects of outsourcing on knowledge transfer between those two teams are significantly more pronounced. Finally, the management implications of these five themes are linked to currently held beliefs of best practices for outsourcing. The paper recommends methods for limiting the effects and mitigating the risk involved with outsourcing software development.

Introduction

Outsourcing is a common and integrated aspect of business philosophy and practice. According to a 2002 Goldense Group study, 90% of the companies surveyed outsourced portions of their research and development work.[1] Companies outsource work for different reasons. One of the most common reasons is to save money. When the Outsourcing Institute polled 1,410 of its new members, it found that saving money was the number one reason.[2] American IT workers have watched as jobs they have traditionally held are sent to other countries for cheaper labor. While their blue-collar counterparts have dealt with this phenomenon for decades, white-collar workers have largely been unaffected until this decade.

As companies opt for cheaper labor, they also look for ways to better manage their existing resources; one such resource is the knowledge contained within the company. According to Richard T. Herschel, companies "must realize that intellectual capital probably matters more than any other asset and must be managed explicitly, not left to fend for itself."[3] The effort of gathering and transferring this knowledge is known as knowledge management.

[1] Bradford L. Goldense and Anne R. Schwartz, July 2004, "Goldense Part III. When companies outsource R&D, the main focus is NPD, according to the study," [Internet, WWW], *Available:* Product Development and Management Association Visions Magazine website; ADDRESS: http://www.pdma.org/visions/july04/outsourcing.html. [Accessed: 24 September 2006]. A copy of this web page is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.

[2] Outsourcing Institute, Winter 2005, "8th Annual Outsourcing Index: Money Matters," [Internet, WWW], *Available:* The Outsourcing Institute website; ADDRESS: http://www.outsourcing.com/content.asp?page=01b/other/oe/q405/moneymatters.html&nonav=false. [Accessed: 24 September 2006]. A copy of this web page is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.

[3] Richard T. Herschel, Summer 2000, "Chief Knowledge Officer: Critical Success Factors for Knowledge Management," *Information Strategy: The Executive's Journal* Vol. 16(4), p. 37+, [Internet, WWW, Database], *Available*: Corporate ResourceNet Database from EbscoHost; ADDRESS: http://search.epnet.com/. [Accessed: 1 May 2003]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

Companies can spend a great deal of time and effort implementing knowledge management programs. There is ample research on both knowledge management and outsourcing. However, little is known about how outsourcing may affect knowledge management and specifically knowledge transfer.

This research attempts to answer the question of what are the effects of outsourcing on knowledge transfer among software engineers. It will present data gleaned from interviews with and surveys of software engineers who have been involved with outsourcing. The paper will discuss this data and present conclusions based upon the data. After presenting conclusions, the research will discuss the management implications of the findings.

Literature Review

Knowledge Management

Companies are more complex than the organization charts that define the human hierarchy of those companies. Different groups within the company interact with each other for a variety of reasons.[4] According to author Phyllis Gail Doloff, there is an "invisible side of the organization: the informal network that isn't reflected on the org chart."[5] Locating and defining this informal network is a difficult process. However, it is a process that is necessary when attempting to determine which individuals in an organization hold specific knowledge. One mechanism by which this is accomplished is a social networking map.[6]

Companies build social networking maps by determining the following:

- With whom do people communicate?

- Why do they communicate with those people?

- How frequently do they communicate with those people?[7]

Companies can determine this information by interviewing employees and asking questions that attempt to determine the previous three points. Once the information is gathered, individuals can then analyze the data and produce an overlay to the organizational chart that has dotted lines showing informal lines of communication and reporting.

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[4] Phyllis Gail Doloff, February 1999, "Beyond the Org Chart," *Across the Board* Vol 36(2), p. 43, [Internet, WWW, Database], *Available*: Business Source Elite from EbscoHost; ADDRESS: http://search.epnet.com/, [Accessed: 29 April 2003]. A copy of this article is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.

[5] Doloff, 1999.

[6] Doloff, 1999.

[7] Doloff, 1999.

One of a company's most precious resources and yet, one if its least understood, is knowledge capital. Perhaps this stems from a limited understanding of how knowledge is created and shared within an organization. Millie Kwan and Pak-Keung Cheung explain the process of sharing and transferring knowledge.[8] They point out that researchers typically don't spend much, if any, time determining how individuals share their knowledge. Kwan and Cheung constructed a framework for identifying steps within the knowledge transfer process through a carefully selected sample of papers providing empirical research on the knowledge transfer process within organizations. They built upon and improved the frameworks of other researchers to develop their own four stage process. The four stages of their process are:

1. Motivation
2. Matching
3. Implementation
4. Retention[9]

This article will play an extremely important role in the research project. It will help to develop questions that seek to examine the social ties between engineers and outsourcing partners. The four stages will also provide a framework with which to measure success or failure of knowledge transfer among research subjects.

Kwan and Cheung maintain that during the motivation stage, a person realizes that he is deficient in some form of knowledge and that deficiency prevents him from completing a

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[8] Millie M. Kwan, and Pak-Keung Cheung, January-March 2006, "The Knowledge Transfer Process: From Field Studies to Technology Development," *Journal of Database Management* Vol 17(1), p. 16, [Internet, WWW, Database], *Available:* ABI/Inform Full TextDatabase from Proquest Information and Learning; ADDRESS: http://proquest.umi.com/,[Accessed: 11 December 2005]. A copy of this article is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.
[9] Kwan and Cheung, 2006.

given task. Once he has identified the missing knowledge, he tries to locate someone who he

believes has the necessary knowledge. Kwan and Cheung define this event as the matching

stage. They stress that matching is often very difficult for a variety of reasons. One reason is

that both participants must be comfortable with each other. Another reason is that strong

social ties, perceived rivalries, and the complexity of the knowledge sought all play a vital

role in the process. Kwan and Cheung state that the implementation stage occurs when the

person seeking the knowledge is able to utilize it. They point out that this is an iterative step

because the recipient must often fine tune the knowledge so that it fits his particular need.

The final portion of Kwan and Cheung's process is retention. Retention begins once the

recipient is comfortable using the new knowledge and incorporates it into his own wealth of

knowledge.[10]

Kwan and Cheung stress that one of the most important factors in every stage of the

process is the existence of strong social ties among the participants. They repeatedly point

out that the two people in the knowledge transfer equation must be comfortable working with

each other. Trust and reliability are key terms. They also find it important to note that

physical distance among the participants can limit the effectiveness of the transfer process.[11]

While researchers focus on knowledge transfer as it pertains to individuals, others are

also delving into an area known as organizational memory. Sree Nilakanta, L. L. Miller, and

Dan Zhu explain the concept of organizational memory.[12] They explain that as individuals

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[10] Kwan and Cheung, 2006.
[11] Kwan and Cheung, 2006.
[12] Sree Nilakanta, L.L. Miller, and Dan Zhu, January-March 2006, "Organizational Memory Management:
Technological and Research Issues," *Journal of Database Management* Vol 17(1), p. 85+. [Internet, WWW,
Database], *Available:* ABI/Inform Full TextDatabase from Proquest Information and Learning; ADDRESS:
http://proquest.umi.com/,[Accessed: 11 December 2005]. A copy of this article is in the student's possession
and maybe consulted by contacting the student at phettepb@msoe.edu.

store up ideas and memories that help to form tacit knowledge, organizations, as an entity, do the same. Research into organizational memory has lead to better knowledge management systems or organizational memory systems (OMS). Nilkanta, Miller, and Zhu describe these systems as a database to hold consolidated information and an application front end used to manage the information.[13] They maintain that any successful OMS should allow for the storage of multiple types of memory and the ability to "represent, capture, and use organizational memory."[14] Nilkanta, Miller, and Zhu also point to organizational learning as a critical component of organization memory. They define transactive memory as the "information stored in each individual member's memory and the awareness of the type of information held by other members of the group."[15] This awareness is important during the matching stage proposed by Kwan and Cheung. When individuals within a group or team know which other members of the team possess knowledge of a specific subject, they have a starting point when they need information about a given subject. If everyone on the team knows Tom has ten years of experience working with databases, they will be quick to seek Tom's advice when they need help with a database problem. Without this awareness, they would be at a disadvantage in their search for information since they may have no idea how to begin solving the problem.

While these systems allow for increased efficiency in capturing and storing organizational data, they are not without pitfalls. As the memory repository within the OMS grows, the more difficult it can become to locate a specific piece of information.[16] These tools also fail to acknowledge the importance of the individual in the knowledge life cycle.

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[13] Nilakanta, Miller, and Zhu, 2006.
[14] Nilakanta, Miller, and Zhu, 2006.
[15] Nilakanta, Miller, and Zhu, 2006.
[16] Nilakanta, Miller, and Zhu, 2006.

As often noted by Kwan and Cheung, individuals with little or no opportunity to form close social ties will be less likely to share their tacit knowledge. This research will help identify the types of systems, if any, in place within the research subjects' respective environments.

One of the errors knowledge system designers make is the failure to recognize that systems cannot store knowledge. They can only store data. When data are combined, they form information. And when information is given context, only then can it become knowledge.[17] A database can only store data. Data are a "set of discrete, objective facts about events."[18] Data, then, comprise information. Information is data with a defined meaning.[19] These definitions are important to note in any discussion of software applications that attempt to store and maintain knowledge.

Information can only become knowledge when a human is involved, because the concept of knowing is a function of the human mind.[20] Numbers and letters stored on a computer are data or information at best. Only when a person reads and understands the data does it become knowledge. While creating an organization wide repository of knowledge may seem like a good idea, organizations, as non-living entities, can neither care about nor utilize knowledge. That ability is uniquely human.

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[17] Ilkka Tuomi, Winter 1999-2000, "Data is More Than Knowledge: Implications of the Reversed Knowledge Hierarchy for Knowledge Management and Organizational Memory," *Journal of Management Information Systems* Vol. 16(3), p. 103. [Internet, WWW, Database], *Available*: Business Source Elite Database from EbscoHost; ADDRESS: http://search.epnet.com/. [Accessed: 6 November 2003]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

[18] Tuomi, 2000.

[19] Tuomi, 2000.

[20] Richard McDermott, Summer 1999, "Why Information Technology Inspired But Cannot Deliver Knowledge Management," *California Management Review* Vol. 41(4) p. 103+, [Internet, WWW, Database], *Available*: Corporate ResourceNet Database from EbscoHost; ADDRESS: http://search.epnet.com/. [Accessed: 26 October 2003]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

Outsourcing

Media headlines, such as "Offshoring is Not the Answer"[21] and "Offshoring Offers Greater Flexibility"[22] have brought the subject of outsourcing, particularly offshoring, to the public's attention. Some of the negative stories are simply fueled by fear and misunderstanding while others are rooted in truth. Individuals, concerned about the loss of jobs, have questioned the benefits of outsourcing to offshore vendors. There are a wide variety of reasons why outsourced projects fail. Fear of job loss and lack of visibility to the progress of the project gives "in-house talent critical to the program's success good reasons to disrupt the program."[23] Two reasons for high failure rates among offshore ventures are transition challenges and difficulty dealing with cultural issues.[24] Of 90 offshore projects followed between 2001 and 2004, 50% have failed.[25]

Another effect of offshoring is wage reduction. When companies send IT jobs offshore, the demand for onshore workers decreases. This often causes onshore IT wages to decrease accordingly.[26] All of these effects serve to compound a paranoia surrounding

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[21] Tom Sullivan, 19 September 2006, "Offshoring is not the answer," [Internet, WWW], *Available:* InfoWorld Daily website; ADDRESS: http://weblog.infoworld.com/daily/archives/2006/09/offshoring_is_n.html, [Accessed: 23 September 2006]. A copy of this article is in the student-author's possession and may be consulted by contacting the student author at Phettepb@msoe.edu.

[22] Christian Annesley, 18 September 2006, "Offshoring Offers Greater IT flexibility, says Norwich Union," [Internet, WWW], *Available:* ComputerWeekly website; ADDRESS: http://www.computerweekly.com/Home/Articles/2006/09/18/218531/Offshoring+offers+greater+IT+flexibility, +says+Norwich.htm, [Accessed: 23 September 2006]. A copy of this article is in the student-author's possession and may be consulted by contacting the student author at Phettepb@msoe.edu.

[23] "Recipe for offshore outsourcing failure: Ignore organization, people issues," September 2004, *ABA Banking Journal*. P. 56+, [Internet, WWW, Database], *Available:* ABI/Inform Full TextDatabase from Proquest Information and Learning; ADDRESS: http://proquest.umi.com/, [Accessed: 11 December 2005]. A copy of this article is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.

[24] "Recipe for offshore outsourcing failure: Ignore organization, people issues," September 2004, *ABA Banking Journal*. P. 56+.

[25] "Recipe for offshore outsourcing failure: Ignore organization, people issues," September 2004, *ABA Banking Journal*. P. 56+.

[26] "Recipe for offshore outsourcing failure: Ignore organization, people issues," September 2004, *ABA Banking Journal*. P. 56+.

outsourcing. When management does not plan well or explain its rationale for outsourcing, the entire process can break down and the project can fail.

The articles reviewed in this section help identify key areas that the researcher can delve into when creating survey and interview questions. The researcher can also look for parallels among any failed projects that participants were involved in or perhaps identify new areas for study.

While there may have been complex and varied reasons for outsourcing projects to fail, cost overruns are a common reason. Author Stephanie Overby points out that outsourcing projects often fail because the project wound up being more expensive than first thought.[27] She stresses that companies should not turn to offshoring as a quick fix to money woes. Rather, they should think of it as any other long-term investment. She lists six key costs that companies underestimate when offshoring:

1. The cost of selecting a vendor

2. The cost of transition

3. The cost of layoffs

4. The cost of culture

5. The cost of ramping up

6. The cost of managing an offshore contract [28]

Overby cautions that when companies quickly jump into an offshoring project, they often fail to consider the cost of multiple trips to the vendors for interviews and contract negotiations.

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[27] Stephanie Overby, 1 September 2003, "The Hidden Costs of Offshore Outsourcing," *CIO Magazine online,* [Internet, WWW], *Available: CIO Magazine website*; ADDRESS: http://www.cio.com/archive/090103/money.html, [Accessed 9 September 2003]. A copy of this article is in the student-author's possession and may be consulted by contacting the student author at Phettepb@msoe.edu
[28] Overby, 2003.

Often times, vendors are flown to the home office for orientations and meetings as well. Over time, these overlooked costs can add up significantly.

The transition phase is often the most costly stage of the entire process.[29] Team leaders or entire teams may fly back and forth for training and knowledge transfers. The IT infrastructure on both sides needs to be strengthened and integrated as well. Depending upon the type of project attempted, the local IT staff may have to provide external access to their networks. This can expose the company to new security risks it had not previously faced. This in turn could force the company to purchase upgraded equipment and software. Performance can also be a key factor. When the contractor team is located in India or China and the local team is in the United States, the wide area network linking the two teams must cross over other network switches and routers which neither team controls. Some of this hardware may not be capable of supporting the desired response time of both teams and may even make the remote connection capabilities for both teams unusable. Local teams may be forced to send personnel, equipment, and software to the offices of the contractor teams to help establish usable connectivity. The cost of performing this work may not be something the local teams planned for which could cause them to go over budget before even getting the project started.

A potential side effect of offshoring is layoffs of domestic workers. Companies must pay out severance and benefit packages and morale may suffer among those left which could increase attrition.[30] Also, those who are left may harbor anger towards the offshore vendor and become obstacles to the project's success.

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[29] Overby, 2003.
[30] Overby, 2003.

One less visible area that provides additional cost during outsourcing is culture. Cultural differences can lead to productivity problems and missed deadlines because of an offshore vendor's unwillingness to push back on poor designs or unrealistic goals.[31]

Companies and employees get used to working within a specific framework and with certain processes. When a project goes offshore, the vendor will be completely unfamiliar with corporate standards and rules. Teaching the vendors what they need to know may involve costly and time-consuming definition and documentation of procedures.[32]

Finally, companies may find that they need to hire an additional project manager whose sole purpose is to manage the offshore project.[33] This person may have to handle negotiations, proposal reviews, and act as a liaison between the two teams.

While there are certainly valid reasons for people to fear offshoring, some of the concern is fueled by extreme numbers presented by the media. Most of the estimates provided to the media for the number of jobs that will be outsourced are exaggerated and do not explain well how they were derived.[34] One example is the Forrester report that predicted 3.3 million jobs would be lost to offshoring.[35] What is not often noted, though, is that this number is across fifteen years.[36] This implies that per year, 220,000 jobs out of 130,000,000

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[31] Overby, 2003.

[32] Overby, 2003.

[33] Overby, 2003.

[34] Daniel Drezner, May/June 2004, "The Outsourcing Bogeyman," *Foreign Affairs* Vol. 83(3), p. 22, [Internet, WWW, Database], *Available*: Corporate ResourceNet Database from EbscoHost; ADDRESS: http://search.epnet.com/. [Accessed: 24 April 2004]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

[35] Forrester Research, 11 November 2002, "Forrester Research: 3.3 Million Research Jobs to Go Offshore," [Internet, WWW], *Available:* Forrester Research Group website; http://www.forrester.com/ER/Research/Brief/Excerpt/0,1317,15900,00.html, [Accessed: 2 September 2006]. A copy of this website is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

[36] Drezner, 2004.

in America would be affected while 22 million new ones would be added by 2010.[37] Drezner also contends that companies observe other companies outsourcing and follow suit. Once some of these projects start to fail, the trend will level out.

Drezner's article will help the researcher to recognize attitudes towards outsourcing among developers. This is one of the more subjective and emotional areas of the study and understanding developer feelings on the matter will be very beneficial.

The reviewed literature for both outsourcing and knowledge management suggests that the combination of both subjects will provide a complex and sometimes emotional hybrid. Regardless of the rationale involved with outsourcing, people will be impacted. The literature shows some will lose their jobs. Others will take on additional duties. Companies will spend more money than they initially planned. What remains to be seen is how the entire process will affect people's abilities to transfer knowledge among themselves. The following section will attempt to answer that question.

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[37]   Drezner, 2004.

Research Purpose and Question

This study was performed in order to investigate the interrelatedness of knowledge management and outsourcing as it pertains to software engineers. It did not seek to determine whether or not outsourcing is a useful business practice or evaluate historical or ongoing projects from a business perspective. The primary research question asked was: What are the effects of outsourcing on knowledge transfer among software engineers?

Methods

Research Type

The researcher began the research process by performing separate literature reviews on knowledge transfer and outsourcing. It soon became evident that there was a dearth of literature and studies that directly linked the two subjects. The researcher decided that primary research involving software engineers would be required.

Participants

Research subjects included software engineers aged eighteen or older, of both genders, and all experience levels. Participants in the study were either currently or had been involved with outsourcing of some or all elements of the software development process within the last twelve months. All participants were informed prior to being interviewed or surveyed that their anonymity would be protected. Survey participants were not limited to any specific geographic region. However, due to logistics reasons and the researcher's desire to interview them face-to-face, interviewees were geographically restricted to the same

demographic area. This may have affected the richness of the data gathered via interviews as opposed to the surveys but the sheer volume of survey respondents and geographic sprawl precluded the researcher from traveling out of state or country to interview survey respondents.

Role of the Researcher

The researcher is a software engineer with over ten years of experience designing and writing software applications for the customer service, supply chain logistics, and healthcare industries. The researcher has also been involved with outsourcing software development projects. The researcher has managed teams of offshore engineers and been involved in the entire software design lifecycle of the projects with these engineers.

Data Collection

A key factor that influenced the data collection process was the Milwaukee School of Engineering's Institutional Review Board (IRB). The IRB provided the necessary guidelines and oversight throughout the entire process. Because the research question focuses on human subjects, the IRB's main concern was protecting the rights of those subjects. The research process consisted of interviews and a web-based survey. The IRB reviewed and helped revise each question that could potentially compromise the anonymity of research subjects. At times, it became a difficult balancing act to protect participant anonymity and yet ask the appropriate questions to gather the necessary data.

After multiple iterations of review and rework, the IRB granted "exempt from review" status to this research project. The multiple iterations were necessary for the researcher and IRB representative to work together to narrow the scope of the project. The

researcher's initial plan was to gather data from senior management, front-line management, and engineering personnel to determine how outsourcing affects the knowledge management efforts at software companies. The IRB representative wisely pointed out that not only would it be difficult for the researcher to manage the scope and logistics of gathering data from that many varied participants, but it would also be much more difficult to protect the anonymity of the subjects when crossing so many layers of a corporation. The representative also noted that the term "knowledge management efforts" was too vague and lacked focus. Additionally, the representative warned that outsourcing may greatly differ from corporation to corporation. This timely information helped the researcher to rethink and focus the research question. Through this process, the researcher narrowed the target subject group and produced a manageable research proposal. Initially, the researcher wanted to contact survey respondents for follow-up interviews. However, the IRB concluded that contacting survey respondents after receiving their comments would violate their anonymity. This was the primary reason for selecting interviewees outside of the pool of survey respondents. Through a careful and collaborative effort, the researcher was able to redesign the study so that the IRB was satisfied that none of the questions would compromise anonymity or negatively affect the respondents' work or personal lives.

The survey contained fifteen mandatory multiple choice questions and one optional additional information entry area. A link to the survey was posted to software engineering UseNet newsgroups and software development oriented websites. In order to maximize responses and avoid webmasters removing the survey request as spam or inappropriate posting content, the researcher contacted the webmaster of each selected site prior to posting the survey link. For some sites, the webmaster simply stated that the survey request posting

would be allowed. On other sites, the webmaster posted the survey link and requested that site visitors help the researcher by taking the survey. The survey link remained active for approximately three months. The total number of respondents was 158.

The survey itself was hosted by the Ioxphere website (www.ioxphere.com) which is the required medium for all MSOE-based survey research. The researcher received training from MSOE CCSD staff on the usage of the Ioxphere software. The researcher then utilized the Ioxphere survey creation wizard to build and maintain the survey. The development process was both beneficial and limiting at the same time. It was beneficial because a third party administered the entire site and software. This saved the researcher time because he did not have to design and write the software used to build the survey. He also did not have to locate a website to host the survey. However, the capabilities and features of the survey creation software were somewhat limiting. The researcher was required to operate within the confines and parameters of the software. This sometimes forced the researcher to modify his plans as he found out that the software was incapable of performing tasks he had hoped to be able to perform. Additionally, the statistical analysis and data presentation tools within the Ixophere software were insufficient for the level of analysis and study the researcher wished to perform. Fortunately, the software allowed for a mass export of the raw data for further study and codification within other tools.

The interview process consisted of ten standard questions with additional follow-up questions as needed. The researcher interviewed four local software engineers who agreed to be interviewed. The identification and selection of interview candidates proved to be one of the most difficult and frustrating tasks of the entire data gathering process. As stated previously, it was logistically impossible for the researcher to travel outside of the local area

to personally interview subjects. The researcher contacted software engineers with whom he had previously worked or knew through other contacts. In most cases, the potential interviewee did not meet the required criteria set forth by the study. Some potential subjects were found to be acceptable candidates but were told by their managers that they should not participate in such a study. These candidates informed the researcher that they were of the opinion that their respective managers were afraid of potential bad press resulting from the interviews and that their management of the outsourcing projects would be called into question. Regardless of the rationale, the researcher was unable to interview these candidates. In addition to software engineers, the researcher also contacted development managers he knew in order to gain access to interview their engineers. Some managers never responded to the solicitation. Another one specifically said that she wanted to help but that "you just have to trust me when I say that I can't let you interview my people." Ultimately, the researcher was not able to gain permission from any managers to interview some of their engineers.

Another aspect that added to the difficulty of recruiting subjects was that the IRB had to approve the wording of every solicitation email. Since the researcher had not been in contact with some of the engineers for quite some time, it would have been awkward to send an impersonal form letter to each potential subject. Unfortunately, the turn around time required for approval for an individualized email to each potential subject was not feasible. Therefore, the researcher developed as much of an individualized form letter as possible.

Once all the subjects were recruited, the next obstacle became scheduling the interview. Some subjects, who had initially agreed to be interviewed, later chose not to take part in the process. This required a new recruitment effort. Once all subjects had verified that they were willing to be interviewed, the researcher began to schedule interviews. One subject

became difficult to reach after he initially agreed to be interviewed and the entire process

from the point he agreed to be interviewed to the actual interview took one and one half

months. Another engineer repeatedly asked to reschedule the interview with short notice. Of

the four engineers ultimately interviewed, the researcher was only able to interview one on

the day originally agreed upon.

Each engineer interviewed was given a pseudonym to protect his identity. The

primary concern of the IRB in this step was that the interviewees might make comments

about their employers that could negatively affect their employment. Each interview was

conducted at the researcher's home and was recorded onto a digital voice recorder. Once the

interview was transcribed, the original recording was destroyed. The researcher also asked

those who were interviewed to anonymously respond to the survey.

Data Analysis

After collecting the data, the researcher began the process of conducting meta-

research on methodologies for analyzing and formatting the data. For purposes of layout and

formatting, the researcher reviewed Eunsook Hyun and Genevieve Davis' paper entitled

"Kindergartner's Conversations in a Computer-Based Technology Classroom."[38]

The researcher also investigated methodologies for performing statistical analysis

upon qualitative data. To aid in this step, the researcher reviewed and studied the

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[38] Eunsook Hyun and Genevieve Davis, April 2005, "Kindergartners' Conversations in a Computer-Based Technology Classroom," *Communication Education* Vol. 54(2), pp. 118+, [Internet, WWW, Database], *Available:* ABI/Inform Full Text Database from Proquest Information and Learning; ADDRESS: http://proquest.umi.com/, [Accessed: 12 September 15, 2006]. A copy of this website is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

methodologies presented in chapter seven of Paul D. Leedy and Jeanne Ellis Ormrod's book

Practical Research: Planning and Design.[39]

Once he had decided upon a format and methodology, the researcher utilized a two-phase approach of analyzing the survey and interview data separately and then in conjunction with each other. The researcher began the interview data analysis process by repeatedly reviewing the transcripts. Early on in the process, the researcher simply highlighted comments that seemed to convey extra meaning or emotion on the part of the interviewee. During the transcription process, the reviewer made notes on non-verbal queues that the interview subject displayed. If the subject laughed or became angry when speaking of a particular aspect of his outsourcing memories, the researcher noted this in the transcript. After each subsequent review, the researcher grouped and categorized the comments according to themes common across all interviews. The researcher then began the process of examining the survey data.

Since the data gathered from the survey were already more codified than the interview data, the researcher was able to perform some initial quantitative statistical analysis upon them. The information resulting from this analysis is available in graphs and charts starting with **Figure 1**. The Ioxphere website provided the ability to convert the raw data into chart data. However, there was limited ability to customize the charts or perform analysis outside of that which was provided by Ioxphere. For this reason, the researcher exported all survey data from Ioxphere and imported it into Microsoft Excel for analysis and charting. This included, but was not limited to, techniques such as frequency distribution, cross

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[39] Paul D. Leedy and Jeanne Ellis Ormrod, 2005, *Practical Research: Planning and Design* (New Jersey: Pearson Prentice Hall), p. 133.

tabulation, and graphing. However, since some of the responses were created with free-form text entry as opposed to multiple-choice, some additional codification of the survey data was necessary in order to further reduce it to a manageable form. One unique aspect of the survey data was the responses given in the free-form fields. The researcher was able to perform the same type of theme-sorting analysis on these data as with the interview data. The researcher separated the comments from the rest of the data and placed them all in a spreadsheet. The researcher was then able to look for keywords and phrases within the comments. Additionally, the researcher added a column next to each comment that indicated whether or not the comment was negative with respect to outsourcing. This was a purely subjective designation that the researcher made based upon language in each comment. However, it allowed for a basic analysis of the ratio of negative to positive or neutral comments. This made cross tabulation of negative comments across communication methods possible.

After separating and categorizing the individual data groups, the researcher cross-examined the two separate data sources and noted the similarities and differences between them. The following section describes the researcher's findings that were derived from the data and methods described above.

Data Discussion

Participant Demographics

The purpose of this research was to determine the effects of outsourcing on knowledge transfer among software engineers. However, the data show that the answer to this question depends greatly upon the definition of software engineer. If *software engineers* are defined as programmers within the company outsourcing the work, the data suggest a

relatively small effect of outsourcing on the knowledge transfer among those engineers. However, if *software engineers* are defined as the larger group of programmers within the company doing the outsourcing and the programmers at the company performing the outsourcing work, the data present a much different picture.

Before delving into the findings of this research project, it is important to understand the demographics of the software engineers who responded to the survey. **Figure 1** shows that almost fifty percent of those surveyed had been in the industry for over ten years.
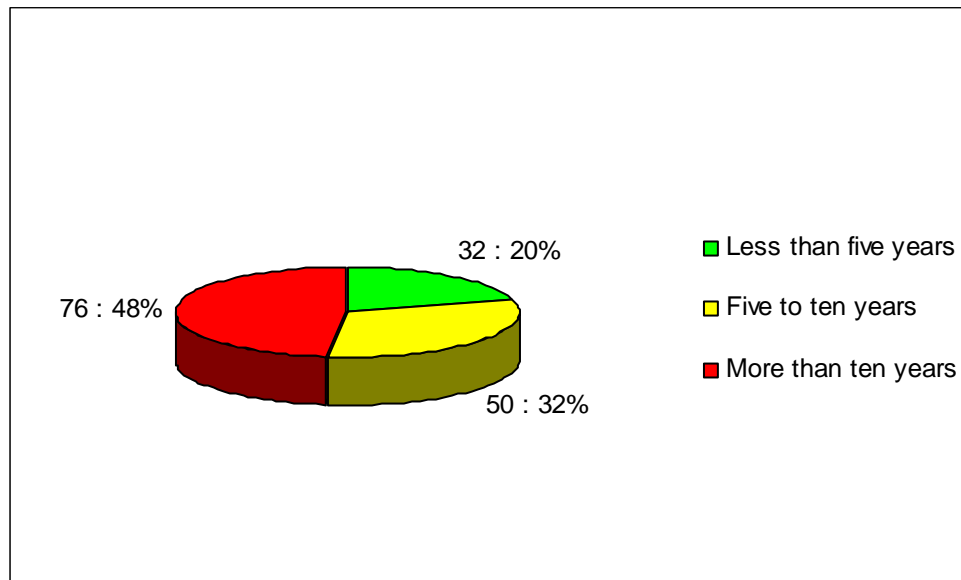

32 : 20% ☐ Less than five years
76 : 48% ☐ Five to ten years
50 : 32% ☐ More than ten years

Figure 1: Number of Years in the Industry.

In contrast to their number of years in the industry, the respondents were relatively new to both their companies and their development teams. Of those software engineers surveyed, 61% had been with their current companies less than five years and 77% had been with their teams less than five years. **Figure 2** and **Figure 3** display the breakdown of years with company and years with current team respectively.
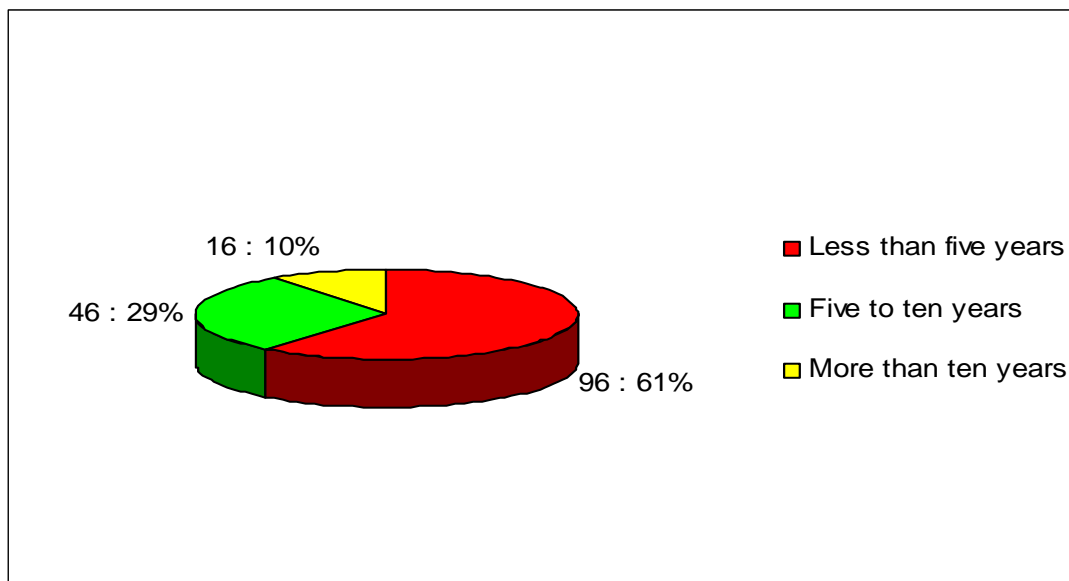
Figure 2: Number of Years with Current Company.
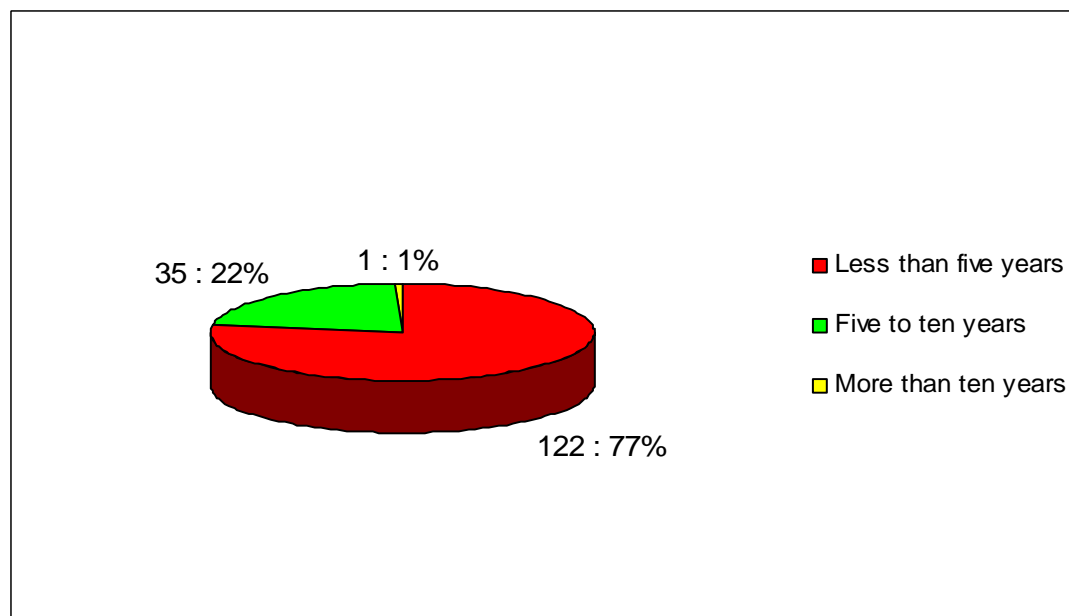

Figure 3: Number of Years with Current Team.

One explanation for this degree of turnover is the failure of many Internet based companies in the early 21st century. Investors no longer risked investing in computer technology. This

forced companies to cut their workforces. According to a 2004 *USA Today* article about the technology industry's downturn, "nearly every tech company ordered cuts after the bust of 2000."[40] These cuts displaced thousands of workers who were forced to find new jobs. As the economic downturn continued, companies continued to lay off workers, some of whom had already been laid off.

The survey did not explicitly ask respondents for their opinions on outsourcing. However, the sixteenth question, which simply allowed subjects to freely enter comments, provided an opportunity for respondents to list anything they felt was relevant to their situation. Of the 158 respondents, forty-one entered optional comments. Of those forty-one, twenty-six were from people who had been in the industry for more than ten years. Thirteen comments came from people who had been in the industry between five and ten years. Only two people who had been in the industry less than five years entered comments. There is nothing in the data that suggests why there was such a discrepancy. Perhaps those with more experience felt compelled to share it within the survey. It's also possible that those with less experience simply had nothing they wished to share. These findings were included within this analysis to draw attention to the fact that the opinions provided via comment entry, originated from highly experienced subjects and should be respected as such.

Data Themes

There were no explicit questions in the survey asking people for their feelings on outsourcing. However, respondents who had strong feelings took advantage of the free-form

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[40] Michelle Kessler, 12 April 2004, "Dot-com bust isn't over for workers," *USA Today*, [Internet, WWW], *Available: USA Today* website; ADDRESS: http://www.usatoday.com/money/industries/technology/2004-04-12-tech-recovery_x.htm, [Accessed: 26 August 2006]. A copy of this article is in the student's possession and may be consulted by contacting the student at phettepb@msoe.edu.

question to provide their thoughts. Of the forty-one people who entered optional comments, twenty-seven were critical of their outsourcing experience. Repeated analysis and synthesis of the survey and interview data produced five common themes:

1. Morale
2. Communication
3. Locale Differences
4. Rationale
5. Planning

The following section will describe each of these themes in detail. It will highlight examples of sub-themes that comprise the major themes by presenting material from specific subjects and graphical representations of key data points.

Morale

One of the first themes to emerge from the data was morale. That data suggest that the outsourcing of software projects negatively impacted the morale of the local teams. Occasionally, there was outright anger and hostility voiced by comments such as "IT SUCKS!" Other comments were subtler but made their point: "Our group was left with the liaison job after the damage was done." There were two major sub-themes that contributed to the decline in morale: motivation and increased stress. The following sections describe how motivation and increased stress contributed to lagging morale.

Motivation

Interviewees and survey respondents noted a decrease in motivation as a result of the outsourcing project. This decrease in motivation was fueled by factors such as the lack of new challenges and the loss of control over many aspects of their jobs. For example, one respondent wrote that the project "demoralized existing staff as all the new development went to the contractors and all the existing support/maintenance stayed with the current staff." Another lamented "outsourcing decisions and specifications were outside the team's control." These comments show that the subjects felt like they had lost control over their own destinies. They no longer received new and exciting development tasks. Presumably in the past, the local teams had input into part of the decision making process. However, as more work was outsourced, their skills and knowledge became marginalized.

Another contributor to lack of motivation was job loss. Subjects wrote of people becoming frustrated and leaving the project or the company altogether. Others wrote of having their positions eliminated because the work they had previously done was outsourced. A respondent wrote: "Most outsourced/laid off employees did not know what was happening until the week before they were gone." One commented read: "It was hard on some people. They were asked to teach their work to somebody and then they were asked to go." Other people within the company became complacent because they assumed any effort on their part would be in vain since their job could be easily outsourced at any time. One of the interviewees, Michael, said: "I think a lot of people that jumped ship, it was because of low morale and that fear that you know, well is my job going to be replaced by, by someone, you know, from an outsourcing company or a contractor?" If a developer fears his job may be outsourced at any time, he will have no vested interest in seeing a project become successful.

There is little point in working towards long-term goals if one does not believe they will be part of the long-term equation. Another respondent linked layoffs and morale by stating that his "in-house testing has been offshored to India. This has had a huge negative effect on employee morale. They essentially laid the testers off but they still have not got things up and running in India yet." By eliminating positions within the local testing staff, the company not only lost all of the knowledge retained by the testers, it put increased pressure on the development team to work with testers who were now thousands of miles away.

Increased Stress

Both interviewees and survey respondents complained of increased stress as a result of outsourcing projects. For some it was because of a heavier workload brought on by eliminated positions, more administrative overhead required, and the amount of rework generated by the contractors. For others, it was simply the fear of losing their jobs.

Of all of these factors, rework was the most prevalent. One subject wrote that "The American teams have had to build time in for extensive fixes when the code comes back." Apparently, the project plan did not provide for rework the magnitude of that which was required. The additional rework time has to come from somewhere else within the project timeframe. Either other phases of the project would have to be shortened or the overall timeline of the project would have to be increased. Neither option would be attractive to a project manager. Increasing the overall project length could have myriad negative effects. If the project is for a customer, the customer could reconsider funding it. If it is an internal project, the increased time could cause senior management to choose another more acceptable project to fund. If the overall timeline of the project were not increased, the extra

time would have to come from other phases of the project. This could force project managers to have to cut corners, potentially introducing quality problems. For example, integration testing could be shortened or even skipped altogether. Another possibility is that the overall quality assurance testing cycle could be shortened, introducing the potential to fail to uncover costly problems.

Another subject wrote: "After 7 months of working with another group within our own company, our team is now having to re-work their development anyway." And still another illustrated the total breakdown of the project by writing that "The outsourcing project became a complete failure with the internal team having to rewrite the entire work done to achieve the desired outcome." Starting over on the project was probably extremely stressful for both the local engineers and management. The engineers would have had to completely recode and perhaps even redesign the work that had already been completed. Management would have had to worry about meeting deadlines and managing the increased scope of the project which more than likely would not have padded the time estimates for a complete rewrite of the code.

The subjects also complained about how demoralizing it was to spend the time designing a system, putting in additional time working with the contractors to get the system or application coded, only to find that what they got back did not work, had poor quality, or did not even compile. They were angry at being required to perform this work with the contractors when they could have done it all themselves in a fraction of the time. When asked about morale, an interviewee named Alex responded:

> Sometimes there is a general feeling that when you are looking at some code
> that is fairly easy and you're looking at it from your perspective where you're
> experienced and you know, um, you have the domain knowledge and you are

looking at somebody who fixed it and didn't fix it right because he didn't
understand the functionality or didn't have the domain knowledge or didn't
know about the standards and the way we do things. Then it's really
frustrating because you know things that you could probably take a few
minutes to get it right, it's probably taking hours or even days for somebody
to fix it. So, that sometimes, brings the morale down and then you are not
hitting the dates like you want to.

Alex's comments highlight the frustration level that subjects had when the amount of time

required to perform a task greatly increased when dealing with contractors. He believed that

he could have quickly fixed the code and moved onto other tasks. Instead he had to try to

explain to the contractor, who did not have the amount of domain knowledge he had, how to

make the change. Additionally, he had to deal with the distance and time zones involved

which only further prolonged the process.

Michael also noted that "there was a lot of rework and in some cases it was just minor

things. But probably about 50% of the time, stuff just flat out didn't work." If returned code

did not work 50% of the time, it's clear that there was a major flaw in the knowledge transfer

at many levels of the project. Perhaps the designs the local team provided the contractors

with were inadequate. The local team may not have even provided designs to the contractors.

The contractor teams did not appear to know how to evaluate success or failure of their work.

This viewpoint was extremely common among interviewees and survey respondents. It was

clear they were very frustrated by the amount of rework they had to do. Michael explained

some of the frustration he experienced:

I think when the project was going on we were working with them, there was
a lot of rework. And a lot of things where, you would have to write up designs
and there would be communication issues between the two of you and they
would have questions about, well, what am I supposed to do with this point?
You know, how do I do this certain part of code? And a lot of times, my
experience was they, you'd explain it to them and you'd ask them if they

understood and they'd say yes, I understand. And then when review time
came around you'd get something completely different.

It's clear from Michael's comments that there was a communication problem between his

team and the contractor team. It's also interesting that he noted that the contractors said they

understood when in reality, they clearly didn't. When the contractors returned the code to

Michael, it became obvious to him that they did not understand even though they said they

had. Michael did not speculate on the reason why the contractors said they understood when

they really did not. One explanation could be the culture of the contractors. Authors Jerald

Greenberg and Robert A. Baron write in their book *Behavior in Organization*s that:

> Another factor that makes cross-cultural communication difficult is that
> different cultures sometimes have very different norms about using certain
> words. Take the simple word no, for example. Although the term exists in the
> Japanese language, the Japanese are reluctant to say 'no' directly to someone
> because doing so is considered insulting.[41]

Michael did not say from which country the contractors were based. Perhaps the contractor

was reluctant to tell Michael he did not understand. Perhaps he simply did not want to appear

incompetent to Michael. Regardless of the reasoning, there was a communication problem

between Michael and his contractor counterpart. As the following section describes, many of

the rework and quality problems could have been caused by poor or limited communication

between the local and outsourcing teams.

Communication

Communication was a very common theme within the data. Subjects complained of

communication problems at all levels of the project. In some cases, it was a language barrier

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[41] Jerald Greenberg and Robert A. Baron, 2003, *Behavior in Organizations* (New Jersey: Prentice-Hall), p. 332.

between the local team and the contractor team. One survey respondent wrote that language

"was also a major problem." Another mentioned how communication "with the outside team

is our biggest problem." One even wrote that "If you could understand 50% of their English,

then you were very lucky." Alex summed up his feelings on communicating with the

contractor team by saying that there "could be some difficulties expressing your thoughts and

they understanding what you are trying to communicate." It is extremely difficult to help or

be helped by someone when you cannot understand them and they cannot understand you.

The frustration level will rise when it becomes clear to both parties that they are not getting

their meanings across. Michael said: "The biggest problem was um, was when we were

working with the people from China and the language barrier was hands down the worst part

of it all." He further elaborated by saying:

> You'd get emails that sometimes made sense and sometimes didn't and there
> was even one time when I had to do, after hours, I had to do a sort of like a
> webinar thing with them. And trying to listen to questions, you know, all the
> way across the globe, you know, in a conference room where you can barely
> hear. Overall I think the communication link between them was rather poor.

As Michael recalled this particular incident, it was clear that he was disgusted with the

process at that point. He placed extra emphasis on 'after hours' to point out that he had to put

in additional time to conduct these discussions. Comments such as these illustrate the

frustration expressed throughout the data.

Since communication was noted as a problem, it is worth describing the methods

respondents utilized when communicating with the contractor teams. The survey question

that gathered the data allowed respondents to select all communication methods that were

applicable to their situations. The methods they were able to choose from included email,

phone, video conferencing, instant messenger, and other. For purposes of statistical analysis,

the responses required further codification. To accomplish that goal, a response of email was

reduced to E. A response of instant messenger was reduced to I. A response of phone was

reduced to P and video conferencing and other were reduced to V and O respectively. With

these codes in place, multi-selection responses were simply appended together. For example,

a response of email, phone, and instant messenger was coded as EPI. A response of phone

and other was coded as PO. The following table provides a comprehensive list of all

combinations of communication methods encountered within the data.

Acronym	Comprising Communication Methods
E	Email
EI	Email and Instant Messenger
EIO	Email, Instant Messenger, and Other
EO	Email and Other
EP	Email and Phone
EPI	Email, Phone, and Instant Messenger
EPIO	Email, Phone, Instant Messenger, and Other
EPIV	Email, Phone, Instant Messenger, and Video Conferencing
EPIVO	Email, Phone, Instant Messenger, Video Conferencing, and Other
EPO	Email, Phone, and Other
EPV	Email, Phone, and Video Conferencing
EPVO	Email, Phone, Video Conferencing, and Other
I	Instant Messenger
IV	Instant Messenger and Video Conferencing
O	Other
P	Phone
PO	Phone and Other

Table 1: Communication Method Combinations.

Figure 4 illustrates the variety of methods that respondents utilized during their outsourcing

projects. The response of 'Other' generally indicated face-to-face communication.
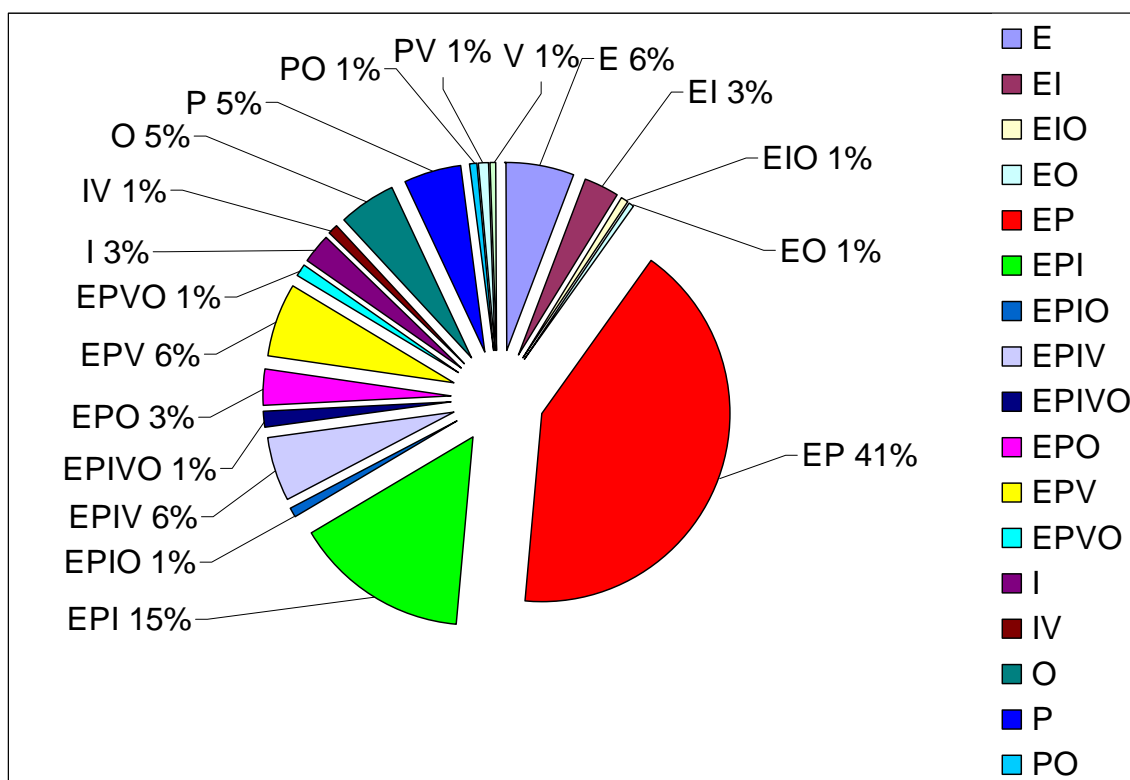
Figure 4: Communications Methods.

According to the figure, by far the most common communication method was a combination of email and phone. Of the twenty-seven people who entered negative or critical comments, eleven of them utilized phone and email as their only communication methods. This could indicate that these two methods alone lead to a substandard communication flow between the two groups. However, there is insufficient data to make that conclusion.

Perhaps more important than how respondents communicated was how often they communicated. The survey asked them to comment on how often they communicated both internally among themselves via meeting and with the contractor teams. **Figure 5** illustrates the frequency with which the local teams met.
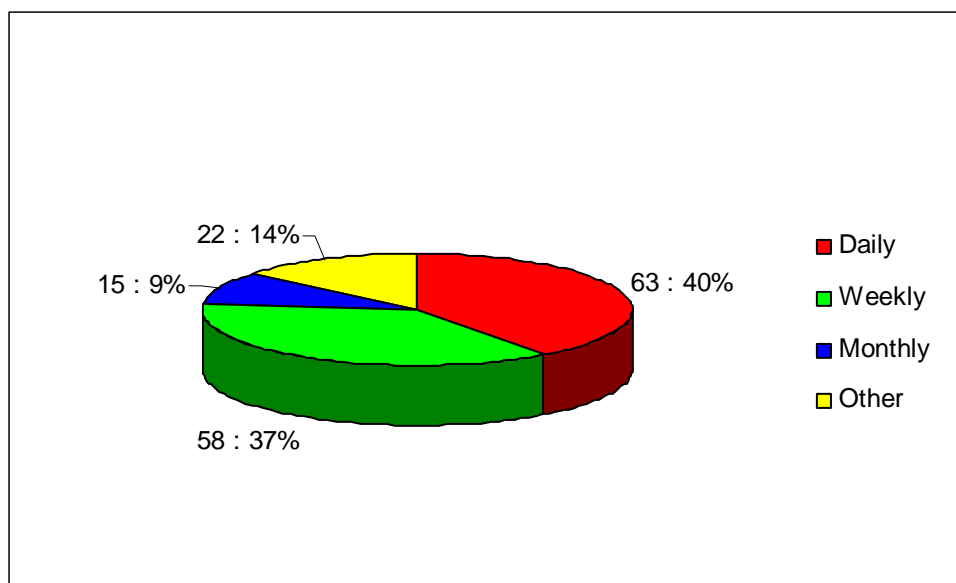
Figure 5: Local Team Meeting Frequency.

Most local teams met at least daily or weekly which should have helped to keep the lines of communication open. The data also show that local and contractor teams met and communicated quite frequently. **Figure 6** shows that the majority of those surveyed communicated with their contractor counterparts as often as needed.
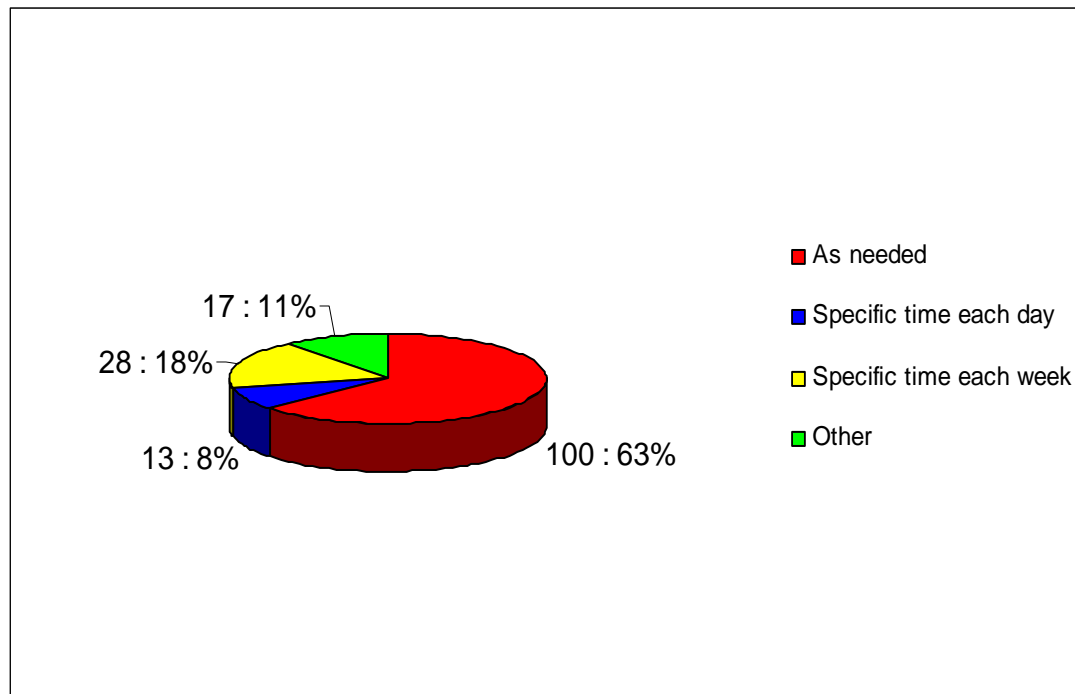
Figure 6: Contractor Meeting Frequency.

This should have facilitated good informational flow between the local and contractor teams. If people could communicate whenever they needed, they could get answers to their questions much more quickly. This would help to allow the projects to continue to move forward on schedule. However, the data also showed that the majority of companies appointed a single contact person on both teams. **Figure 7** illustrates the commonality of this practice.
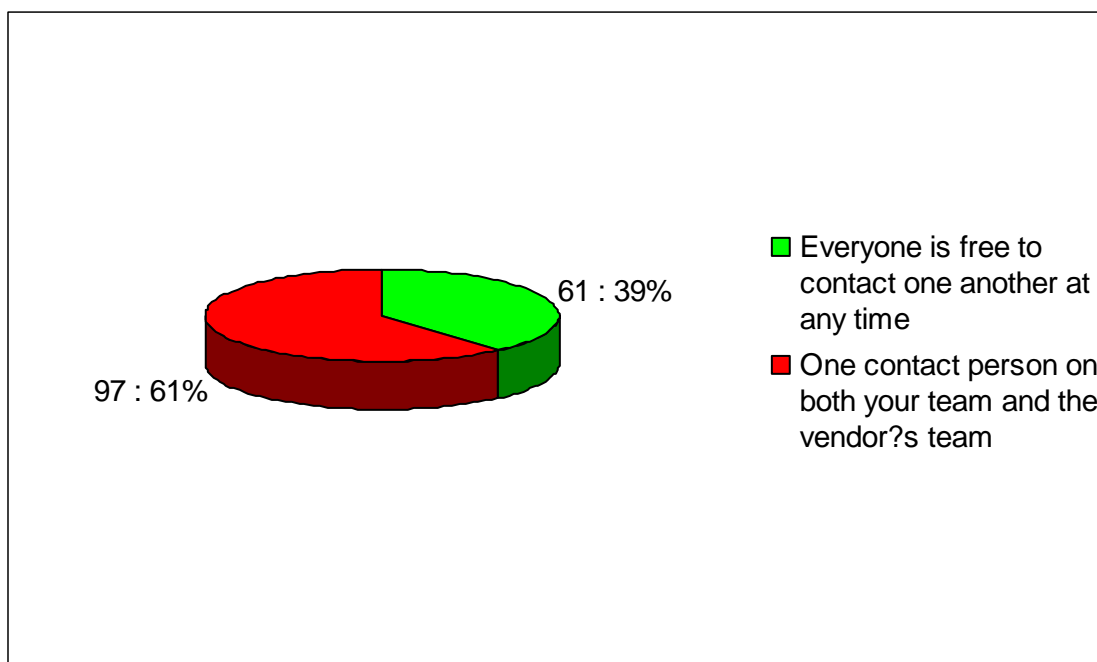
Figure 7: Contractor Team Point-of-Contact.

This procedure would provide a mechanism for people on both teams to be able to funnel

questions to a specific person rather than a free-for-all. It would make the tracking of

responses to questions much easier and would make the possibility of information loss

smaller. Unfortunately, it could also create a bottleneck. Depending upon the contact

person's workload, questions may not be asked or responded to in a timely manner. It would

also put the person needing the information at the mercy of the schedules of both contact

people. If the contact person was unexpectedly out sick or pulled away for a day or two, the

project could be held up. If there was a backup person on both sides, that person may not

have built up the necessary comfort level with his or her counterpart. Over time, the two

primary contact people should have developed a working relationship that allowed for easier

information transfer. Displacing one of the two contact people could have the effect of

upsetting that conduit and making knowledge transfer more difficult.

As Kwan and Cheung noted, social interaction is a key element in building trust among those who would share knowledge.[42] **Figure 8** shows that prior to the outsourcing project, 61% of the local teams met outside of work for some form of interaction such as meals or social events.
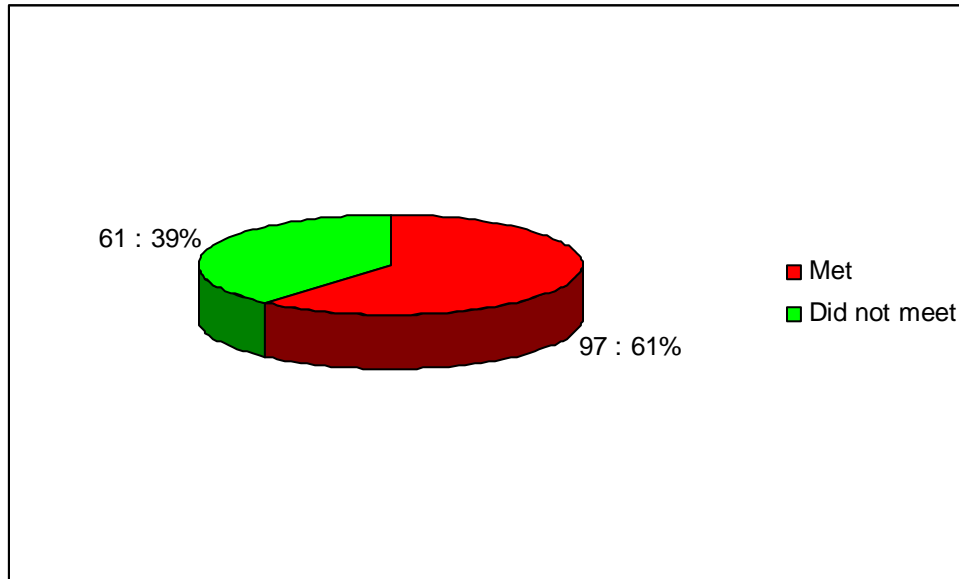

Figure 8: Percentage of Local Teams That Met Outside of Work Prior to Outsourcing.

Meeting outside of work allowed the local teams to develop social relationships. Whereas coworkers' relationships tend to start and end at the entrance to the company, coworkers with friendships will continue their interactions outside the office. This friendship allows people to build trust in one another. This trust and friendship will greatly aid in the transfer of knowledge between to people because the person is not only helping a coworker, he or she is helping a friend. **Figure 9** shows that after the outsourcing projects completed, 59% of the local teams still met outside of work.

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[42] Kwan and Cheung, 2006.
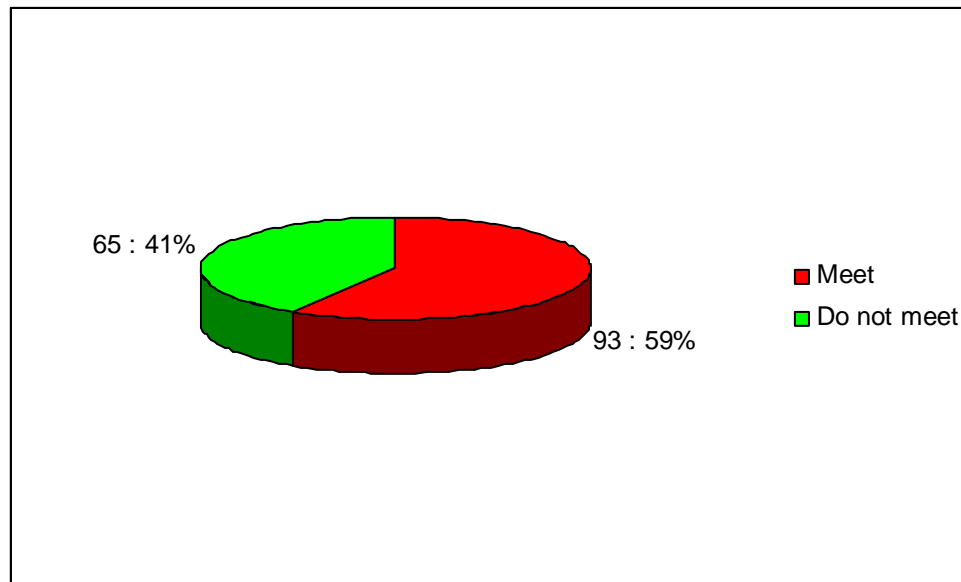
65 : 41%

93 : 59%

■ Meet
■ Do not meet

Figure 9: Percentage of Teams Meeting Outside of Work after Outsourcing.

While the survey did not ask for the reasons why a team did or did not meet after the

outsourcing project, the 3% change towards not meeting could be accounted for by teams and

team members changing after project completion. All interviewees also stated that they met

outside of work after completion of outsourcing projects with the same frequency as they met

prior to the projects.

In addition to communication problems, the data showed that the locale of both

parties can have a profound impact upon the schedules of both people and projects. The

following section describes the effect of locale differences on knowledge transfer as found

within the data.

Locale Differences

Respondents and interviewees were clear about their feelings regarding differences in

geographic location or locale between the local team and contractor team. Complaints of this

fact were widely evident in the data. One respondent pointed out that time zone is a "major problem. I felt like I was working 24/7 sometimes to support the China team." As noted previously, this increase in workload can often lead to lowered morale. When asked about his experience with working extra hours to support a contractor team, Alex said that the extra hours "did provide increased pressure on me which meant, I mean, time away from my family and sometimes my family didn't get, appreciate the fact that I was receiving calls late in the night and stuff like that and definitely you know, it bothered them." Alex's comment highlights a great point: the effect of increased stress upon the family of software engineers involved in an outsourcing project. There were no survey or interview questions that asked about family. Alex was the only subject to mention his family. However, it stands to reason that with non-single engineers working additional after-hours support, there could be some negative effects upon their families. More time spent away from their families could potentially lead to animosity towards the outsourcing project and perhaps even towards the contractor team.

As indicated by **Figure 10**, most companies outsourced their software projects to a separate company as opposed to another group or division within the same company.

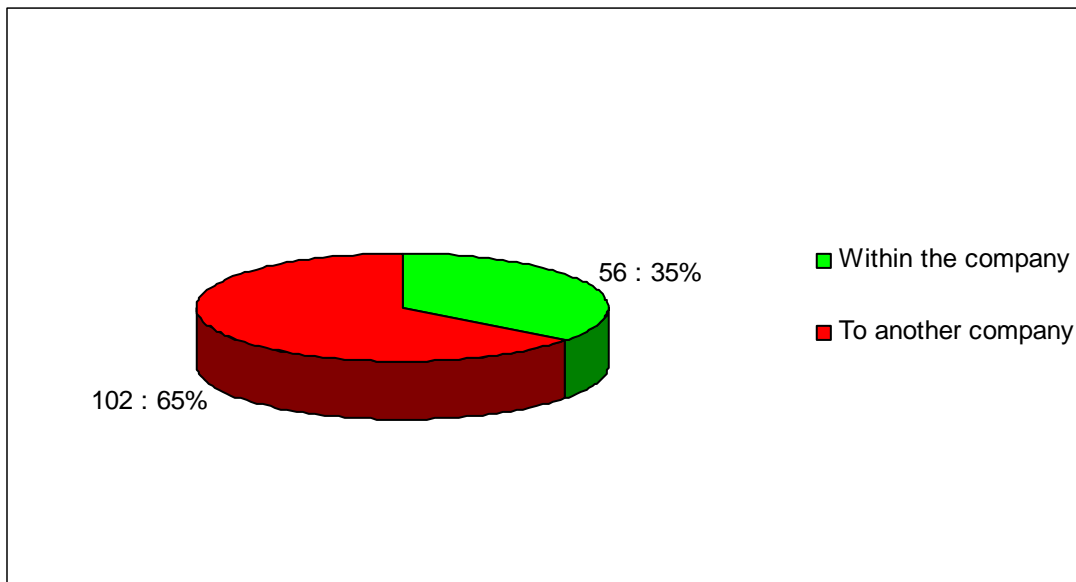**Figure 10: Outsourcing Company.**

To display the data relative to geographical location, **Figure 11** shows that almost half of the companies represented in the survey sent their work offshore. Somewhat striking though, is the fact that fully one quarter outsourced their work within the same building. Outsourcing to one's own company or bringing the contractors onsite would account for this figure.
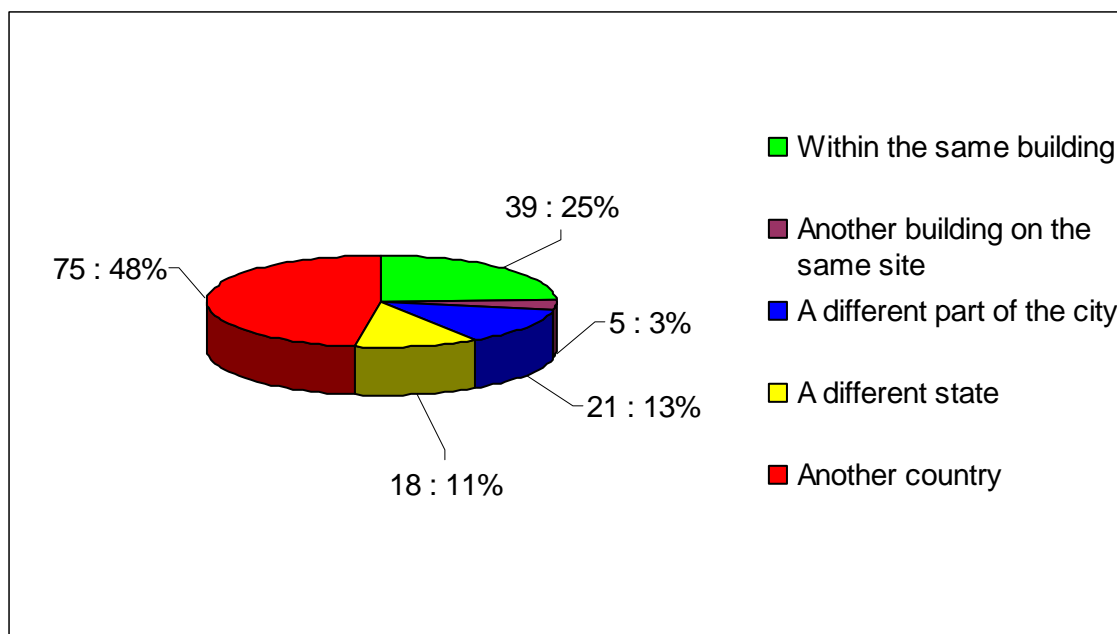
Figure 11: Outsourcing Company Location.

An interviewee named Steve said he was resistant to the idea of outsourcing: "I had to do a lot of working at night to communicate with them and develop a relationship." This was in addition to the eight or nine hours he normally worked. Alex noted that with "a twelve hour turn around you know, halfway around the world, it's hard to do that. It's hard even to basically pick up the phone and talk to the person because you know you're not on the same time." The overall consensus among respondents regarding time zone is best summarized by one respondent who wrote that working with a person "12 hours away creates a definite lag in getting things done." Subjects had to not only work their standard workday, they were asked to work after hours to support the project. They were frustrated at the turnaround time for activities that they used to quickly perform. To them, there was no benefit in sending their work to someone else, which increased the overall turnaround time and often had to be reworked anyway.

In addition to time zone, subjects blamed culture as having a negative impact upon the project. One respondent wrote that the vendor "is from India and their onsite employees like to huddle and speak Hindi in an attempt to conceal problems from us." Unless this respondent speaks Hindi, he or she probably cannot be certain that the contractors were trying to hide something. Because they were speaking another language, this respondent believed that they were conspiring. At the very least, it led to feelings of suspicion and mistrust. Another respondent compared the local and contractor teams by writing that the contractors' culture was "different and they had a different attitude." It is assumed that the subject meant different in a negative way. Unfortunately, without more data or elaboration, it is impossible to know in which ways the subject felt the contractor's culture and attitude was different. Since the subject felt the differences were important enough to include in the optional comments, one can infer that the differences were sufficient to bother him.

It is evident in the data that locale differences had a negative influence upon outsourcing projects. Because of the great distances and multiple time zones between the local and contractor teams, members of the local teams were required to work additional hours. Local teams had to be available before and after their normal work day in order to provide an overlap with the work day of the contractors. Because of this, some of the local teams experienced increased stress and sinking morale.

Rationale

Another common theme throughout the data was rationale. Subjects seemed to either not understand why work was outsourced or just disagreed with it. They believed that they could do the work faster, more efficiently, and with higher quality than their contractor

counterparts. **Figure 12** illustrates that management gave the majority of local teams some sort of rationale for outsourcing the work. It is, however, interesting that almost 40% were not told why work was being outsourced. When teams are not told why their companies wish to outsource work, they are left to guess at the reasoning. Without proper communication and upfront rationale, the local teams could only assume why projects were outsourced.
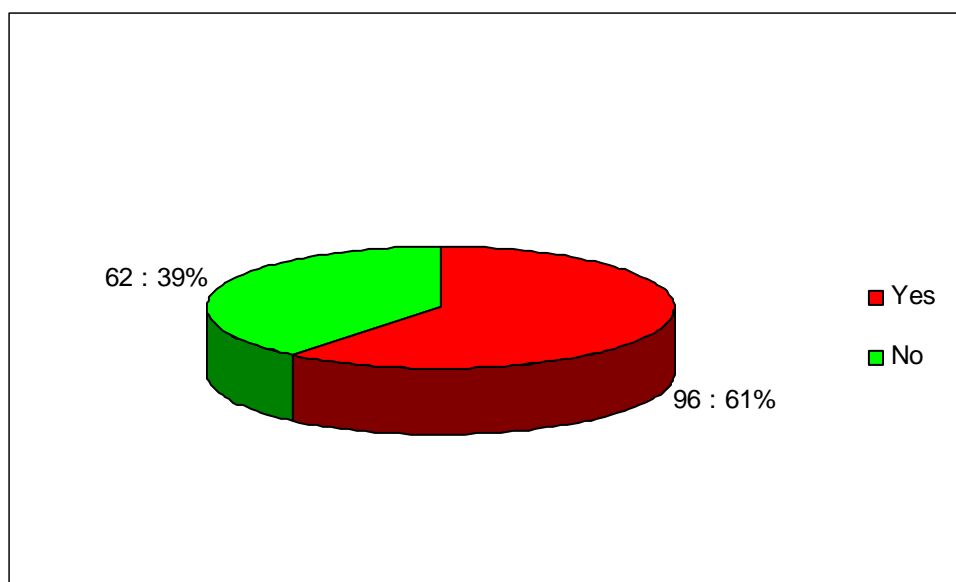
Figure 12: Was Outsourcing Rationale Explained?

One survey respondent succinctly wrote that outsourcing "requires a damn site more than a managerial whim. All levels of a business have to be involved; it can't be a few 'ivory tower' thinkers." This subject was part of the 39% who did not get an explanation for outsourcing. In this case, he assumed that there was really no good business reason to outsource and that it was just something management wanted to try. It is also clear that this subject did not feel involved in the decision to outsource. It is not clear that he disagreed with outsourcing in general. Rather, if the company was to undertake an outsourcing project, he felt it was imperative that all departments were involved in the process in order to ensure success.

Some of the reasons subjects gave as to why they believed their companies were involved in outsourcing were:

1. "They [the contractors] were cheap"

2. "Not having enough resources to accomplish committed work"

3. "Outsourcing was conceived by upper management"

The first comment points out that it was simply a function of money. The company in this case, appears to have been interested in saving money so they outsourced work to contractors. The second comment illustrates a common situation in the post technology bubble era: companies asked managers and employees to do more with less. Employees left because of attrition and layoffs and those remaining had to take on additional responsibilities. This subject's company appears to have reached a point where their current headcount could not sustain the current workload. So they chose to outsource. This third subject does not elaborate as to why his company chose to outsource. He only wishes to point out that it was upper management as opposed to his group that chose to outsource work.

Planning

The final major theme found within the data was the planning of the outsourcing project. There were complaints about poor, limited, or the complete lack of planning. Some respondents wrote that their companies were simply not prepared for the amount or work required to outsource a project. Common elements within the planning theme were expectations and required process changes. Both of these will be explained in detail in the following section.

Throughout the responses, people wrote of expectations. They often touched on expectations for requirements, quality, and timeframe. One respondent wrote:

> My guess is that it will take about 6 months for them [the contractor team] to come up to speed to any degree to be helpful. So we've managed by trying to spend time doing more unit testing. The problem is the business still expects us to produce software changes at the same rate as before when we had in house testers and with the same quality. Someone at the top is smoking something and it isn't a cigar.

In this case, management was not prepared for the length of time required to bring the contractor team up to a level of competence sufficient for completing tasks. The company also appeared to have an expectation that there would be no drop in the level of quality produced with the inclusion of the contractor team. Based upon the rather sardonic smoking comment, it is evident that the subject does not agree with his company's expectations. As the following section explains, one of the most important aspects of setting expectations and planning for a software project is defining requirements.

One of the first steps in most software development methodologies is defining requirements. Requirements can be considered the foundation of a good software project. Without definitive requirements, the entire software process suffers. Designers have no basis on which to design the application. They may incorrectly make assumptions that ultimately invalidate the finished project. Quality assurance testers will also find it extremely difficult to engineer test cases. They will have no baseline requirement against which they can compare actual results. **Figure 13** informs that over three quarters of the respondents sent requirements to the outsourcing vendor prior to the onset of the project.

28 : 18%

130 : 82%
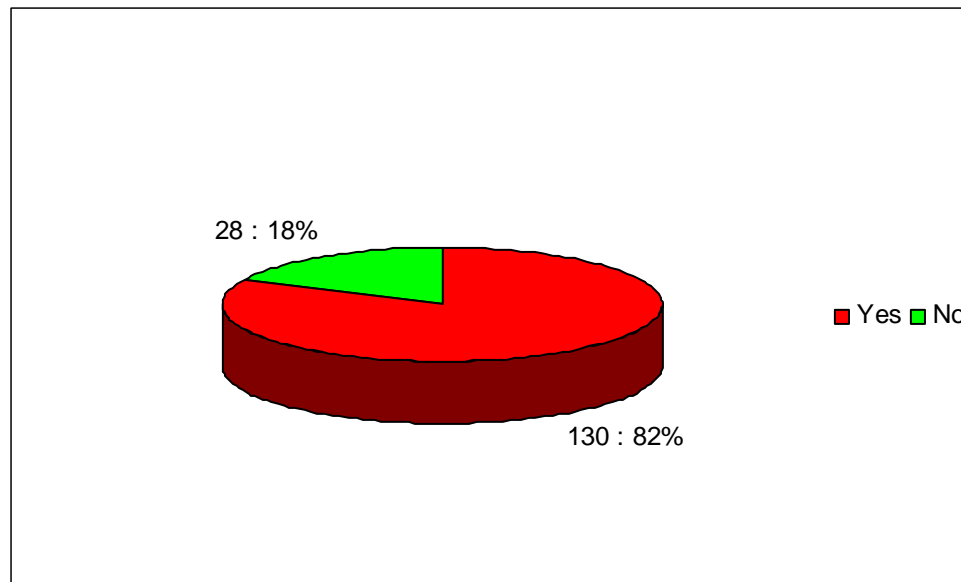
Figure 13: Were Project Requirements Provided to the Outsourcing Vendor?

While sending requirements does not guarantee a successful project, it is definitely an important step in beginning one.

Even after providing initial requirements, local teams sometimes found that the requirements were not specific enough or needed some form of alteration. As illustrated by **Figure 14**, of the 82% who provided requirements, only 24% provided enough detail and 23% had to be completely rewritten.

Figure 14: Initial Requirement Quality.

One subject warned, "If your company can't spec a system then the project will be a disaster." Another response neatly summed up thoughts on the necessity of requirements with respect to outsourcing: "If you don't have your requirements clearly defined and greatly limit the number of change requests, you lose any advantage to outsourcing." Without requirements, there is no way to measure the success of the returned product.

Perhaps because of the inconsistencies with requirements, it is no wonder that the subject of quality was brought up ofte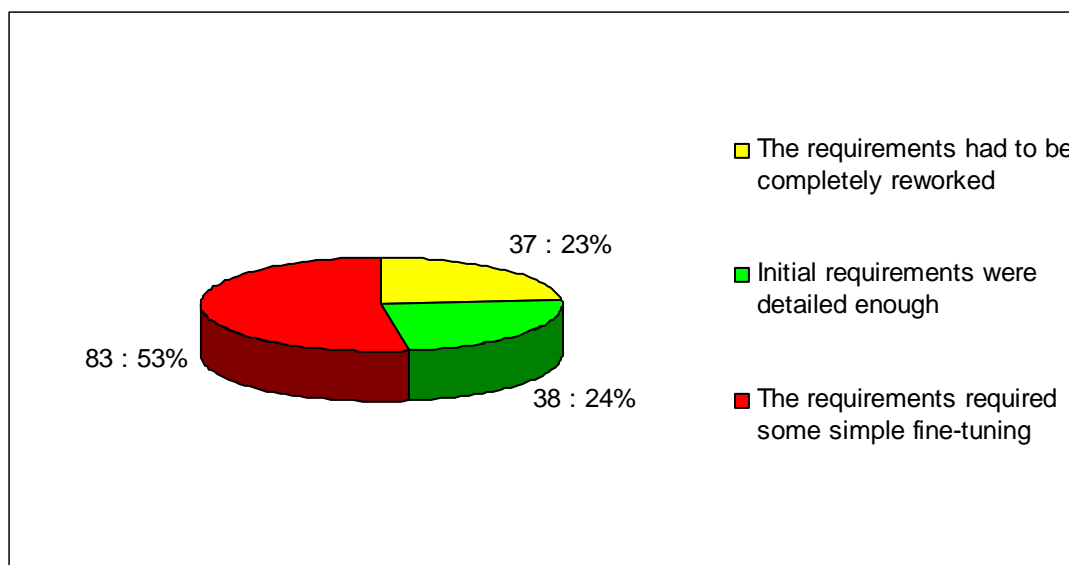n. All interviewees said that quality was either fair or poor. Of those respondents who entered optional comments, 45% complained of some sort of quality problems with the returned work. One response simply stated, "We have received poor quality from this vendor." Michael said that in his case, quality was "average to below average" and that it "had to do with them not really understanding the industry and understanding even how to test things properly." It is unclear if Michael is referring to unit testing or integration testing. Software engineers should be able to unit test the code that they have written. However, integration testing can be much more difficult. The first difficulty can

be defining integration testing. Some companies may define integration testing as the testing of the delivered component with respect to the other components in the system. These components may be hardware or software. Other companies may define integration testing with further levels of granularity. Michael's company apparently did not adequately define the acceptable level of testing expected from the contractor team.

Steve acknowledged that the quality of work first returned by the contractor was poor and another subject stressed the need for oversight by writing: "You must have frequent code reviews or else you may get un-maintainable code." If the company receives un-maintainable code from the contractors, the local teams will either have to fix the code or send it back to the contractors with an explanation of the deficiencies. Either option will cost the project more time. Finally, one respondent demonstrated the need for formal quality standards by writing, "Our definition of acceptable results and theirs leave too much room for error." One can apparently conclude from this comment that either the local team did not adequately define acceptable results or the contractor team did not understand or agree with the definition. Regardless of the reasons behind the failure, there was a communication breakdown between the local and contractor teams that affected quality.

One of the more prevalent elements of planning was not having the proper processes and procedures in place to best utilize contractors. This required extensive training and knowledge transfer. Both survey respondents and interviewees alike spoke of the underestimation of the time required to train contractors. When asked if there was a procedure in place to train the contractors he worked with, Alex said, "There was a process. There was a procedure. But um, I think that it was fairly inadequate. Companies, or in this case company, underestimated the time we were basically given for training these people up

to speed. And they wanted results fairly quickly which basically hampered the end product." He explained that the process took longer because the contractors "didn't have the domain knowledge, didn't know the processes, and how we did things."

When requirements are missing and poor quality requires rework, one of the first aspects of a software project to suffer is the delivery date. Multiple comments from respondents alluded to expected end dates being missed. One angry respondent wrote, "Outsourcing sucks. They don't understand [the] U.S. business process and it actually took them longer to deliver than what management expected. We did a project with outsourcing that was supposed to take 3 months. A year later it is still not implemented." This comment points out several important notes. Aside from the respondent's obvious dislike of outsourcing, management failed to set appropriate expectations for the turnaround time of the project. This could be the result of management not understanding all of the forces that affect an outsourced project. It could also be that the contractor team was not prepared to complete the project. The respondent noted that the contractor team did not understand U.S. business practices. This may have caused delays in the project as the contractors worked to gain domain expertise and understanding.

Another subject wrote, "The business relationship ultimately fell apart as the outsourced project was never completed by the business partner." The subject gave no further explanation of why the partner never completed the project. One respondent simply wrote that the "outsourcing company failed to deliver." Again, there was no explanation of the failure. For both of these examples, there are myriad reasons for the contractors not completing their projects. They are included in this discussion because the respondents felt it

important enough to note, in an optional text entry field, that the outsourcing projects they were involved in completely failed.

Perhaps the best summarizing comment regarding planning for outsourcing was in the form of a response that read: "The main problem here is the failure to recognize the importance of conceptual planning before development work. The second problem is a lack of formal process. These two problems result in the same poor results regardless of whether an internal or outsourced team performs the actual development." This respondent rightly notes that planning should not be considered uniquely tied to outsourcing. All software projects require some amount of planning.

The data gathered and investigated provide a glimpse into the experiences of software engineers with respect to outsourcing. However, in order to be of use and provide benefit, the data need application and explanation in the context of management. The following section describes the management implications of the data gathered in this study.

Management Implications

While this study did not attempt to examine the benefits or detriments of outsourcing, the subjects made clear that they did not see valid business reasons for the practice. However, the personal experience of the researcher and current literature suggest that outsourcing can be beneficial if done properly. The following section will link the research data examined above to best practices and recommended procedures as described by the current literature on the subject. It will do so by keeping with the five data themes that the researcher distilled from the data. Each of the five sections will contain methods procedures that managers can utilize to help offset or minimize the problems noted by the research subjects. These sections are not meant to provide a blueprint or roadmap for successful software engineering outsourcing projects because the situations encountered by each company will be varied and unique. They are simply presented as important factors to consider and perhaps starting points for further research.

Rationale

The data presented in this study indicate that subjects did not appear to understand their companies' rationales for outsourcing. This could have been caused by poor communication between management and workers. Another possibility is that management may not have really understood why they were outsourcing either. Long before a firm begins searching for outsourcing vendors, creating key performance indicators, and compiling best practices lists, it must determine if outsourcing is in its best interest. It must have a reason other than following the latest business trend or reducing costs. James Brian Quinn,

Buchanan Professor of Management at Dartmouth College, and Fredrick G. Hilmer, Dean of the Australian Graduate School of Management, observed, "by assessing the relative costs and risks of making or buying, companies can leverage their skills and resources for increased profitability,"[43] A necessary step in this process is for companies to identify their core competencies. Authors Michael Hitt, Duane Ireland, and Robert E. Hoskisson defined core competencies as "resources and capabilities that serve as a source of competitive advantage for a firm over its rivals."[44] In essence, companies must determine what they do or how they do it that sets them apart from their competition. Quinn and Hilmer expand upon the concept by providing a list of points that further define core competencies:

1. Skill or knowledge sets; not products or functions.

2. Flexible, long-term platforms – capable of adaptation or evolution.

3. Limited in number.

4. Unique sources of leverage in the value chain.

5. Areas where the company can dominate.

6. Elements important to customers in the long run.

7. Embedded in the organization's systems.[45]

Companies often incorrectly identify products or functions within the organization as their core competencies. They then waste precious time and money creating programs and

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[43] James Brian Quinn and Frederick G. Hilmer, 1995, "Strategic Outsourcing," *McKinsey Quarterly,* Issue 1, p. 48, [Internet, WWW, Database], *Available*: Business Source Elite Database from EbscoHost; ADDRESS: http://search.epnet.com/. [Accessed: 3 May 2004]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

[44] Michael Hitt, R. Duane Ireland, and Robert E. Hoskisson, 2003, *Strategic Management: Competitiveness and Globalization* (Ohio: South-Western), p. 21.

[45] Quinn and Hilmer, 1995.

promotions on those bad assumptions rather than on the core areas in which they are truly competent.

Once a company has properly identified its core competencies, it can exploit them to create a competitive advantage over its rivals. Outsourcing, too, can play a role in the creation of competitive advantage. This can, however, only occur if companies follow best practices of other companies with a history of success in outsourcing. Companies can experience difficulties when they quickly initiate an outsourcing program with little or no supporting research or planning. Dean Elmuti, professor of management at Eastern Illinois University, Yunus Kathawala, Associate Chair of the School of Business at Eastern Illinois University, and Matthew Monippallil, professor of accounting at Eastern Illinois University explain, "Outsourcing has become a useful tactic to lower costs and gain a competitive advantage."[46] However, too many managers simply look at costs when making the decision to outsource. Elmuti, Kathawala, and Minippallil stress that companies should be cognizant of both the short-term and long-term reasons for outsourcing. In operational terms, companies should think of both the strategic and tactical reasons for outsourcing. Elmuti, Kathawala, and Minippallil list the following as long-term reasons for outsourcing:

1. Freeing resources
2. Sharing risks
3. Accelerating reengineering benefits[47]

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[46] Dean Elmuti, Yunis Kathawala, and Matthew Monippallil, May/June 1998, "Outsourcing to Gain a Competitive Advantage," *Industrial Management* Vol. 40(3) p. 20, [Internet, WWW, Database], *Available*: Business Source Elite Database from EbscoHost; ADDRESS: http://search.epnet.com/. [Accessed: 3 May 2004]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.
[47] Elmuti, Kathwala, and Monippalli, 1998.

When companies outsource functions of their business processes that are not core competencies, they free up money and people. This allows them to allocate these resources to more important functions: core competencies. Outsourcing also allows companies to transfer risk to the outsourcing vendor. Research and development or manufacturing costs are risks that companies can pass on to the vendor. Instead of investing time and money on research into improving some aspect of a non-core competency process, a company can pass this burden onto its vendor. Presumably, this task or process is part of the vendor's core competencies. Companies that are free to concentrate on core competencies are able to create value and hopefully, a competitive advantage.

In addition to strategic reasons for outsourcing, companies can utilize outsourcing to achieve their tactical goals. Elmuti, Kathawala, and Minippallil provide the following list as short-term reasons companies should consider for outsourcing:

1. Assisting with difficult to manage functions

2. Utilizing resources not internally available

3. Reducing and controlling operating costs

4. Generating cash infusion

5. Making capital funds available [48]

While these five items are important to consider when contemplating outsourcing, companies must be careful not to outsource solely for reducing operating costs. They must weigh the risks and rewards associated with outsourcing and decide what is right for them. When companies properly plan and execute with these guidelines in mind, they can build a comprehensive and cohesive business strategy to gain competitive advantage.

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[48] Elmuti, Kathawala, and Minippallil, 1998.

Morale

      Managing the morale of employees during outsourcing can be a difficult activity, but

it is one aspect that managers do have some control over. According to the data, subjects

experienced lagging morale because of increased stress and low motivation. Certainly the

lack of communication contributed to the problem. Research subjects often indicated that

they did not see the benefit of outsourcing and yet were given no indication from

management as to why they were outsourcing work. The management teams of their

respective companies needed to be more forthcoming with their rationale for outsourcing and

the anticipated effects upon employees. Authors Lisa Webb and Justin Laborde encourage

companies to keep their employees informed by "posting frequently asked questions and

making senior executives available to those employees who may be impacted one way or

another by the outsourcing decision."[49] Intrinsic to this information sharing is the element of

trust. Employees must trust that their managers are providing them with valid information.

Fred Niederman, Professor of MIS at Saint Louis University, Sumit Kundu, Professor in

international business at Florida International University, and Florida International

University doctoral student Silvia Salas indicate that honesty is the best way to deal with

employee morale problems that result from outsourcing.[50] They further suggest

implementing a transition plan that will help laid-off workers find new jobs. This, they

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[49] Lisa Webb and Justin Laborde, 2005, "Crafting a Successful Outsourcing Vendor/Client Relationship," *Business Process Management Journal* Vol. 11(5), p. 437+, [Internet, WWW, Database], *Available:* ABI/Inform Full TextDatabase from Proquest Information and Learning; ADDRESS: http://proquest.umi.com/,[Accessed: 16 September 2006]. A copy of this article is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.

[50] Fred Niederman, Sumit Kundu, and Silvia Salas, April/June 2006, "IT Software Development Offshoring: A Multi-Level Theoretical Framework and Research Agenda," *Journal of Global Information Management* Vol. 14(2), p. 52+, [Internet, WWW, Database], *Available:* ABI/Inform Full TextDatabase from Proquest Information and Learning; ADDRESS: http://proquest.umi.com/,[Accessed: 16 September 2006]. A copy of this article is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.

believe, will help the remaining employees to see that their coworkers were treated fairly and justly.

Monitoring the morale of employees involved in outsourcing is an important but difficult task. Each situation will be different since each individual deals with stress differently. Managers will have to monitor their employees and look for telltale signs such as frequent angry work-related encounters and burnout.[51] There is no all-encompassing solution to lagging morale. Managers and companies will need to be flexible and understanding with employees, yet make their expectations clear in order to work out a solution that is beneficial to both parties. According to best-selling author and *New York Times* columnist Thomas L. Friedman, "The way you keep good jobs in this country is not by building big walls, but by attracting people with big ideas—and then giving them the freedom to do whatever can be done with anyone, anywhere, anytime."[52] Managers must keep the gifted people they have and provide them the latitude with which to grow their skills and in turn lift their morale.

Locale

The research subjects in this study repeatedly noted that a difference in time zones was an obstacle to the usefulness of outsourcing. Traditionally, American software companies have outsourced projects to India and China.[53] Because of the time zone

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[51] Greenberg and Baron, p. 129.

[52] Thomas L. Friedman, 6 October 2006, "Big Ideas and No Boundaries," [Internet, WWW], *Available:* True Blue Liberal website; ADDRESS: http://www.trueblueliberal.com/2006/10/06/big-ideas-and-no-boundaries/, [Accessed: 10 November 2006]. A copy of this web page is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

[53] Miadhu T. Rao, Summer 2004, "Key Issues for Global IT Sourcing: Country and Individual Factors," *Information Systems Management* Vol. 21(3), p. 16+, [Internet, WWW, Database], *Available*: Business Source Elite Database from EbscoHost; ADDRESS: http://search.epnet.com/, [Accessed: 3 May 2004]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

differences between these countries and the U.S., there is little overlap in core business

hours. This required subjects to come to work early or stay late in order to have real-time

communications with their vendors. Unfortunately, this is one variable in the outsourcing

equation that managers have little control over. They must outsource to the vendor that best

fits their needs. That vendor may be on the other side of the globe. However, because of the

difficulties involved with the distance, companies are seeking alternative locales for

outsourcing. Miadhu T. Rao, assistant professor in the management department at the Albers

School of Business and Economics at Seattle University, explains:

> While the problem may seem trivial, there is no easy way around it. Some
> organizations have been looking for outsourcing providers in countries
> that lie in closer time zones. This allows for a partnership where the
> offshore outsourcing team can operate simply as remote members of the
> same project group. This "nearshore" sourcing has made a number of new
> countries attractive alternatives to the usual offshore destinations (such as
> India, China, and Russia). For U.S. companies, Canada, Mexico, The
> Bahamas, Brazil, and Peru all offer cities that lie within one to three time
> zones of their corporate offices.[54]

Companies can reduce the overall burden of outsourcing when they are able to outsource

work to vendors in or near their own time zones. When employees are able to talk to their

vendor counterparts during normal working hours it helps to reduce their stress levels and

workloads. They will no longer have to come in early or stay late to provide overlap in hours

between the two offices. Long Island University professor Shailendra C. Jain Palvia suggests

that outsourcing to Canada is the least risky option because Canada "has the same time zones

as the US, its major cities are located near US major cities, English is the primary language

(except for French in Quebec province) in Canada, and its culture and business practices are

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[54] Miadhu T. Rao, Summer 2004.

similar to the US's."[55] Palvia also notes that Mexico is another option for outsourcing. He points out that Mexico's common border with the U.S, the NAFTA agreement, and history of doing business with U.S. companies are all traditionally strong reasons to outsource there. However, he cautions that Mexican IT companies are not well known and the lack of English skills does hinder IT outsourcing prospects there.[56] Companies should exercise caution and research Mexican IT companies in detail before starting outsourcing projects there.

Certainly, companies will continue to outsource to the vendor that provides the best fit. However, if the difference in quality and skill sets between a vendor in the same time zone and one on the other side of the world is negligible, companies would be wise to contract with the closer one.

Communication

The data suggest that communication was a problem for the subjects. While they primarily complained about communications problems with their contractor counterparts, it's evident that there were also communication problems with senior management. This section describes methods and activities managers can take to help reduce communication problems during outsourcing projects.

Once a company has determined that outsourcing can play an important role in its future, it must be able to openly communicate its rationale for outsourcing. Senior researcher Georg Erber and research assistant Aida Sayed-Ahmed of the German Institute for Economic

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[55] Shailendra C. Jain Palvia, 2004, "Global Outsourcing of IT and IT Enabled Services: A Framework for Choosing an (Outsourcee) Country," *Journal of Information Technology Cases and Applications* Vol. 6(3), p. 1+, [Internet, WWW, Database], *Available:* ABI/Inform Full TextDatabase from Proquest Information and Learning; ADDRESS: http://proquest.umi.com/,[Accessed: 16 September 2006]. A copy of this article is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.
[56] Palvia, 2004.

Research believe that companies must demonstrate proper global corporate citizenship when

outsourcing.[57] They reason that the myriad emotional and political issues tied to outsourcing

can be difficult to combat. They list the following actions that companies should take as part

of outsourcing:

- Set the strategic direction for corporate citizenship in your company and engage in the wider debate on globalisation and the role of business in development.
- Define key issues, stakeholders and spheres of influence which are relevant for corporate citizenship in your company and industry.
- Establish and implement appropriate policies and procedures and engage in dialogue and partnership with key stakeholders to embed corporate citizenship into the company's strategy and operations.
- Build confidence by communicating consistently with different stakeholders about the company's principles, policies and practices in a transparent manner, within the bounds of commercial confidentiality.[58]

This list is important because it removes the focus from outsourcing. Instead, the list places

focus on global interactions among companies. Rather than a tool to simply cut costs,

outsourcing becomes an inherent behavioral trait of the corporate character.

The research subjects frequently mentioned difficulty communicating with their

offshore counterparts because of language differences. Management has very little control

over this aspect of the project since they have very little control over the skill sets of the

employees the outsourcing vendor hires. The guidelines in the Locale section above

suggested that companies outsource to vendors located nearby geographically. This can also

help with language. As noted previously, English is the predominant language in Canada.

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[57] Georg Erber and Aida Sayed-Ahmed, March/April 2005, "Offshore Outsourcing: A Global Shift in the Present IT Industry," *Information Technology* Vol. 40(2), p. 100+, [Internet, WWW, Database], *Available:* ABI/Inform Full Text Database from Proquest Information And Learning; ADDRESS: http://proquest.umi.com/, [Accessed: 16 September 2006]. A copy of this article is in the student's possession and may be consulted by contacting the student at phettepb@msoe.edu.

[58] Erber and Sayed-Ahmed, 2005.

Mexico is close but as Palvia mentions, strong English skills are not common. Companies looking for a vendor could negotiate a requirement for proficiency of the English language into their contracts with the vendor. However, this is something that may be difficult to control and certainly should not be expected.

Planning

Risk is an inherent part of any outsourcing effort. How well companies plan for risk mitigation in their outsourcing projects will often determine their level of success. Jerome Barthelemy and Dennis Adsit advise: "While outsourcing is a powerful tool to cut costs, improve performance, and refocus on the core business, outsourcing initiatives often fall short of management's expectations."[59] Barthelemy and Adsit argue that there are seven common mistakes that companies make when embarking upon an outsourcing project:

1. Outsourcing activities that should not be outsourced

2. Selecting the wrong vendor

3. Writing a poor contract

4. Overlooking personnel issues

5. Losing control of the outsourced activity

6. Overlooking hidden costs of outsourcing

7. Failing to plan an exit strategy[60]

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[59] Jerome Barthelemy and Dennis Adsit, May 2003, "The Seven Deadly Sins of Outsourcing," *Academy of Management Executive* Vol. 17(2), p. 87, [Internet, WWW, Database]. *Available*: Business Source Elite Database from EbscoHost; ADDRESS: http://search.epnet.com/, [Accessed: 3 May 2004]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu

[60] Barthelemy and Adsit, May 2003.

The main reason for outsourcing is to save money.[61] Because the goal is to save money, it becomes all the more painful for a company when it uncovers unanticipated costs during an outsourcing project. Author Stephanie Overby lists the following hidden costs that are commonly uncovered during an outsourcing project:

1. Selecting a vendor

2. Transition

3. Layoffs

4. Culture

5. Ramping up

6. Managing an offshore contract [62]

These are costs that companies routinely overlook when they outsource work. Their budgets for the project may only provide for the quoted price from the vendor for a given amount of time. Since each of these costs will be unique to a company, management at that company must consider the impact carefully. For example, the culture of a company may be very laid back and relaxed. If this relaxed culture transfers over to requirement gathering and system design, the company may have to devote more resources to effective project management to ensure the vendor has enough information to be able to meets its obligations.

Companies can also help offset potential risk by creating key metrics with which they can measure the success or failure of an outsourcing project and by observing best practices

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[61] Nita Brooks, Summer 2006, "Understanding IT Outsourcing and Its Potential Effects on IT Workers and Their Environment," *The Journal of Computer Information Systems* Vol. 46(4), p. 46+, [Internet, WWW, Database], *Available:* ABI/Inform Full TextDatabase from Proquest Information and Learning; ADDRESS: http://proquest.umi.com/,[Accessed: 16 September 2006]. A copy of this article is in the student's possession and maybe consulted by contacting the student at phettepb@msoe.edu.

[62] Stephanie Overby, 1 September 2003, "The Hidden Costs of Offshore Outsourcing," *CIO Magazine,* [Internet, WWW], *Available: CIO Magazine online* website; ADDRESS: http://www.cio.com/archive/090103/money.html. [Accessed 8 September 2003]. A copy of this article is in the student's possession and may be consulted by contacting the student at phettepb@msoe.edu

commonly utilized by successful outsourcing companies. Howard A. Rubin, professor and computer science department chair at Hunter College suggests that the following activities in an outsourcing effort should be monitored:

1. Contract initiation actions

2. Contract goal seeking activities

3. Performance target-attainment actions

4. Continuous measurement support

5. Real-time monitoring of contractual goal performance

6. Periodic formal management reviews on progress

7. Quarterly benchmark analysis against external industry performance

8. Production of an annual baseline/benchmark report[63]

These activities are useful project management tools. They help to provide the local managers with a feedback loop for comparison of actual and expected results. These eight activities present a start to finish model that encompass the entire outsourcing project. It is not enough to work carefully at negotiating the contract. All phases of the project must be continuously monitored. These tools, if implemented properly, will provide managers the necessary insight into the progress of their project and hopefully the ability to provide course correction when difficulties arise.

The decision to outsource is one that companies must make carefully. There are pitfalls and hidden costs scattered throughout the process. Companies must decide how

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[63] Howard A. Rubin, Spring 1997, "Using Metrics for Outsourcing Oversight," *Information Systems Management* Vol. 14(2), p. 7, [Internet, WWW, Database], *Available*: Business Source Elite Database from EbscoHost; ADDRESS: http://search.epnet.com/. [Accessed: 3 May 2004]. A copy of this article is in the student-author's possession and may be consulted by contacting the student-author at phettepb@msoe.edu.

outsourcing will fit into their overall business strategy through careful research and introspection. While all layers of the company need not be involved in the decision to outsource, they certainly must be involved in all other phases of the process. Companies must have a clear goal in mind and make sure that the goals are quantifiable so that they may be measured throughout the life of the project. They must make an intelligent and informed decision on which outsourcing vendor to choose. The locale of the vendor is very important to the success of the project. Ultimately, each company must weigh all of the factors presented in this paper and more, and decide if outsourcing makes sense in the context of its own corporate goals.

Analysis and Conclusion

The five themes of Morale, Communication, Locale Differences, Rationale, and Planning, by themselves, simply organize the data into convenient classifications. In order to investigate them, in the context of knowledge transfer, there must be a method with which to evaluate the data presented in this study. Kwan and Cheung's knowledge transfer model is a useful tool for such an evaluation. It is useful because the bridge between each stage represents a tangible milestone with which to evaluate the research. The criteria required to transition from one state to another offers a checklist that allows the procedures and processes represented within data to be evaluated as a success or failure. **Figure 15** provides a visual representation of Kwan and Cheung's model.
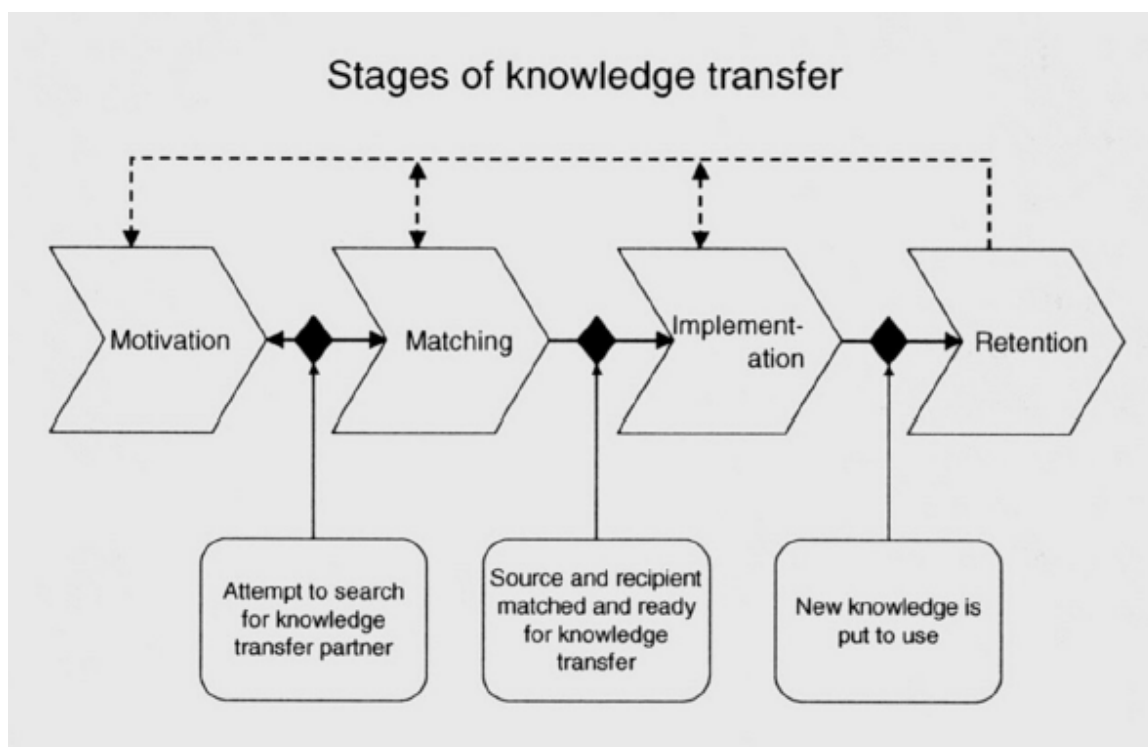

Figure 15: The Four Stage Knowledge Transfer Model.

SOURCE: Kwan and Cheung, p. 19.

While the motivation stage of Kwan and Cheung's model is essential in understanding the entire process, its application to this study is of limited use. For purposes of this discussion, it is assumed that the motivation for both local and contractor teams is the desire to complete their respective project assignments and is present within both teams. Specifically, the local teams want to successfully complete their projects and meet their deliverables. Additionally, the contractor teams want to satisfy their contracts and make their customers, the local teams, successful.

Kwan and Cheung indicate that the matching stage "begins with an attempt to search for suitable transfer partner(s)."[64] The majority of the five data themes can be evaluated against this stage. For the local teams, this is a relatively simple process. Developers are often located near each other. There are phone and email lists available for contacting other developers. According to the data, most local teams met daily or weekly. Presumably, developers could get help or direction at these meetings that would help them overcome project obstacles by gaining the necessary information. One possible difficulty as presented by the data is the fact that most respondents had been with their companies and teams for less than five years. Although the survey did not further delineate the time inside of five years, it is possible that some respondents had not been at their respective companies or with their teams long enough to know to whom they should go when seeking specific knowledge. However the surveys and interviews did not appear to indicate that the matching stage would have been difficult for the local teams.

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[64] Kwan and Cheung, 2006.

Matching between local teams and contractor teams, however, was much more difficult. Because 61% of the survey respondents had a single point of contact for both the local and contractor teams, individuals would be hampered in their searches to find the appropriate knowledge holder on the opposite team. There would be little or no visibility into the talents and expertise between the two groups. Additionally, the knowledge seeker would have to access the knowledge holder by proxy at a minimum through two other individuals. To even further complicate the matching process, a full 75% of respondents outsourced work to contractors who were not physically located within the same building. Whereas local teams could simply walk over and talk to someone they thought might hold the knowledge they sought, individuals working intra-team did not have that luxury. The failure to easily secure matches at this early stage would have already severely hampered the knowledge transfer process.

Implementation marks the third stage of Kwan and Cheung's model. According to Kwan and Cheung, at this point, "resources flow between the recipient and the source. Depending on the level of knowledge complexity, transfer specific social ties between the source and the recipient are established."[65] For the local teams, the creation of social networks and ties is much easier accomplished. Kwan and Cheung show that "transfer of knowledge, especially complex knowledge, requires numerous exchanges, which, in turn, depend on ease of communication and intimacy of the overall relationship between the partners."[66] These numerous exchanges happen daily among the local team members. People meet for lunch. They attend the same meetings. They stop at the water coolers and pass in the

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[65] Kwan and Cheung, 2006.
[66] Kwan and Cheung, 2006.

halls. All of these seemingly innocuous and incidental interactions allow the individuals involved to build and adapt social relationships over a period of time. However, limited distant contact, as experienced between local and contractor teams, cannot easily facilitate the building of strong social relationships and sharing of knowledge. The data showed that most interactions between local and contractor teams took place through email or phone conversations. In her article, "The Neglected Receiver of Knowledge Sharing," author Nancy Dixon writes that "In some organizations, there is an expectation that knowledge transfer will occur primarily though technology. But the reality is that transferring complex knowledge requires face-to-face conversations rather than just reading an email or examining an item in a database."[67]

Like the motivation stage, the retention stage of Kwan and Cheung's model is of limited use in the context of this study. They explained that the final stage "begins after the recipient has achieved satisfactory results with the transferred knowledge."[68] Since this study is concerned specifically with knowledge transfer and sharing, there were no specific questions in either the survey or interviews that specifically asked about long-term storage of knowledge. The retention stage is a plausible candidate for further investigation in another study. It is also arguable that most subjects did not achieve satisfactory results and therefore did not transition to the retention stage.

Based upon the data gathered in this study in conjunction with the literature reviewed, the effects of outsourcing on knowledge transfer among software engineers appears to be

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[67] Nancy Dixon, March/April 2002, "The Neglected Receiver of Knowledge Sharing," *Ivey Business Journal* Vol. 66(4), p. 35+, [Internet, WWW, Database], *Available:* Corporate ResourceNet Database from EbscoHost; ADDRESS: http://search.epnet.com/, A copy of this article is in the student's possession and may be consulted by contacting the student at phettepb@msoe.edu.
[68] Kwan and Cheung, 2006.

correlated to the definition of software engineer. If the local teams of software engineers interacted efficiently and on a friendly basis prior to outsourcing, they continued to do so during and after the conclusion of the outsourcing project. Although working with outsourcing contractors placed an increased burden upon the local engineers and caused them a great degree of frustration, the local engineers continued to transfer knowledge among each other in the manner appropriate to completing their assigned tasks. However, when the local teams interacted with the contractor teams, the knowledge transfer process often fractured and failed. Communication bottlenecks between the two teams often prevented the projects from moving forward. Differences in geography and time zones increased the turnaround time for getting questions answered, reviews performed, and rework completed. These factors served to fuel animosity from the local teams towards the contractors, which, in turn, further degraded the communication link between the two groups.

Recommendations

Outsourcing affects knowledge transfer among software engineers. Chiefly, the areas of morale, communication, locale, planning, and rationale are affected the most. The paper has also shown the management implications of the noted effects. In continuance of the management implications section of the paper, this section provides recommendations to managers contemplating an outsourcing project based upon the findings within the data and the management implications noted from the respective sections. The author recommends that managers involved in or considering outsourcing keep in mind the following points:

- *Make a business case for outsourcing.* Outsource activities that are not core competencies to free up resources for business critical projects.

- *Keep employees informed early and often.* When employees are left to assume the reasons for outsourcing and worry that their jobs will be lost, their productivity will drop. Be as honest as possible with them regarding their futures at the company.

- *Choose the geographically closest outsourcing vendor that still meets required criteria.* Distant time zones require more effort and resources because of the turn around time and difference in hours.

- *Plan the outsourcing project and continuously revisit benchmarks.* The outsourcing project requires project planning and often even organizational changes in order to be effective. Measure performance metrics at all phases of the project and modify the metrics if needed.

- *Be willing to admit mistakes and provide course corrections.* If it becomes evident that the project is not meeting expectations, don't be afraid to make changes were required.

Glossary

Inshoring – The process of bringing work that was previously offshored back to the company that offshored it.

Knowledge Sharing – The process by which people disseminate to and gather useful contextualized information from each other.

Outsourcing – The process of sending a portion or all of a software project to any group outside of the product development department. This may be intradepartmental within the company or with a completely separate company.

Outsourcing Vendor – The company or entity to which a project or job us sub-contracted.

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Appendix A: Interview Questions

1. Did your team members communicate frequently with each other prior to outsourcing? Was every team member free to talk to any other member of the team? Did people feel free to go to anyone else on the team with questions?
2. How well did your manager communicate with the team? Did team members feel comfortable voicing concerns to the manager? Did they feel like they were "in the loop?"
3. What were/are the working relationships like between the outsourcing vendor and your team?
4. What was the general morale and mood of your team like before the outsourcing project started?
5. If the outsourcing project has not yet completed, how well do you feel it has gone? If the project is completed, how well do you feel it achieved its intended goals?
6. What was the initial quality of the product like after it was first returned from the vendor?
7. Did the quality of subsequent builds/releases increase or decrease over time?
8. What is the morale and mood of your team like now?
9. How often does your team communicate now and do you feel the quality of the communication has gotten better, worse, or stayed the same.
10. Would you be inclined to participate in another outsourcing project again?

Appendix B: Survey Questions

Assumptions:
It is assumed that if you are taking this survey, you are a software engineer, age 18 or older, who has been involved with an outsourcing project within the last twelve months or a currently involved in one. The project will consist of sending some portion or all of a software development task to an outsourcing vendor (either internal or external to your company). However, your team is still responsible for the ultimate delivery of the project.

1. How many years have you worked in the software industry as a developer?
    a. Less than five years
    b. Five to ten years
    c. More than ten years
2. How long have you been with your current company?
    a. Less than five years
    b. Five to ten years
    c. More than ten years
3. How long have you been with your current team?
    a. Less than five years
    b. Five to ten years
    c. More than ten years
4. Was work outsourced to another group within your company or another company altogether?
    a. Within the company
    b. To another company
5. Where was the outsourcing vendor in relation to your physical location?
    a. Within the same building
    b. Another building on the same site
    c. A different part of the city
    d. A different state
    e. Another country
6. Was the rationale for outsourcing clearly explained to your team before the project began?
    a. Yes
    b. No
7. How often did your team meet to share information and update each other either prior to the outsourcing initiative?
    a. Daily.
    b. Weekly
    c. Monthly
    d. Other – Please explain

8. How often did/do you communicate with the outsourcing vendor?
    a. As needed
    b. Specific time each day
    c. Specific time each week
    d. Other – please explain
9. What type of communication method(s) did/do you use when communicating with the outsourcing vendor?
    a. Email
    b. Phone
    c. Instant messenger
    d. Video conferencing
    e. Other – please explain
10. Do you have a predetermined contact person through whom all correspondence should go or are people from either team free to contact each other at any time?
    a. One contact person on both your team and the vendor's team
    b. Everyone is free to contact one another at any time
11. Do your team members ever take it upon themselves to meet outside of work?
    a. Yes
    b. No
12. If your team does meet outside of work, in what manner do the members meet?
    a. For meals
    b. Social activities (sporting events, movies, etc)
    c. Other – please explain
13. Did your team provide requirements to the outsourcing vendor?
    a. Yes
    b. No
14. Did the vendor find the requirements detailed enough or were there multiple iterations of reviews?
    a. Initial requirements were detailed enough
    b. The requirements required some simple fine-tuning
    c. The requirements had to be completely reworked
15. Does your team still meet outside of work as often as you did prior to outsourcing?
    a. Yes
    b. No
    c. Other – please explain.

Please feel free to provide any other comments or explanations about your outsourcing experience you wish to in the space below: