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**MULTI-NATIONAL PROJECT TEAM COMMUNICATONS
AND CULTURAL INFLUENCES**

by

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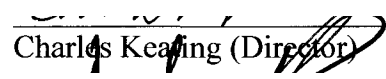
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ABSTRACT

MULTI-NATIONAL PROJECT TEAM COMMUNICATIONS AND CULTURAL INFLUENCES

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This exploratory case study dissertation examined multinational project teams' communication satisfaction as influenced by the project team's cultural attribute of power distance. Utilizing an exploratory case study, semi-guided interview research approach, ordinal scale data and open-ended contextual based question responses were obtained. This data was gathered from United States – Russia and Canada – Angola multinational, complex, high technology oil transportation project teams. Triangulation data gathering techniques were utilized to obtain empirical data from multiple sources of data and multiple data types. Subsequent data analyses combined descriptive statistical analysis, graphical analysis, cluster analysis, and content analysis techniques to derive a theoretical construct of multi-national project team communications and the individual's power distance culture attribute interactions.

According to published literature, project team communication is affected by the individual member's culture. The literature also indicates that the greater the diversity of individual cultures, the greater the potential for unsatisfactory project communications. This research utilized two culturally polar multi-national project teams as identified by their national culture index. Focusing this research on culturally diverse project teams was supported from cross-cultural research literature that identifies the need to use 'polar' examples to develop new theoretical constructs. Relying on previously validated instruments, this empirical study analyzed these culturally polar project teams to identify how the project team communication satisfaction, as indicated by the participants, related to the identified individual cultures power distance index.

The research concluded that individual project team members' culture indexes did not reflect the extreme diversity that Hofstede indicated national origin culture indexes suggest. This finding indicates that for these case studies the ability to accurately predict a project team member's cultural index according

to their nation of origin is low. The study also found that, overall, the project teams' rate project team communication satisfaction as satisfactory to very satisfactory. These findings and supporting published literature data generated the theoretical construct that these experienced, multi-national, project teams' exhibit a middle to low power distance cultural attribute with satisfactory project team communication. The findings also indicate that there is a positive relationship between the project team power distance index and project team communication satisfaction rating.

Co-Directors of Advisory Committee: Dr. Andreas Sousa-Poza
 Dr. Rafael Landaeta
 Dr. Oliver Hedgepeth

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This dissertation is dedicated to
Raissa, Angel, Elizabeth, Marlena, Scott, Aaron, and Charity.

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INTRODUCTION

Globalization, the state where nations, businesses, and people interact across national borders, continues to increase (Adler, 1995; Hofstede, 1997). From a business perspective, not only are corporations offering products and services across national boundaries, but they are also economically leveraging the globalization environment by utilizing foreign manufacturing facilities and labor as well as the application of joint venture agreements to develop natural resources or develop new products (Teeikangas, 2002). Globalization is partially driven by the need to provide products or services faster, cheaper, and better (Sennara, 2002). Project management, as a discipline, has been recognized as a process that provides enhanced capabilities to achieve these objectives (Kerzner, 1998) and assisting in enhancing the global company's potential for success (Iles and Hayers, 1997).

While attempting to achieve company objectives - delivering the product or service faster, cheaper, and better - various project implementation methods have been applied (Teeikangas, 2002) which often combine corporate resources into a multi-national project team (Egginton, 1996). Within this multi-national project team environment, the diversity of nationalities creates a cross-cultural context where each member comes equipped with their own culture (Thomas, 2003). As an example, informatics literature suggests that diversity of individual cultures can affect how the team interacts and communicates (LaCoursiere, 2004). Multi-national project team, cross-cultural communication interactions, is the topic of this inductive based, case study exploratory research.

The objective of this inductive based case study exploratory research is to partially fill the multi-national project team communications and cross-cultural influences knowledge gap. While there is research which postulates that personal and professional needs are the driving force behind project performance, over culture, (Thamhain, 2004) other research identifies culture as one of project's critical success factors (Pinto and Slevin, 1989; Muller and Turner, 2004). Sennara discusses how "Communication is culture based. Both cultural dimensions of power distance and Individualism vs. Collectivism indicate the different styles of communication in cultures" (2002, p. 92) and the crucial role of communications in projects (Muller and Turner, 2004).

The journal model for this dissertation is the *Engineering Management Journal* format.

Yet, while project management literature identifies the importance of understanding the interaction of communication and culture the literature also identifies a lack of research in this area (Teeikangas, 2002; Chevrier, 2003; Matveev and Nelson, 2004). This research partially fills this knowledge gap as it developed an improved understanding of the interaction between multi-national project team communication satisfaction and project team's individual members' power distance culture attribute.

This dissertation consists of an introduction, a literature review, research method section, a data gathering section which is followed by the data analysis and conclusion sections. The introduction is organized into five areas: background, purpose of the study, research question, study limitations and significance of the study. The background section identifies the foundation for this research. From this foundation, the study purpose is explained, in more detail, which provides grounding for the need of this research. Next the research questions, study limitations and the study significance are presented.

Following the introduction section the literature review presents a view of existing multi-national project team cross-cultural literature and identifies the project management body of knowledge gap that is addressed in this research.

The next sections briefly discuss the applicability of conducting an applied inductive exploratory case study research as well as the actual research model. Following this discussion the case study data gathering and data analysis sections present the information gathered. Finally a conclusion section is provided that summarizes the overall research and identifies the developed theoretical construct derived from this research.

Background

Culture research has its roots in anthropology and is related to the individual's underlying values, beliefs, and shared philosophy (Li-Ping, Furnham and Davis, 2003; Shore and Cross, 2005). Springing from these early anthropology research efforts the study of culture has expanded into virtually every discipline from sociology (Sackmann and Phillips, 2004) to management (Trompenaars and Hampden-Turner, 2000) and project management (Shore and Cross 2005), to name just a few examples. Culture research is the effort of trying to understand the dynamics of culture (Schein, 2004). Cross-cultural research is an expansion of basic culture research which focuses on the interactions of different cultures (Adler, 1983) versus the study of a more homogeneous setting. As an example, from the management research area Adler presents:

Cross-cultural management is the study of the behavior of people in organizations located in cultures and nations around the world. It focuses on the description of organizational behavior within countries and cultures, on the comparison of organizational behavior across countries and cultures, and, perhaps most importantly, on the interaction of peoples from different countries working within the same organization or within the same work environment. (Adler, 1983, p. 226)

Regardless of whether the research is culture or cross-culture based, the common reference subject is the individual and their culture. As the various culture literature sources suggests, every person carries with them their culture (Schein, 1992; Trompenaars and Hampden-Turner, 1998), and it is difficult to change (Hofstede, 1997). When a project team consists of two or more nationalities, this establishes a cross-cultural context where communication can be influenced by the individual's culture attribute, such as power distance (Muller and Turner, 2004).

Understanding the interaction between multi-national project team communications and the individual's power distance culture attribute may assist the project team in improving its performance and probability for success as communication has been described as one critical project implementation success factor (Pinto and Slevin, 1989) and is positively related to performance (Rodwell, Kienzle and Shadur, 1998) as communication is "... a vital element for project success [which] becomes vulnerable to disturbances through misinterpretations caused by cultural differences" (Muller and Turner, 2004, p. 407). The Project Management Institute's® *A Guide to the Project Management Body of Knowledge*® (PMBOK®) also establishes that project managers engage in "...communications planning, information distribution, performance reporting and administrative closure" processes (PMBOK, 2002, p. 205). These sources support the premise that communication is an important element for project team.

Communication has also been identified as an area of challenge within projects in general (Thamhain, 2004). As organizational culture research indicates, power distance culture attribute affects how superior-subordinate communications occur (Fey and Denison, 2003). Adding the dimension of a cross-cultural, multinational project team adds complexity to the communication process. In this context, the project team is not only dealing with interpersonal communications based on different cultures but sometimes significantly different cultures, as indicated within national culture literature (Hofstede, 1997).

Within the multi-national, cross-cultural, project teams' domain, understanding the project team communication interactions, is an area that requires improved knowledge (Matveev and Nelson, 2004) and an area that has received limited research and requires more empirical study (Chevrier, 2003).

Developing an understanding of multi-national, cross-cultural, project team communication interaction formed the premise of this research. The research proposition is project team communication is important and contains a cross-cultural power distance attribute. This proposition is based on project management literature that links communications to performance and success (Pinto and Slevin, 1989; Muller and Turner, 2004) and cross-cultural literature that links communication to culture (Ford, 2004, Muller and Turner, 2004). The proposition is also based on anthropologists' and modern culture researchers' principles that every person carries within them their own culture, which was established during formative years, and is very difficult to change (Hofstede, 1997; Schein, 2004). Summarizing the research proposition, multinational project team communication will be affected by the individual's culture which was developed in their formative years and is difficult to change.

This research developed a theoretical understanding of this proposition through the use of an inductive based exploratory case study research. This research was guided by an appropriate research question, development of a research model, gathering the identified data and performing appropriate qualitative analyses as will be discussed, in that order, next.

Purpose Statement

The purpose of this study was to investigate the relationship between multi-national project team communications and the individual's power distance cultural attribute using an inductive case study exploratory research method. This research generated a theoretical construct of project team communication satisfaction and the individual's power distance, within a multinational project team.

The importance of communications can not be understated. A review of project management literature identifies communication as one of the critical success factors (Pinto and Slevin, 1989) and is a source of project problems (Thomas, Tucker and Kelly, 1999; Muller and Turner, 2004). A common literature theme is that effective communication is essential to the project team as a project team's objective is the delivery of a unique product or service through the reliance on people and their communications.

While not universal, project management literature also frequently associates culture with communication (Appelbaum, Chehaveb and Konidas, 2003; Matveev and Nelson, 2004; Muller and Turner, 2004), and suggests that project teams "... require systems that can carry or convey communication values" (McKinney, Barker, Smith and Davis, 2001, p. 1043). From culture literature, values are those

items that are the core of a person's culture (Rokeach, 1973; Hofstede, 1997) and "Values are among the first things children learn...[and] that by age 10, most children have their basic value system firmly in place, and after that age, changes are difficult to make" (Hofstede, 1997, p. 8). As values are at each person's cultural core, they affect the individual's conscious and unconscious decisions, actions, and communications as reflected in cultural attributes such as their power distance index (Hofstede, 1997). This research developed a theoretical construct of the multi-national project team's communication satisfaction and the individual's power distance cultural attribute relationship.

Research Question

Within the context of a cross-cultural project team the research question is: Is there a relationship, and if so how, between the overall project team's communication satisfaction and their individual power distance culture attribute?

This core question is based on a theoretical construct from information gathered during the literature review that suggests a relationship exists between project team communication satisfaction and the individual's power distance culture attribute.

This literature based, theoretical construct, is important for theory building inductive based exploratory case study research and is "... an essential step in doing case studies" (Yin, 2003, p. 29). Yin's position is also supported from other case study research literature that suggests having a theoretical focus, prior to conducting the case study research, provides guidance and direction for the research data gathering and analysis (Eisenhardt, 1989). As a multi-national project team, cross-cultural, research effort having a guiding theoretical focus was important.

The importance for developing a theoretical construct, before beginning the case study research, was also supported from two other perspectives. First, project management literature does not provide a theory on the relationship between project team communication satisfaction and the individual's power distance index (Matveev and Nelson, 2004). While project management literature discusses and proposes that culture is an influence on projects a clear theory of what these influences is lacking.

This lack of a clear theoretical basis presented a challenge in focusing the research within specific bounds. To overcome this challenge, as the cross-cultural and case study literature presents, this research relied on the development of a conceptual theoretical construct as a method of focusing the research. This

focus provided guidance from the research question to the data gathering process and final data analysis. The process used is in alignment with other theory building case study methods as discussed by Eisenhardt (1989) and Yin (2003).

As identified in the literature and followed in this research, developing the research question originated from literature reviews that included project management, small group, multi-national management and culture research, areas, as well as personal observations. From this research question the next step was the development of a conceptual theory that there is a relationship between project team communication satisfaction and the individual's power distance. This conceptual theory is supported from the literature such as project management literature where Kendra and Taplin state that in part "...communication networks that exist within an organization define its corporate culture" (2004, p. 37). Further support for the conceptual theory also appears in small group research with the concept that culture and group composition affect small group meeting communication patterns (Du-Babcock, 2003). From the multi-national management research literature there are discussions on how cultural differences cause misunderstandings (Branned, 2000), and finally, culture research also discusses communication interactions and culture (Trompenaars and Hampden-Turner, 2000; Schein, 2004).

To ensure an understanding of the established conceptual theory the definitions of communication, multi-national project team, and cultural dimension of power distance, as used in this document, is required. The following sections provide these definitions and describe their application within this research.

Communication. The Project Management Institute's® (PMI®), *A Guide to the Project Management Body of Knowledge*®, describes communication as the processes of "...planning, information distribution, performance reporting and administrative closure" (2000, p. 205). As this list indicates, communication processes consist of various methods to transfer data and information between parties in an attempt to influence, alter, or effect some change. One communication definition is "... a process in which a person, through the use of signs (natural, universal), symbols (by human convention), verbally and/or non-verbally, consciously or not consciously but intentionally, conveys meaning to another in order to affect change" (Schihl, 2004). Another communication definition is the act which "... occurs with a particular social

system composed of interdependent groups attempting to achieve commonly recognized goals” (Wikipedia, 2004).

Utilizing this set of descriptions and meanings, for this research, the following definition was developed. A multi-national project team communication is ‘an exchange of data and/or information, either verbally or in written form, intended to assist in the delivery of a common goal associated with the project’s specific objectives/outputs/outcomes.’

Multi-national project team. Found within various literature sources are common references to multi-national corporations (Goodall and Roberts, 2003), inter-organizational interactions (Teeikangas, 2002), and multi-culture teams (Branned, 2000). A review of this literature identifies a common theme that the multi-national team includes members from at least two politically different nations, as identified by their passports. To overcome the literature inconsistent application of a single term the following specific multi-national project team descriptive definition was developed.

For the purpose of this study, a multi-national project team is descriptively defined as a group of people, from at least two different national origins, as identified by their passports, who are assigned/working on the same project to produce a specific output or outcome. A project will meet the definition as defined in PMI’s® PMBOK®.

Cultural dimensions. Published research efforts of anthropologists, sociologists and other cultural researchers, identify that all people have a set pattern of thinking and feeling that is learned at an early age (Peng, Peterson and Shyi, 1991; Hofstede, 1997). These collective learned patterns of thinking, feeling, etc. are commonly referred to as culture (Sennara, 2002).

As the various literature sources reveal, there is no single definition of culture. In Kroeber and Kluckhohn’s 1952 study they identified over 160 culture definitions (Bertalanffy, 1969) while recent research has extended this earlier effort with a resulting identification of over 300 culture definitions (Storti, 1998). Within project management literature authors either fail to provide a definitive culture definition or predominately, they refer to Geert Hofstede’s seminal work and his culture definition, mental programming of the mind (Sennara, 2002).

Contained in Hofstede’s original research are four distinct culture attributes which are intended to provide an overall characterization of the various nations’ culture. One key communication culture

attribute is 'power distance,' which is defined as "... the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (1997, p. 29). This research focused on understanding the relationship between the individual's power distance and the overall project team communication satisfaction.

Research Proposition

This research proposition was that multi-national project team communication's have a cultural dimension according to the definitions of communication, culture, and power distance - as previously presented.

Several items support this proposition. First, we all engage in multiple communication methods that include processes such as face-to-face verbal communication, phone calls, body language, and written forms that include E-mail, memos, letter, policies, and procedures. Second, we all carry culture within us that was assimilated in our formative years. Third, while culture researchers present varying definitions and views of culture, i.e. national culture by Hofstede or organizational culture by Schein, each tend to discuss specific attributes over a continuum range of measurements. As an example, Hofstede's original research results provided four indexes that are designed to demonstrate each measured nation's relative cultural relationship along the respective attribute index scale. By comparing each nation to other nations, along this index scale, one can gain an understanding of the nation's members' potential responses to varying conditions. Another example is Trompenaars and Hampden-Turner's six cultural dichotomies discussion that involves polar measurements on each of the universally shared problem dichotomies (Trompenaars and Hampden-Turner, 2000). For each of the dichotomies every individual and organization makes decisions, communicate, and conduct business based on where they are along the universally shared problems scale.

Fourth, that as all people demonstrate common cultural dimensions or universally shared problems, the physical manifestations of these will vary by factors such as the individual's nationality, geographic location where they were raised, and organizational participation (Hofstede, 1997; Trompenaars and Hampden-Turner, 2000; Schein, 2004). As a result, each individual's identified cultural attribute, like power distance, can be identified on the respective cultural researcher's continuum scale, discussed in item three above.

The fifth item is that core cultural values develop during the individual's formative years. These early cultural assimilations provide modifying and influencing affects on all tasks one undertakes from

what they are thinking to interpretation of communications (Rokeach, 1973). Due to the formative years' assimilations, the knowledge is tacit in nature and the individual is typically not directly aware of the effects. These deeply rooted cultural assimilations are thus, difficult to change (Hofstede, 1997).

These five attributes establishes the foundation that supported the research proposition that if we all carry within us a cultural component, that is largely based on our formative years, which can be indirectly measured on a continuum scale, and is difficult to change, its combined affect will impact the project team's way of thinking, feeling and communicating. Furthermore, when a project team consists of people from different nationalities they will, individually, exhibit cross-cultural characteristics in the way they communicate. Collectively, the combination of the individual's power distance and their communication will assist in developing the teams' multi-national project team communication satisfaction index. To generate the communication index measurement this research relied on the inductive exploratory case study methodology through a data collection combination of semi-guided interviews and self-administered surveys. The multiple data gathering process provided the method to build a deeper, richer, understanding of the multi-national project team cross-cultural communication interactions case studies on an individual case study and cross case analysis method. The next section will discuss some limitations to this research.

Study Limitations

This section addresses the primary limitations to this research that include; (1) lack of a single definition of culture, (2) lack of direct measure of culture, and (3) research conclusions generalizability. The objective of this section is the identification and discussion of these limitations.

Lack of a Single Definition of Culture. The literature is clear that there is no single, universally accepted, culture definition. "Kroeber and Kluckhohn (1952) collected and discussed some 160 definitions without coming out with a definitive one" (Bertalanffy, 1969, p. 201). Almost fifty years later culture research has not resolved this problem and in fact, the problem has increased. Current cultural definition research efforts have identified well over 300 different definitions (Sennara, 2002). Lacking a clear, universally agreed on, definition of culture is often viewed as a limitation to culture research. Stated in the form of a question: How can one measure a concept, such as culture, that has no single definition?

To address this limitation, this research adopted Hofstede's definition of 'software of the mind' (Hofstede, 1997). This culture definition, as it applies to this research, is supported from two aspects, first, project management culture literature review identifies that project management authors either provide no culture definition (Ollila, 2002) or they predominantly reference Hofstede (Teeikangas, 2002; Chevrier, 2003; Muriithi and Crowford, 2003; Shore and Cross, 2003).

Second, this research context was multi-national projects which involved at least two national cultures, as identified by their passports. As the area of research focus was multi-national nations, interacting towards a common objective/goal, relying on national culture attribute of power distance provided a guiding principal. Within this context, Hofstede has conducted and presented the seminal and often referenced national culture research.

Each of these aspects supported the decision to rely upon Hofstede's power distance definition and is "... in agreement with many other researchers [that] identifies the work of Hofstede (1984) as the most influential scholarly work in the area of culture..." (Muller and Turner, 2004, p. 404).

No Direct Measure of Culture. Schein presents culture as an abstraction that "... points us to phenomena that are below the surface, that are powerful in their impact but invisible and to a considerable degree unconscious...." (2004, p. 8). The deeper, invisible and unconscious nature of culture limits the ability to directly measure it. As a result, Harkness, Vijver and Mohler discusses culture research methods where researchers measure "... indicators (which can be measured) [that] provide access to (latent) constructs (which cannot be directly measured). The constructs, in turn, represent underlying (theoretical) concepts" (2002, P. 11). This is an issue that all social based culture research faces which is addressed by data gathering techniques that measure the indicators which indicate the constructs.

Addressing this limitation required the adoption of accepted indirect measurement techniques. For this research, an inductive exploratory case study method was applied that relied on semi-structured interview techniques and self-administered questionnaires. Both the semi-structured interviews and self-administered questionnaires relied on previously applied and validated, in other cross-cultural research efforts, instruments. These previously developed and validated research questions, by Earley and Erez (1997) with a Cronbach alpha of .84 and Roberts and O'Reilly (1974) Cronbach alpha of .74, provide a measure of individual power distance and communication satisfaction, respectively, from which the

theoretical concept of the project team's communication satisfaction was developed. This is a common and accepted research method which has been applied in other cross-cultural research (Schaffer and Riordan, 2003; Vatrapu and Perex-Quinones, 2004).

Generalizability. Generalization is an area that is often challenged in case study research (Lee and Baskerville, 2003). These challenges tend to center around the aspects of limited research sample sizes, i.e. small 'Ns,' and the inability to generalize to different contextual case study populations. The intent of this inductive exploratory case study research was not to develop a broader statistical based population generalization but to develop an analytical theoretical understanding (Yin, 2003) of multi-national team's communication satisfaction based on the understanding of the individual's power distance culture attribute. This research was theory developing, not theory testing, within the specific context of multi-national project teams. As such, the results may not be broadly generalizable across different contextual situations and populations (Yin, 2003). Thus, rather than developing a broad, statistical based, population generalizable result, the research developed on analytical generalization and generalizability of the research method.

Analytical generalization is "... the mode... in which a previously developed theory is used as a template with which to compare the empirical results of the case study" (Yin, 2003, p. 33). In this research a conceptual theory was developed against which the case study's empirical data was compared. The resulting conclusion is analytically generalizable within the context developed.

The second discussion of generalizable involves the research method. As a generalizable method it is transferable to other research that would replicate this effort in different cross-cultural contexts.

National Culture Power Distance Index: Hofstede's national power distance index (PDI) – as multi-national project team selection criteria – can be viewed as a limitation to the research. As the literature shows, Hofstede's survey is a widely commented on and replicated instrument, and it appears that it is not uncommon for researchers to apply it incorrectly. As Hofstede reports, "... about 30 replications ... [have occurred]. Not all of them have been equally meaningful or flawless," (Hofstede, 1997, p. 254). The instrument was originally "... designed to discriminate among national cultures. They are not suitable for discriminating among individuals" (Hofstede, 1997, p. 254).

The purpose of using Hofstede's PDI was not to utilize his survey, as part of the interview process, but to provide an indication of the national culture dimension which helps select the project teams. Using Hofstede's PDI, as an indication of divergent cultures, rather than the actual determination of the individual's PDI addressed this limitation.

Significance of the Study

This research contributes to the body of knowledge in three specific ways. First, the project management literature review extends and expands earlier project management literature reviews. Extension occurs through synthesizing the five earlier studies and conducting an analysis of all Project Management Journal[®] (PMJ[®]), International Journal of Project Management (IJPM) articles and published project management books between 1993 and 2003, inclusively. This effort extends the project management literature reviews to include the most recently published literature while focusing on the analysis on project management culture.

By specifically focusing on culture this literature review expands the earlier work. Culture and its affects or interactions with project team communications is an area not specifically covered by the earlier literature reviews. As Table 1 identifies the five previous reviews did not specifically focus on culture within the project management literature.

Table 1. Previous Project Management Literature Reviews

Author(s)	Year	Research Focus
Kloppenborg, Opfer and Gallagher	2000	Identification and interpretation of project management research trends for 85% of the English published project management literature between 1960 and 1990
Betts and Lansley	1995	Classified all International Journal of Project Management paper for the period of 1982-1992 to provide a partial map of the discipline of project management
Morris	2000	Reviewed and classified all Project Management Journal, International Journal of Project Management, and PM Network articles, between 1990 and 1999, according to the 50 Centre for Research in the Management of Projects Body of Knowledge Topics
Themistocleous and Wearne	2000	Reviewed and classified all Project Management Journal, International Journal of Project Management as well as the Project Management Institute and International Project Management Association conference proceedings, between 1993 and 2003, according to 44 topics developed from various systems of Body of Knowledge elements.

As Table 1 highlights, the previous reviews focus were general and broad in nature. Conversely, this literature review was specifically focused on project management culture literature.

Second, this research also provides a contribution, to the body of knowledge, by partially closing two specific cross-culture project management body of knowledge gaps. As discussed in the Literature Review section, there is a clear gap in theoretical constructs on the relationship between the project team communication satisfaction and the project team member power distance cultural attribute. While many authors present the concept that culture is important to projects, few provide in depth, empirically supported studies on this topic. As an example, Thamhain points out that in the information technology literature area "...published results seem to be sparse and fragmented, and the understanding of how managerial style and organizational culture affect IT applications to project management is rather limited" (2004, p.1). This research partially fills this gap by providing a cross-culture based empirical study that specifically focuses on the project management discipline, team communication satisfaction, and the individual's culture attribute.

Another identified literature review gap is the limited set of multi-national or cross-cultural project management contextual based empirical studies and few case studies (Adler, 1983; Ofori-Dankwa

and Ricks, 2000). Several factors attributed to this lack of multi-national cross culture research and published literature which includes difficult to conduct, costly to perform (Harkness, Van de Vijver, and Mohler 2002) and a lack of standardized methods (Schaffer and Riordan, 2003). This research partially fills this gap as its focus was cross-cultural project management contextual settings.

By partially closing the identified literature reviews culture knowledge gap this research also contributes to the multi-national project management team body of knowledge. Partial closure of the knowledge gap occurred through the application of an inductive exploratory cross-cultural, multi-national project team communication satisfaction and individual's cultural power distance attribute analysis.

Support for this research need was found throughout the various literature references yet it has historically been difficult to perform. As an example, while the level of cross-cultural research attention is increasing (Thatcher, 2001), the project management literature (Makilouko, 2004), and general management literature (Schaffer and Riordan, 2003) are in alignment that performing cross-cultural research is time consuming, expensive, complex, and difficult and “..... ‘very few researchers have addressed empirical research methodologies for intercultural communication’ (MacNealy 40-41)” (Thatcher, 2001, p. 458) and there is a lack of clear international cross-cultural research methods (Thatcher, 2001; Lenartowicz, Johnson and White, 2003).

Third, this research addressed the lack of a clear international cross-cultural, multi-national project management research method as it developed, implemented and documented one such approach. The approach used resulted in the development of a robust model that provides a method for conducting cross-cultural, multi-national project management research that can be replicated in other cross-culture contexts. As identified above, very few researchers have addressed empirical research methodologies and methods. The research presents a detailed method that was applied, within the identified context, which can be duplicated in other cross-culture research.

The next section provides a set of definitions, for a selection of critical phrases and words, as apply within this research.

LITERATURE REVIEW

This section provides three views of current project management applicable literature, in relation to this research. The first view is a synopsis of relevant project management literature relying on frequency of occurrence of applicable project management culture and project management literature, as reviewed from the leading project management journals – such as Project Management Journal and International Journal of Project Management - as well as the management literature – Management International Review, Journal of American Academy of Business, Journal of Operations Management – and culture – International Journal of Intercultural relations.

The second view presents a frequency of occurrence where the literature discusses communications, culture and a combination of communications and culture.

The third view provides a summary of the various literature sources reviewed as part of this research. The intent of the third view is to identify how the various literature sources discuss communications and culture. An outcome of this view is to represent the gaps found within the literature and how this research fills some of these gaps.

Following the first synopsis section a broader discussion of the literature is presented. The following discussion provides a detailed view of the literature, where the literature gaps and how this research fits within these gaps. This literature review also extends and expands on earlier literature reviews to advance the body of knowledge.

Literature Review Synopsis

The purpose of this literature review synopsis is to briefly show the body of knowledge gaps that have been identified. This is achieved by presenting three summary views – Tables 2, 3, and 4 - of the reviewed literature.

Table 2 provides an overall percentage summary of the various cultural and communications categories. The literature review identified three major analysis classifications which include culture, communication and project based literature. Within the culture classification subcategories of cross-cultural, national culture, organizational culture, project management culture and culture research methods are specifically discussed.

Table 2 also provides a set of communications subcategories classifications that include inter-personal communication, organization communication, and project management communication. As an example, of the information contained within Table 2, project management culture research, of any kind, accounts for about 21% of the literature summary. In the communications section, project management communications was specifically discussed approximately 8% of the time. Table 2 does not imply that within all the available literature the various subcategory percentages are available. Table 2, instead, presents a view of the literature specifically identified and reviewed for this research. As Table 2 demonstrated project communication is not a frequent topic within the reviewed literature. Table 2 presents a cross reference of culture and communications which provides a clearer view of the body of knowledge gap.

Table 2. Literature Percentage Summary View

Cross-cultural	Cultural				Communication			Project
	National	Organization	Project Manag.	Methods	Inter-personal	Organization	Project Manag.	
41%	20%	31%	21%	11%	10%	11%	8%	21%

Table 3 builds on Table 2 by presenting a cross reference between the culture and communications categories which provides a clearer view of the literature identified gaps. Identification of these gaps is achieved by providing a view that identifies the number of articles that the various reviewed authors combined project management specific different culture attributes and communications categories within their articles.

Table 3. Literature Comparison

		Communication			Culture				Project	Comm. & Culture	Com., Culture & Methods
		Inter-Personal	Organizational	Project Manag.	National	Organizational	Project Manag.	Methods			
Culture	Cross - Culture	2	3	5	1	8	1	4		4	1
	National	2		2		1	1	1	2		
	Organization			1				1	2		
	Project Manag								2		
	Methods										

As Table 3 shows, with the exception of one author, Thatcher (2001), all other references either did not include communications or cross-cultural research methods in their articles.

While Thatcher's article discusses communication and cross-cultural research methods it is not an empirical based research article that analyzed cross-cultural research within the context of project communication satisfaction. Rather, Thatcher's "... article explores three ways to design US empirical methods to be more valid and ethical in cross-cultural studies" (2001, p. 458).

Tables 2 and 3 demonstrate that there is a cross-cultural, project management communication research gap. Of the forty-four sample articles 4 included cross-culture research and communications research, 9%, and one combined cross-culture research, communications research, and research methods, 2.2%. As demonstrated the published literature does not provide a reference base of research be it empirical based or case studies research efforts.

Table 4 provides a broader view of the reviewed literature by expanding on the earlier forty-four articles. This listing provides identification of the specific literature source and a classification of the article in relationship to culture and communications. Table 4 provides a visual means of identifying where the published literature and subsequent research gaps exist.

Table 4. Literature Review Synopsis

Author	Year	Culture			Communications			Project	Comments
		Cross-Culture	National Organization	Project Method Manag.	Inter-personal	Organization	Project Manag.		
Henrie, M.E.	2005	X		X X	X	X		X	Cross-culture, multi-national communications, PDI and method
Back, K.M.	2004			X				X	Performance & Learning
Delisle, C.L. & D. Olson	2004							X	Project terminology
Ford, J.	2004	X			X				Team diversity, conflict
Henderson, L.S.	2004		X		X				Communication process-encoding/decoding
Karlsen, J.T. & P. Gottschalk	2004			X					Information technology knowledge transfer
Kendra, K. & L.J. Taplin	2004		X						I.T. project performance
LaCoursiere, S. & M. Sarkar	2004		X		X				Virtual medical teams
Makilouko, M.	2004	X		X					Leadership & virtual project teams
Schein, E.H.	2004		X						Org. Culture
Swigger, K.F. Alpaslan, R. Brazile & M. Monticino	2004	X							Distributed project team performance
Thanhain, H.J.	2004			X					Personal and professional needs drive project performance
Thanhain, H.J.	2004		X				X		IT Project Performance
Vatrapu, R. & M.A. Perex-Quinones	2004	X							Culture affects on structure interview, used Earely/Erez PDI
Andersen, E.S.	2003		X					X	Norwegian project, task culture
Chevrier, S.	2003	X		X					European international project leadership
Douglas, C., J.S. Martic & R.H. Krapels	2003					X			Self managed work teams
Du-Babcock, B.	2003	X	X			X			Small group comm
Evaristo, R.	2003	X		X					Trust, distributed projects
Evaristo, R.	2003	X		X					Trust & team process, new P. Mmodel
Jaafari, A.	2003		X					X	Complexity impact on project culture

Table 4. Literature Review Synopsis – Continued

Author	Year	Culture				Communications		Project	Comments
		Cross-Culture	National Organization	Project Manag.	Method	Inter-personal	Organization Project Manag.		
Lenartowicz, T., J. P. Johnson, & C. T. White	2003		X						Intra-country, subcultures, international manag..
Li-Ping, T., A. Furnham, & G. Meit-Tzu Wu Davis	2003	X							Organizational Theory, work, money & Protestant work ethic
Muriithi, N. & Crawford	2003		X		X				Africa case study
Ramaprasad, A. & A. N. Prakash	2003		X				X		Foreign Managers leveraging local knowledge
Schaffer, B. S.	2003	X		X				X	Cross-culture organization research
Thomas, D. C.	2003	X		X					Organization manag..
Hader, S. & S. Gabler	2002	X							Cross-culture survey techniques
Harkness, J. A.	2002	X				X			Cross-culture survey methods
Ollila, S.	2002			X				X	Leadership
Sennara, M.	2002	X			X				Risk & Trust
Skjak, K. K. & J. Harkness	2002	X				X			Methodologies, Data Collection Methods
Sui Pheng, L. & S. Yugan	2002	X							China construction industry
Teeikangas, S.	2002	X		X					Literature Review
Thatcher, B.	2001	X		X			X		Lack of empirical studies
Branned, M. Y.	2002	X							Lack of empirical studies, teams.
Hartman, F. T.	2000							X	Trust on projects
Hunt, A.	2000			X					Organization culture affects on projects
Inglehart, R. & W. Baker	2000		X						Modernization Culture Theory
Kloppenborg, T. J., W. A. Opfer & J. M. Gallagher	2000							X	Literature Review 1960-1990
Morris, P. W. G.	2000							X	Literature Review
Ofori-Dankwa, J. & D. A. Ricks	2000		X	X		X			International business culture
Sherif, M. H.	2000		X		X			X	Project team performance
Themistocleous, G. & S. H. Wearne	2000				X			X	Literature Review
Trompenaars, F. & C. M. Hampden Turner	2000	X		X		X	X		Multi-national management culture
Wilemon, D.	2000					X		X	P.M. research, interpersonal conflict
Demeester, M.	1999			X					Technology transfer culture based issues
Kotmour, T.	1999							X	P. M. Learning Framework
Loosemore, M. & H. A. Muslmani	1999							X	U.K. & Persian Gulf projects

Table 4. Literature Review Synopsis – Continued

Author	Year	Culture				Communications			Project	Comments
		Cross-Culture	National	Organization	Project Manag.	Method	Inter-personal	Organization		
Thomas, S. R., R. L. Tucker & W. R. Kelly	1999							X		Communication assessment tool
Fussell, S. R., R. E. Kraut, F. J. Lerch, & W. L. Sherlis	1998						X			Team Performance
Sparrow, P. & P. Wu	1998		X							Human Resource Management
Cavusgil, S. T. & A. Das	1997			X		X				Management empirical research methods issues
Earley, P. C. & M. Erez	1997			X						Integration of culture diversity in org. settings
Hofstede, G.	1997		X							Reformat of earlier culture research
Kangari, R. & C. L. Lucas	1997						X			A guide for working internationally
Smith, M. B.	1997							X		Communication & trust
Harpham, A. & A. Binns	1996			X						Trust on projects
Adler, N. J.	1995	X		X						Literature Review
Jackson, T.	1995	X								Management theories Western based
Adler, N. J.	1983	X		X						Literature Review
Hofstede, G.	1982	X	X			X				Need to adapt in multi-national project teams

The following section discusses the broader literature review which extends and expands earlier literature review efforts within the area of cross-cultural project team and their communication satisfaction.

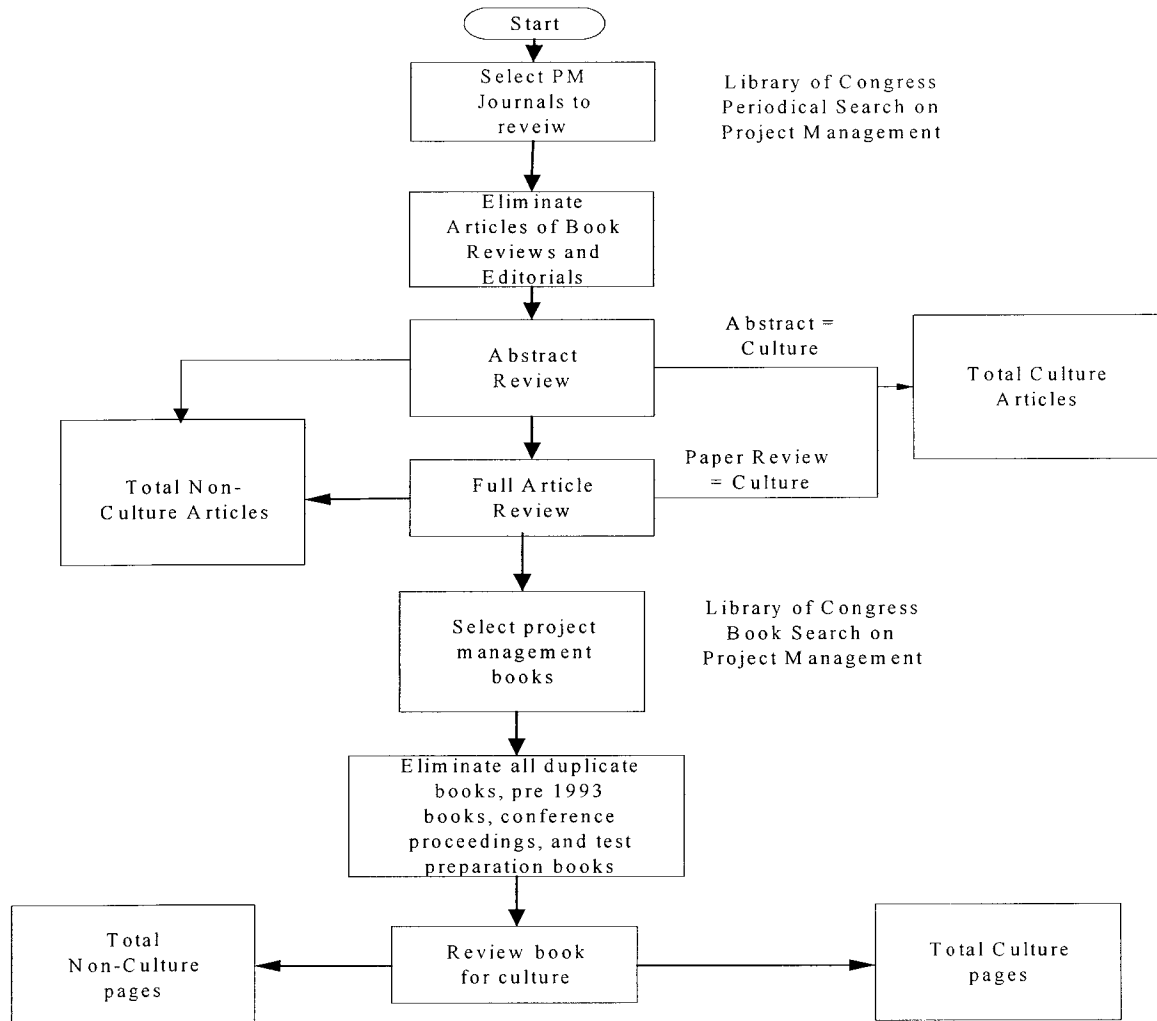
Project Management Literature Review

This section present a broader literature review, which contributes to the project management culture body of knowledge through the extension and expansion of earlier project management specific literature reviews. This section extends, as is discussed in more detail later, five earlier project management literature reviews that encompass a broad range of project management interest areas, literature, sources and specific review focus. Extension of these earlier efforts occurred through the analysis of leading project management journal articles and published books between 1993 and 2003, inclusive. This review also expands these earlier efforts by focusing on the specific topic of culture within the leading project management journals and published books.

Figure 1 provides a flow chart of how this literature review was conducted. As the flow chart depicts, this review involved the selection of appropriate project management journal and published book sources, and identification of applicable culture based literature. Based on this review process the review

identifies the level of published cultural based research that is available within the literature sources reviewed.

Figure 1. Literature Review Method



Literature Review Overview. Figure 2 graphically outlines the five previous in-depth literature reviews.

The first and largest review was conducted by Kloppenborg, Opfer, and Gallagher which reviewed approximately 85% of all English language published project management literature between 1960 and 1990 (Kloppenborg, Opfer and Gallagher, 2000). This review focused was on trends within project management research as identified in the first forty years of published project management literature.

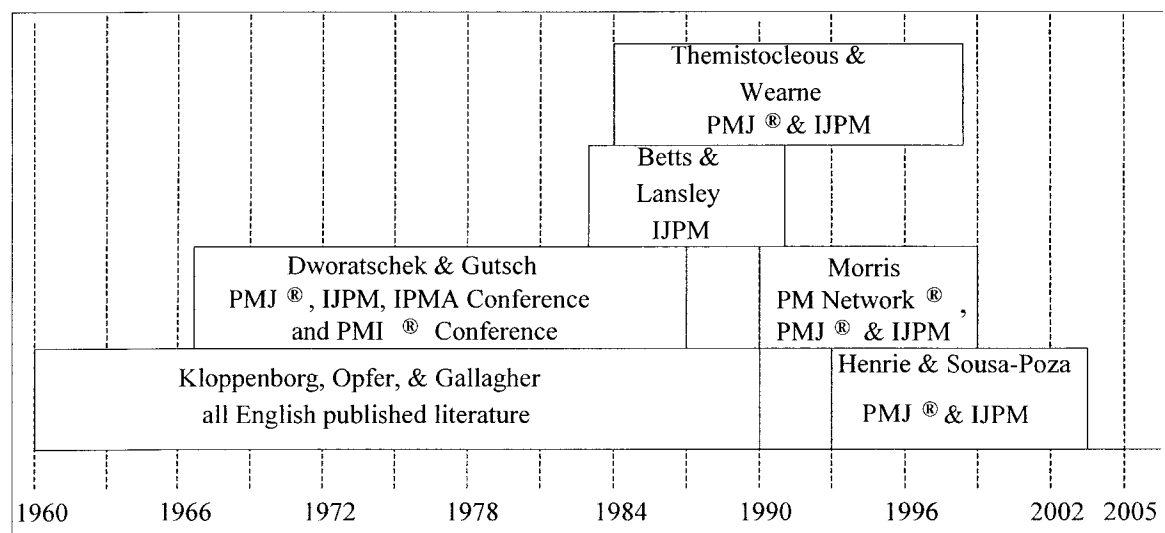
Concurrent to the Kloppenborg, Opfer, and Gallagher efforts, Dworatschek and Gutsch research "... surveyed the topics of papers published..." (Themistocleous and Wearne, 2000, p. 7) by PMJ, IJPM and IMPA Conference and PMJ[®] Conference proceedings and articles between 1967 and 1987 for their relationship to the project management body of knowledge.

Slightly overlapping the Dworatschek and Gutsch work, Martin Betts and Peter Lansley classified IJPM papers between 1983 and 1992 in eleven broad categories that included human factors, project organization, project environment, project planning, conceptual models, project information, project performance, risk management, project startup, project procurement; and innovation (Themistocleous and Wearne, 2000).

In somewhat of a parallel effort Themistocleous and Wearne analyzed the relative frequency that project management 'Body of Knowledge' topics were covered in the PMJ[®] and IJPM journals between 1984 and 1998 (Themistocleous and Wearne, 2000).

The most recent study was conducted by Peter Morris who reviewed all PMJ[®], IJPM and PM Network[®] articles between 1990 and 1999 (Morris, 2000). This study classified all article against the project management Body of Knowledge topic areas.

Figure 2. Literature Review Time Line



From a project management culture perspective these extensive reviews have identified that project team culture is a research area where little data and little information are available. As an example, Kloppenborg, Opfer and Gallagher (2000) forty year literature survey identified less than 4% of the English published, project management literature was related to culture. The other literature reviews did not specifically identify the frequency of culture based literature within their evaluations.

The following section presents a review of this literature review analysis:

Project Management Literature Review Discussion. The reviewed literature identified that culture can and does have both positive and negative effects on project management (Hunt, 2000). Also, a general project management literature consensus is that culture is a critical project operations attribute (Andersen, 2003; Jaafari, 2003; Thomas, 2003). This concept is highlighted from one study that found that 49% of interviewed participants indicated items such as interpersonal conflict, communication breakdowns, and inter-group conflict are magnified by different culture affects (Wilemon, 2000).

While the literature reports on the effects culture has on projects, a significant literature review finding is the lack of empirical project management culture research. Kloppenborg, Opfer and Gallagher, (2000) forty year literature survey identified less than 4% of the English language published; project management literature was related to culture. The 1993 to 2003 literature review identified that this extremely low level of published project management culture research continues. In reviewing a combined total of 770 *Project Management Journal*[®] and *International Project Management Journal* abstracts and articles, approximately 4.5% and 8%, respectively, of the articles provide data or information on culture research. The project management books reviewed identified approximately 2.1% annual mean percentage culture reference.

The level of culture review, as presented in the project management literature, has not changed since the early 1960s. This is a trend that does not match the general consensus that culture is contained in all people and organizations. Other conclusions of this review are discussed next.

Conclusion, Project Management Literature Review 1993-2003: The primary objective of this literature review was to delineate, using content analysis methods, (Denzin and Lincoln, 2000; Leedy and Ormrod, 2001) the current state of culture research within the project literature. From this review several important

points were derived. First, the review identifies that the level of reported culture literature is consistent with the earlier reviews. As these earlier reviews identified approximately 4% of culture related articles between 1993 and 2003 approximately 4% of *Project Management Journal*[®] articles, approximately 8% of the *International Journal of Project Management* articles, and 2.1% annual mean culture referenced book pages contained direct and significant culture discussions.

Yet this low level of literature coverage does not appear to be supported by the information provided within the literature. Table 5 presents a summary of the important review points that were obtained in this research effort.

Table 5. Project Management Culture Literature Review Important Points

Important Review Points	Reference
Culture is a critical element of organizations in general	(Hofstede, 1984; Schein, 1992; Hofstede, 1997; Trompenaars and Hampden-Turner, 1998; Teeikangas, 2002)
There is a lack of a single, universally accepted definition of culture	(Storti, 1998; Ollila, 2002)
Understanding culture is important for project managers	(Harpham and Binns, 1996; Kendra and Taplin, 2004)
There is a lack of empirically based project management culture research	(Ollila, 2002; Teeikangas, 2002; Thomas, 2003)
There is a lack of a clear and universal cross-culture research method	(Harkness, Van de Vijver and Mohler, 2002; Sennara, 2002; Schaffer and Riordan, 2003)
Cross-cultural projects experience an increase complexity	(Dinsmore, 1984; Jaafari, 2003)
Culture affects communications	(Ford, 2004; LaCoursiere and Sarkar, 2004; Matveev and Nelson, 2004)

As these points identify, project culture is important, appears to contribute to project success or failure, contributes to project team effectiveness, contributes to project performance, remains an area that has not been well researched, and is a modifying attribute of communications, the focus of this research.

Expanding the literature review beyond project management specific references finds that similar cultural research issues are identified in the areas of management in general. A major review of

management journals identified "... that less than 5 percent of organizational behavior articles [4.2%] published in top American management journals focused on cross-cultural issues" (Adler, 1983, p. 228) and "Two [later] studies replicated Adler's results and found no significant increase in the number of cross-cultural organizational behavior articles (Godkin, Braye and Caunch, 1989a: Peng, Peterson and Shyi, 1990)" (Jackson, 1995, p. 16).

From other research areas, such as international management literature and cross-cultural research, culture is identified as a critical team element (Teeikangas, 2002; LaCoursiere and Sarkar, 2004; Matveev and Nelson, 2004), there is a lack of empirical research (Teeikangas, 2002), conducting cross-cultural research is difficult (Schaffer and Riordan, 2003), and there is no clear consensus on methodology or methods (Cavusgil and Das, 1997; Lenartowicz, Johnson and White, 2003).

Additionally, culture has been identified as a core organizational, team and project team performance attribute that is difficult to analyze using techniques such as survey instruments (Yeung, Ulrich, Nason and Glinow, 1999; Thamhain, 2004).

These various literature sources support the proposition that there is a gap in project management cross-culture research methods as well as in understanding the interaction of cross-culture influences on project team communications.

RESEARCH METHOD

The research was conducted using an exploratory case study method patterned after Yin's (2003) case study methods. According to Yin, exploratory case study is typically used as an initial research effort that is intended to develop a theoretical understanding. For this research, this method was applicable as the intent was to develop an understanding of the relationship between individual project team members' power distance cultural attribute and the multi-national project team communication satisfaction index.

This research was contextually based in the sense that to develop a richer understanding of the phenomena, divergent data gathering processes were applied, which included the direct interaction between the survey population and the researcher – in the form of semi-guided interviews - and the use of a self-administered survey. The semi-guided interviews and self administered surveys were based on a common set of questions. The primary difference between the data gathering methods involved the ability to obtain a greater understanding of the project context through the interview process. A richer understanding of the data was achievable through the use of open ended questions. Discussing and exploring the various open ended questions allowed new information to be interactively explored, thus developing more in depth detailed data.

The following section provides a broader discussion on the research method as conducted in this study.

Exploratory Case Study Research

Exploratory case study research is associated with development of a richer, contextually based understanding of the phenomena and the researcher's inability to manipulate the experiment.

“As the term suggests, exploratory research ... is the initial research, before more conclusive research is undertaken. Exploratory research...[relies] on secondary research such as reviewing available literature and/or data, or qualitative approaches such as informal discussions with consumers, employees, management or competitors, and more formal approaches through in-depth interviews, focus groups, projective methods, case studies or pilot studies” (UIC, 2004).

Case study exploratory research is also associated with the restriction of research subject manipulation. As Yin states, “The case study is preferred in examining contemporary eventswhen the

relevant behaviors cannot be manipulated” (2003, p. 7). Exploratory case study research methods are applicable to discovering richer theoretical understandings of the phenomena.

The structure of an exploratory case study research design encompasses five specific components:

1. a study’s question – see Research Question section
2. its proposition – see Research Proposition section
3. its unit(s) of analysis – the project team communication satisfaction
4. the logic linking the data to the propositions; and
5. the criteria for interpreting the findings (Yin, 2003, p. 21)

Components 1 and 2 are discussed in the associated identified sections. Component 3, unit of analysis, is associated with ‘what the case is.’ Case studies have been used to study single events, individuals, and organizational changes. The “... unit of analysis (and therefore of the case) is related to the way you have defined your initial research question” (Yin, 2003, p. 23). Following this logical discussion this research unit of analysis is project team communication satisfaction as identified by the individual project team members. This unit of analysis is derived from the research proposition, which is linked to the present understanding of the cross-cultural, multi-national, project team literature. As the literature review section discussed, there is a lack of empirical evidence on the relationship between individual power distance culture dimension and the project team communication satisfaction. The literature review also identifies a general lack of published project management culture literature and the effects culture has on multi-national, cross-cultural project teams.

With clarification of Yin’s case study design components 1, 2, and 3, the challenge comes in the clarification of components 4 and 5, i.e. linking data to propositions and interpreting the findings, respectively. As Yin discusses, these components are “... the least well developed in case studies” (2003, p. 26). As such, the remainder of this section will highlight the methods that were used in gathering the data and linking the data to the proposition.

Data Gathering and Analysis Overview

While there are many approaches to data gathering and analysis, this exploratory case study research method applied a parallel effort of data gathering and analysis. As the data was gathered, parallel analysis occurs. Rather than wait until all the data is gathered to begin analysis, the exploratory case study researcher begins data analysis as soon as data becomes available.

The intent of parallel data gathering and analysis is to start noticing any pattern generation early in the research effort. From early pattern recognition, the researcher can develop preliminary interpretations of the phenomena, reject others, and discover the need to gather other data or expand on current data. As the research continues, the generation of theoretical understanding occurs (Stage and Manning, 2003).

The results of this process are the development of empirical analytical generalizations and theories based primarily on the data itself (Eisenhardt, 1989).

This study closely followed this model, in that each case involved the parallel efforts of gathering data, data analysis, and preliminary theoretical construct development.

Exploratory Case Study Research Association to Research Design

The use of exploratory case study research was well suited for this research design for several reasons. First, the research was designed to develop a theoretical understanding of the relationship between the individual project team member's culture and the overall project team communication satisfaction. As the literature review discussed, there is currently a theoretical gap on the relationship between cross-culture project teams and multi-national project team interpersonal communications. To partially address this gap requires 'initial research' to develop a theoretical understanding of the interactions between project team members' culture and project team communication satisfaction.

Second, the use of an exploratory case study model supports the concept that there is a lack of empirical based project management culture research. As the literature review identified, multi-national project team literature lacks a theoretical understanding of how culture is or is not influential on the project team's communication satisfaction. With a lack of clear project management culture research (Adler, 1983; Kloppenborg, Opfer and Gallagher, 2000), theory, and empirical data," (Ofori-Dankwa and Ricks, 2000) the use of exploratory qualitative research provides a validated empirical research method that allowed the theoretical construct formulation on the individual project team member's cultural relationship with the project team communication satisfaction.

Third, exploratory case study research provided a way to "...ensure that the researcher [did] not ignore structural elements that can have significant confounding effects on the phenomena they are trying to model" (Mehndiratta, Picado and Venter, 2001, p. 5). This is in alignment with the qualitative research intent of understanding 'why' research questions (Leedy and Ormrod, 2001). To better understand the

'why,' the researcher had to interact with the population of interest through the use of an experimental case study method. This research method provided a sound framework to build a richer understanding of the individual cases and the cross case comparison.

Fourth, exploratory case study research has been applied in similar research endeavors including international business studies, international cooperative joint venture research, intercultural communication and project management. Table 6 lists some examples of exploratory research application.

Table 6. Examples of exploratory research

Research Area	Size	Reference
Multi-national team negotiations	18 individuals, six from 3 countries	(Graham, 1985)
International joint ventures values, practices, systems	2 firms	(Danis and Parkhe, 2002)
Intercultural communications	17 U.S & 14 Japanese people	(Oblander and Daniels, 1997)
Project manager & owner perceptions on project start-up practices	Not supplied	(Halman and Burger, 2002)

As these examples demonstrate, exploratory research is a method that focuses on initial understanding and using smaller sample, "N" sizes. As qualitative researchers identify qualitative research has no definitive rules on sample size (Patton, 1990). As this research intent was to develop a theoretical cross-cultural project environment construct smaller sample sizes allows for the heuristic inquiry that Patton (1990) discusses as possible with smaller sample sizes.

The next section discusses the research design approach that this study followed.

Research Design

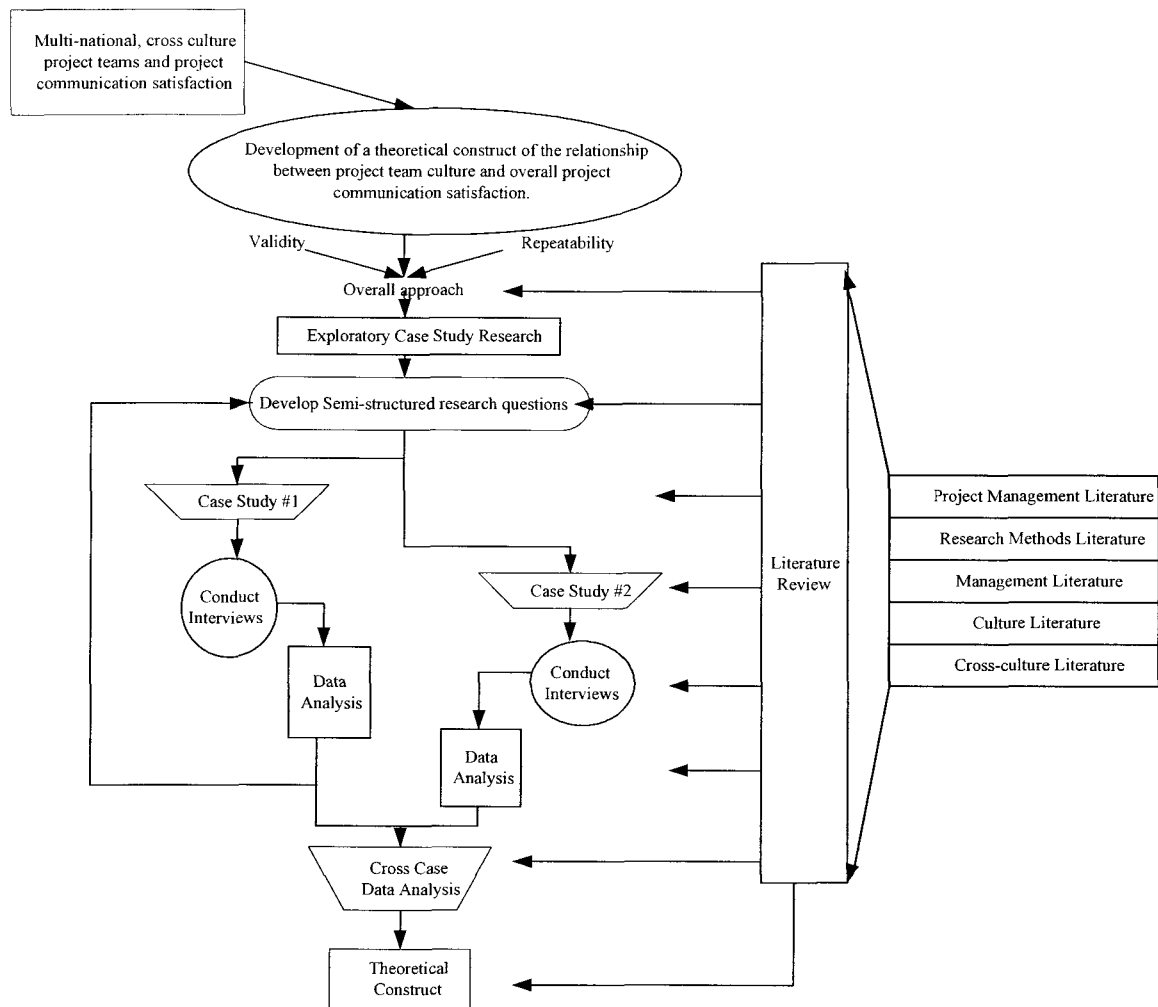
This research utilized a cross-sectional, exploratory case study research method. The selection of this method was driven by the research question and the data required developing a theoretical understanding of the phenomena of interest.

The research question is a social based question intended to develop an understanding of the relationship between multi-national, cross-cultural project team communications and the individual project team members' power distance culture attribute. The primary explored question was: What is the project team communication satisfaction relationship with the individual project team member's power distance culture attribute?

To develop a theoretical response to this question, the research applied a cross sectional case study research approach within the context of an exploratory method. This approach was applicable as case study exploratory research is a process that is intended to develop theoretical understandings inductively from social setting data (Denzin and Lincoln, 2000; Leedy and Ormrod, 2001; Yin, 2003).

Figure 3 graphically shows the overall research design process.

Figure 3. Research Plan Overview

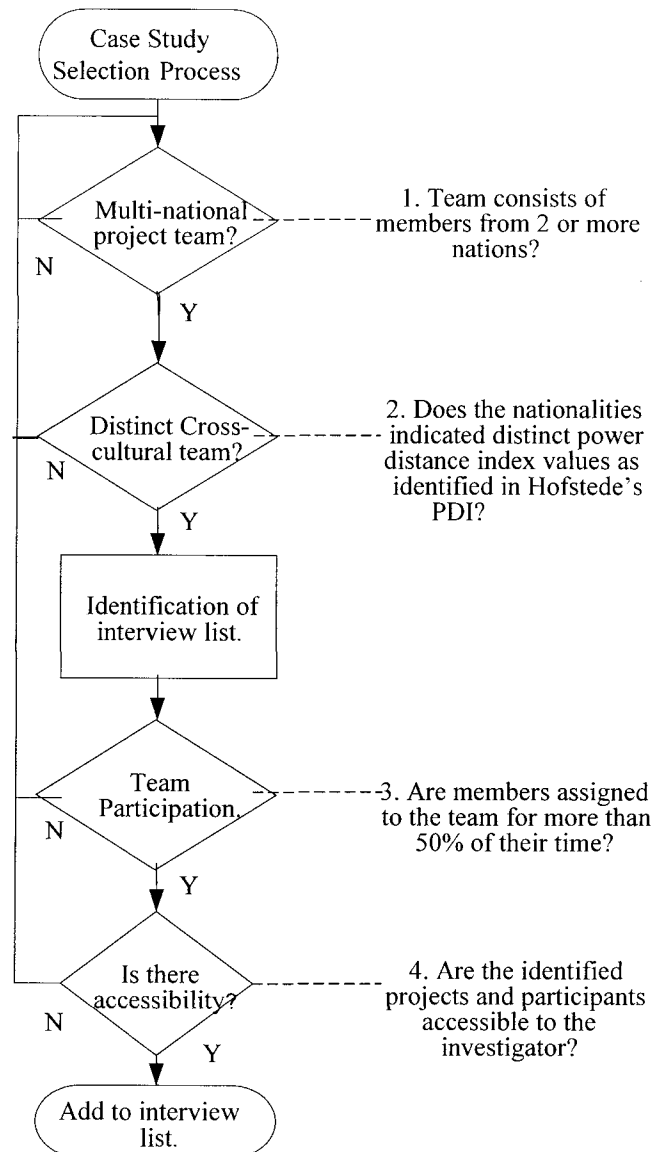


Implementation of Figure 3 followed the logical process of looking globally and moving downward to a specific team selection. A short overview of this process is described next.

Project Team Selection

As the area of research involved multi-national cross-cultural project teams, selection of the specific case study teams could be anywhere a multinational project team is working, i.e. globally. Reducing this global potential to a realistic set of case studies involved factors such as distinctly indicated cultural differences, accessibility, and maintaining a consistent research context (Schaffer and Riordan, 2003). Narrowing the global potential case study projects to a realistic number involved a theoretical sample process (Eisenhardt, 1989; Hader and Gabler, 2002) that included a sequence of decision points, as shown in Figure 4.

Figure 4. Project Selection Process



The research protocol relied on the use of systematic theoretical sampling. Systematic theoretical sampling is the process of specifically selecting case studies to achieve explicit results. As Eisenhardt states,

... theoretical sampling (i.e. cases are chosen for theoretical, not statistical, reasons, Glaser & Strauss, 1967). The cases may be chosen ... to fill theoretical categories and provide examples of polar types. While the cases may be chosen randomly, random selection is neither necessary, nor even preferable. As Pettigrew (1988) noted, given, the limited number of cases which can usually be studied, it makes sense to choose

cases such as extreme situations and polar types in which the process of interest is "transparently observable" (1989, p. 537).

Other supporting cross-cultural research literature, also identifies the application of systematic theoretical sampling of diverse culture survey populations as one method of culture difference identification (Jackson, 1995; Hader and Gabler, 2002).

Figure 4 graphically shows the overall systematic theoretical sampling process followed in selecting the specific case studies for this research. As noted, each included case study was identified as a 'polar type,' that is based on Hofstede's PDI ranking, the project team members were identified in the 1st and 4th PDI quartiles. According to the literature (Jackson, 1995; Hader and Gabler, 2002) utilization of polar types provides assistance in developing resulting polar cultural theoretical constructs.

The first steps in selecting polar type projects involved identification of multi-national project teams versus homogenous project teams. This question relied on the multi-national project team definition provided earlier which identified two multi-national projects. These projects are identified as Case Study #1, a Russia/America project, and Case Study #2, Canada/Angola. Each of these case studies involved personnel from more than one nationality which met the intent of the first question.

For those projects that passed gate 1, the next question determined if the project team makeup is a project that consists of diverse nations. This step narrowed the multi-national project team selection to those projects that fit within the overall research context, i.e. multi-national project teams that consist of culturally polar project team members.

Identification of a polar project team membership relied on establishment of upper and lower quartile Hofstede PDI rankings. Establishment of these boundaries was identified as Hofstede's 1st and 4th quartile groups. To identify the anticipated boundary lines, a review of the literature was conducted to identify Hofstede's PDI formula. Formula 1 was identified and provides the basis for the polar ratings.

Formula 1. Hofstede PDI Formula

$$PDI = 125 - 25 \times (\text{mean score employee}) + (\% \text{ perceived manager 1} + 2) - (\% \text{ preferred manager 3}) \text{ (Pheng and Yuguan, 2002)}$$

While it is theoretically possible to score a zero, a review of Hofstede's country listing shows a PDI national range between 11 for Australia and 104 for Malaysia with a resulting mean PDI of 55. The range of acceptable national PDIs was achieved through the identification of the ¼ percentile points.

Development of the ¼ percentile ranking shows a lower PDI index level of approximately 39.5 and upper index level of 75 PDI. Relying on the upper and lower quartiles provides a consistent measurement of indicated divergence that contains approximately two quartile differences between the project team members' PDI scores.

Reviewing Hofstede's raw nation PDI listing reveals that the United States' PDI ranking is just over the lower ¼ percentile ranking with a score of 40 versus the 39.5 percentile cutoff. As data indicates that the United States engages in multi-national project teams and is in very close proximity to the lower cutoff, I've expanded the lower limit to the PDI index to include the United States with a PDI of 40. Expanding the lower cutoff by four index points will continue to provide polar PDI readings. The range of acceptable PDIs will be $40 < x < 75$. By consistently relying on Hofstede's PDI index the project teams PDI cultural index indicated that the proposed cases involved diverse nations.

The third and fourth gates established if the participants were allocated to the project at least 50% of their work time and accessible. Working with the individual project managers each case team membership was identified as being assigned more than 50% of their time. Establishing if the project team members were involved at least 50% of the time helped to maintain consistency in the interviewees' responses. The logic follows that if someone rarely participates in the overall project then they will have insufficient participation to significantly impact the overall communications. While establishment of this limit is subjective, project experience indicates that anyone that participates at least 50% of their time will have an impact on the overall project communications.

The final step in the selection process was to ensure investigator accessibility to the project team. Successful case study research requires that there is a good possibility that access to the project team can be obtained. As is discussed further in the Data Analysis section, obtaining access was the major data gathering challenge.

This research followed the project team identification process as outlined. Two multi-national, divergent cultural project team memberships were identified with resulting data gathering processes applied. The applied data gathering and data analysis approaches are discussed in the next sections.

Data Gathering. This research relied on a multiple data gathering process that is sometimes referred to as crystallization or triangulation data gathering techniques that rely on data from more than one source. Crystallization data gathering and triangulation data gathering techniques are similar techniques where researchers' obtain increasing levels of analysis validation by relying upon many different data sources (Yin, 2003). The different data sources provide a rich source of information from which to drive the data analysis process and the resulting convergence on a common theoretical understanding (Denzin and Lincoln, 2000).

Table 7 provides an overview of the types of data gathering techniques and data analysis methods that were used.

Table 7. Data Gathering Methods

Data Collection Method	Reference	Data Analysis Method	Reference	Expected Outcome
Semi-structured interviews – self administered questionnaire	<ul style="list-style-type: none"> Yin (2003). <u>Case Study Research: Design and Methods</u>. 3rd ed. Thousand Oaks, Sage Publications Creswell (1994). <u>Research Design: Qualitative & Quantitative Approaches</u>. Thousand Oaks. Sage Publications Leedy and Ormrod (2001). <u>Practical Research: Planning and Design</u>. Upper Saddle River. Merrill Prentice Hall. 	Graphical data analysis, relational cluster identification, summary and nonparametric statistical analysis	<ul style="list-style-type: none"> Yin (2003). <u>Case Study Research: Design and Methods</u>. 3rd ed. Thousand Oaks, Sage Publications Creswell (1994). <u>Research Design: Qualitative & Quantitative Approaches</u>. Thousand Oaks. Sage Publications 	Contextual information, Identification of individual power distance measurement, Identification of project communication satisfaction rating.

As shown in Table 7, data gathering was based on semi-structured interviews that consist of Likert style and open ended responses as well as self-administered surveys.

Table 8 provides an overview of semi-structured interview questions and their classifications. The same set of questions was used during the interviews as for the self-administered surveys.

Table 8. Data Gathering Questions

	Question Type	Question #	Source
1	Demographic information	1-9	Harkness (2002)
2	Individual Communication Satisfaction, Likert Scale	10-15, 17-19, 21-23, 25-27	Roberts & O'Reilly (1974)
3	Individual Communication Open Ended Questions	16, 20, 22, 24	
4	Individual Power Distance Likert Scale	29, 31, 33, 34, 36, 38-40	Earley and Erez (1997)
5	Individual Power Distance Open Ended Questions	30, 32, 35, 37	
6	Project Communication Satisfaction Likert Scale	27	Roberts & O'Reilly (1974)
7	Project Communication Satisfaction Open Ended Questions	28 and 41	

As Table 8 shows, the data gathering questions encompass seven (7) different types that gather a range of data that includes the survey participants' demographic information, Likert scale communication satisfaction ratings, and power distance information. The questions consists of a normal demographic set of information requests, previously validated survey instruments, and open ended questions designed to add a richer understanding of the Likert scale responses. Data gathering obtained ordinal scale data that was analyzed with descriptive statistical techniques as well as rich textual data content analysis techniques. Each of the data gathering question classifications are discussed in the following sections.

Interviews. Appendix C contains the semi-structured interview form. These questions were developed from information gathered during literature reviews, personal experience and guidance from Earley and Erez's (1997) *Power Differential Questionnaire* (PDI) and Roberts and O'Reilly's (1974) *Organizational Communication Scale* (OCS) survey instruments. Authorization for use of these questionnaires was obtained via Email to the respective authors.

Each area of the questionnaire was developed to provide data on specific project team attributes applicable to the research statement and propositions. Each data question section is expanded on next.

Demographic Data. As Harkness points out, demographic data provides "...information about respondents and their social context ... [as]... Background variables [that] provide the 'independent' information against which study-specific 'dependent' data are analyzed" (2002, p.101). For this research, the demographic information provided valuable data that assisted in the determination of potential relationships between the individuals previous project background (questions 3, 4, 6, and 7), the case study participants population age (question 8), how long they have been with this project (question 1), their position within the project (questions 2 and 5), and their level of project communication satisfaction as well as their PDI ratings.

The demographic information also provided an overall view of the survey participants within this context. Two benefits from this information were the ability to validate the similarity of the project team compositions and the identification that each case was comprised of experienced multi-national project members. Another benefit of this data is that it allows future replication efforts to identify if their survey population significantly differs from this study.

Communication Satisfaction Likert Scale Data. Likert scale data is a commonly used data gathering technique that allows the respondents to assign a value to their level of agreement or disagreement to the question on an ordinal scale. The purpose of the communication satisfaction Likert Scale questions was to obtain information on the perceived level of communication system usages (questions 10, 12, 17 and 18), as well as the individual's rating of several communication factors such as use of hierarchical communications paths, summarization of data, and communication comfort levels within the hierarchical structure (questions 11, 13, 14, 15, 19 and 21-22), along with the individual's rating of the overall project communication process satisfaction (question 27).

These questions are based on Roberts and O'Reilly's (1974) individual communication satisfaction survey. As a previously developed and validated questionnaire – Cronbach Alpha = .84 - it provided additional research design validation. Analyzing the data through a tripartite process of graphical analysis, cluster analysis, and summary statistics and nonparametric statistical analysis techniques allowed

for the identification of patterns and variability between the individual and collective demographic data and the individual power distance index, discussed next.

Power Distance Likert Scale Data. The power distance Likert scale (questions 29, 31, 33, 34, 36, and 38-40), utilizes Earley and Erez's (1997) individual power distance survey. This survey has been previously used and validated – Cronbach Alpha = .74 - to provide a better understanding of individual power distance than Hofstede's power distance questionnaire.

As Hofstede reports, "... about 30 replications ... [have occurred]. Not all of them have been equally meaningful or flawless," (1997, p. 254). Hofstede's instrument was originally "... designed to discriminate among national cultures. They are not suitable for discriminating among individuals," (Hofstede, 1997, p. 254). As such, Hofstede's survey is not intended to determine PDI at the individual level; his efforts are to derive a national PDI indication only.

To overcome Hofstede's individual PDI derivative issues, Earley and Erez developed, tested and validated their individual PDI survey. As reported by Vatrappu and Perez-Quinones "... the Earley/Erez ... power differential scale is similar to the power distance questionnaire used by Hofstede but is more robust and reliable" (2004, p. 2).

Measuring individual PDI is in alignment with the research objective that looked for relationships between the project's demographic data, as well as the overall project communication satisfaction, and the individual culture PDI attribute. The previously identified tripartite analysis method looked for patterns between the project demographic data as well as the project communication ordinal data in relationship to the derived PDI indexes

Open Ended Questions. While ordinal scale questions provide a means to establish project communication satisfaction and power distance indexes, they fail to provide a deeper, richer, understanding of the individuals' insights, thoughts, concepts and ideas. To overcome this shortfall, the research employed several open ended questions (Yin, 2003) to build a better understanding of the individuals views on the project communication processes (questions 16, 20, 22 and 24), individual power distance (questions 20, 32, 35, and 37), as well as their overall impression of the project communication satisfaction in general (questions 28 and 41).

Reliance on these open ended questions provided a different means to look for agreement on the final theoretical construct. Utilizing a different set of data is a key element to Crystallization data analysis as it helps identify the existence, or not, of patterns and trends. Open ended questions content analysis developed information that collaborated and refuted emerging concepts and ideas that were developed during the discrete case analysis efforts as well as the cross-case analysis process which are discussed next.

General Data Gathering Overview. The data gathering process was conducted on a project-by-project basis treating each as a stand alone, unique, case study that involved the interactive and iterative data gathering and data analysis process. A combination of data gathering techniques was used to obtain responses to the questions. For some interviews, the questionnaire was completed with the interviewer present and asking the questions. Other interviewees wanted to first complete the questionnaire and then be interviewed. Regardless of the actual process utilized, as each interview was conducted the respondent's Likert scale responses were noted and open ended response notes taken. Shortly after each interview, a set of follow up 'memos,' or as they are sometimes referred to 'case study notes' (Yin, 2003) were created. These memos provide greater detail on each interview that was not possible during the actual interview process. Each of these data sources became a set of data within the case study data base.

The case study data base was critical for the discrete case study and cross-case analysis. Relying on the case study data base provided a method of linking the conclusions back to the data which were obtained during the interview process. Being able to track from the data to the conclusions and from the conclusions to the data provides a level of data and research method validation.

Other data that was captured during the interview process included interview date, start time, end time, physical characteristics of the interview and the number of participants present.

A critical component of the data gathering and analysis process was the flexibility of adding to the interview questionnaire to obtain different data, concepts and ideas as a reflection of the earlier interview and analysis efforts. As an exploratory research effort, it was not possible to anticipate and predict all potential research question avenues. Case study exploratory research provided for this flexibility throughout the data gathering and analysis processes (Yin, 2003).

An example of this flexibility was the addition of the questions:

1. Why do you believe that the project communication satisfaction is consistently high?

2. Did this project have a specific culture and if so what was the culture and what was the driver behind the culture?
3. What was the 'official' project team language?
4. With English as the 'official' project team language did the different linguistic skills impose any problems or affect overall project satisfaction?

These questions were developed as a result of Case #1 early data analysis where an apparent homogeneous set of responses was obtained. The intent of these new questions was to identify other project characteristics or attributes that would provide further clarification on the observed relationships.

This tripartite data analysis process is discussed next.

Data Analysis Techniques

In this case study exploratory research, data analysis was a continuous process that began immediately when the first bit of data was obtained. As the first interview occurred, the responses were analyzed for consistency, inconsistency, and any apparent early trends. As each subsequent interview occurred, the next interviewee responses were compared with the earlier obtained data. The process was interactive and cyclic to achieve the "... criteria of 'saturation' (i.e. new data fit into the categories already devised) of the categories for ending the research" (Denzin and Lincoln, 2003, p. 520). This approach is similar to other inductive research efforts, such as grounded theory data analysis technique, and is supported in the case study literature (Corbin and Strauss, 1990; Stake, 1995; Denzin and Lincoln, 2000; Yin, 2003). This data analysis process is a form of reflection (Denzin and Lincoln, 2000) where the researcher is looking to gain a deeper understanding of each case is contextual and temporal situation. The interactive and parallel data analysis provides a continuous interpretation of data such that new or revised theoretical constructs are formed as the new data either supports or repudiates the current constructs (Denzin and Lincoln, 2000).

The ordinal data analysis technique utilized a tripartite approach combining graphical analysis, cluster analysis, and utilization of summary and nonparametric statistical techniques. Supporting this tripartite data analysis process, textual content analysis was conducted on the open ended questions' responses to develop the richer understanding of the ordinal scale data. The next sections provide a review of each analysis method and its contribution to the final theoretical construct.

Graphical Analysis. Analyzing data through simple X-Y scatter plots and histograms is a common research method that provides a great deal of information (Yuan, Rahn and Zhuang, 2004) that can be "...

exceptionally useful for discovering surprises in data such as anomalies, outliers, or otherwise exotic values....” (Brown and Svyantek, 2001).

For this research, graph analysis was the first analytical step to identifying any surprises, anomalies, and potential trends. The use of X-Y scatter plots and histograms were predominately relied on. As is discussed further in the data analysis section, this analytical step provided a firm foundation that the respondents’ data was homogeneous with very limited variability. Graphical analysis also identified that the data did not comply with normal distribution statistical characteristics.

Development of the X-Y scatter plots also provided the foundation for the next analytical step, Cluster Analysis.

Cluster Analysis. The use of cluster analysis is one of exploratory case study’s “...most desirable techniques” (Yin, 2003, p. 116). This technique allows the researcher to analyze the data to determine what type of pattern emerges and pattern consistency (Stake, 1995). Pattern analysis is important because “If patterns coincide, the results can help a case study to strengthen its internal validity” (Yin, 2003, p.116).

Cluster analysis provided a second analytical method to analyze the data. Combining the graphical analysis results and cluster analysis provides a two prong approach in the development of the resulting theoretical construct. While graphical analysis provided one view of the data cluster analysis provides a different view. Merging these analytical techniques, results in a broader holistic view of the project team’s communication and cultural attributes. The evolving theoretical construct indicated very comparable project context, communication styles, and cultural attributes. One significant emergent finding is that mature project team member’s cultural attribute is significantly different than the predictive national culture ratings. Adding nonparametric statistical analysis techniques provides yet another data view as is described next.

Statistical Analysis. Summary statistics and nonparametric relationship statistical Kendall tau_b statistical techniques were applied to the participants’ data. Summary statistical analysis was conducted to assist in developing a better overall understanding of the relationships between the various ordinal scale data as Table 9 identifies.

Table 9. Summary Statistical Analysis

	Statistical Comparison	Anticipated Results
1	Project characteristics	Identification that the projects are both highly technical projects within the oil transportation industry.
2	Project team demographics	Identification that the project teams are comprised of experienced multi-national, cross-culture project team members.
3	Project team communication comfort levels	Identification of how the project team members viewed hierarchical communication comfort levels.
4	PDI to project communication satisfaction	Identification of any relationships between the individual PDI and the overall communication satisfaction.

While summary statistics provide a set of critical information, they do not provide variable relationship information. To understand if a relationship existed between Individual PDI and the project team communication comfort, as well as the overall project communication satisfaction, a nonparametric Kendall's tau_b correlation analysis statistic process was performed.

Kendall's tau_b statistical analysis was identified as an appropriate analysis process as:

1. The analyzed data is ordinal
2. The data set is not normally distributed
3. The data set sample size is less than 20 samples

This correlation analysis was conducted to identify if a statistically significant relationship was identified for:

1. Individual PDI to Overall Project Communication Satisfaction
2. Individual PDI to project hierarchical communication comfort levels.

Statistical analysis identified the noteworthy understanding that no statically significant relationship was identified between project team communication satisfaction and their culture rating.

Merging the graphical analysis, cluster analysis, and statistical analysis information generated the theoretical construct that overall project communication satisfaction is a derivative of the project team members' project experience, training, and the project management leadership skills. This theoretical construct was compared to the respondents' open ended question responses.

These open ended question responses were analyzed through content analysis as is discussed next.

Textual Content Analysis. Textual content analysis is associated with the interviews' open ended questions responses and additional spontaneous information that developed during the interview process. The intent of content analysis is to derive the richer contextual information based on statements, stories, or other verbal responses. Content analysis involves the process of analyzing the verbal responses through the development of content dictionaries and data coding (Denzin and Lincoln, 2000).

This content analysis process relied on a process of: (1) open coding, (2) axial coding, and (3) selective coding. Each of these coding processes provides a specific function to the full analysis efforts.

- (1) Open coding is defined as "... the interpretive process by which data are broken down analytically" (Corbin and Strauss, 1990, p. 12). It is this process where the data is labeled, concepts start to be developed and categories begin to emerge. This was accomplished by analyzing and comparing each interviewee's data to the other interview data. The data was then categorized and subcategorized with links and interconnects identified. This coding step provided the foundation for identification of the textual responses linkages and relationships which occur during axial coding.
- (2) Axial coding – "In axial coding, categories are related to their subcategories, and the relationships tested against data" (Corbin and Strauss, 1990, p. 13). Conducting axial coding provided data that supported the tripartite theoretical constructs that the team's predictive cultural attributes did not show a relationship to the measured culture attributes. This coding process also provided further support that project team attributes of experience, training, and leadership affect the resulting measured culture attribute and overall communication satisfaction. The resulting theoretical construct occurred by merging the tripartite analysis and selective coding.
- (3) Selective coding is where "The categories and their interrelationships are combined to form a story line that describes what happens ..." (Leedy and Ormrod, 2001). All categories are joined around a core that "... represents the central phenomenon of the study..." (Corbin and Strauss, 1990, p. 14). The developed story line and theoretical construct is provided in the data analysis section.

A layered textual content analysis approach was applied to the data sets. The first analysis layer involved analyzing each case as a discrete event. This analysis built a holistic view of each case independent of the other case. The next analytical analysis layer merged the two cases in a cross case analysis process. The cross case analysis process looked at trends and differences between the cases and what the combined data set determined. Applying this layered approach allowed the data to build a compelling holistic view of the resulting theoretical construct.

The objective of this research was to develop a theoretical understanding of the relationship between individual project team members' PDI and the project team's overall communication satisfaction within the context of multinational projects. Interlinking a tripartite data analysis and textual content analysis provide a holistic theoretical construct built on a qualitative crystallization method. The overall research method was built on canons of science as is explained in the following sections.

Canons of Science Discussion

This section provides a 'canons of science' discussion, as applicable to this inductive exploratory case study research. The section is outlined to begin with a brief historical review of qualitative case study research. This historical review is then followed by a short discussion on the literature identified canons of science challenges and support to qualitative based research. The remainder of this section presents the canons of science characteristics and how they were applied to this research.

Case Study Background

Within the United States, case study research methods fare typically linked to The Chicago School within the time frame of 1900 to 1935 (Denzin and Lincoln, 2000). Between 1935 and the early 1960's the method fell out of general use as researchers' tended to focus more on quantitative investigation methods. In the 1960's social scientists started to return to case study methods as increasing levels of quantitative research concerns occurred (Tellis, 1997). While case study research is in wide use it suffers a stereotypical view as a 'weak method' that lacks sufficient rigor (Yin, 2003). Case study research is also reported as a method that is surrounded by confusion (Eisenhardt, 1989) and challenges to validity such as construct validity, internal validity, and external validity (Tellis, 1997) or as commonly referred to 'cannons of science.'

To address the literature identified challenges this research applied the canons of science, as discussed next, to ensure a robust and rigorous research.

Canons of Science

As the literature discusses, qualitative research methods, in general, have "... a long, distinguished, anguished history in the human disciplines (Denzin and Lincoln, 2000, p. 1). The very nature of this anguished past reflects the lack of universal agreement on the classification of case study research and the quantitative/qualitative research canons of science discussions.

A review of case study research literature identifies two case study research classification themes. One theme is that case study research is just one of many qualitative research methods (Denzin and Lincoln, 2000; Leedy and Ormrod, 2001). The other research theme is that "...the case study strategy should not be confused with 'qualitative research'... [as] ...case studies can be based on any mix of quantitative and qualitative evidence" (Yin, 2003, p. 14). Acknowledging that these two research themes are present a review of the literature develops some commonality between research themes which included; (1) case studies can use a mix of quantitative and qualitative data gathering processes (Creswell, 1994; Denzin and Lincoln, 2000; Leedy and Ormrod, 2001; Yin, 2003), (2) it is an all-encompassing method (Creswell, 1994; Stake, 1995; Yin, 2003), (3) it focuses on a system (Stake, 1995; Denzin & Lincoln, 2000), and (4) it is intended to develop a holistic view of the case (Creswell, 1994; Tellis, 1997; Denzin & Lincoln, 2000; Stake, 1995; Yin, 2003). Regardless of the classification discussion, providing for, and following, canons of science set increases the study's overall validity. Yet, as with the classification discussion there continues to be literature discussions around what constitutes applicable qualitative canons of science.

Canons of science are "... a set of rules... for testing the sufficiency of any given evidence to prove any given proposition, (Mill, 1974, p. 12)" (Staley, 1999, p. 604). Based on this concept, qualitative researchers put forward that their research should be evaluated on a set of principles, rather than the physical science, historically based, canons (Klein and Myers, 1999). Principles, in this case, would be guiding ideas rather than the hard and fast rules of conduct. The extremist of this position is attributed to Paul Feyerabend and his "anything goes" principle. This principle springs from:

If you want universal standards, I say, if you cannot live without principles that hold independently of situation, shape of world, exigencies of research, temperamental peculiarities, then I can give you such a principle. It will be empty, useless, and pretty ridiculous – but it will be a “principle.” It will be the “principle” “anything goes.” (Feyerabend, 1978, p. 188) [as quoted from] (Staley, 1999, p. 603).

Counter to the ‘anything goes’ principal there are researchers who state that “... the usual canons of good science should be retained ...” (Corbin and Strauss, 1990, p. 4) which include the aspects of scientific rigor, significance, validity, repeatability, and generalizability (Corbin and Strauss, 1990). One other viewpoint is that “the dialogue between quantitative and qualitative researchers... should be refrained, so as to move beyond their attempt to derive rules for qualitative research primarily by extending practices commonly used by quantitative researchers” (Munk, 1998). At the present time, no universally acceptable agreement on which is the final answer, to the debate, exists.

Acknowledging the on-going nature of the canon of science debate this research was designed and followed the canons of science of scientific rigor, significance, validity, repeatability, and generalizability. The next sections highlight how each of these was applied.

Qualitative Scientific Rigor

This case study research design followed the following tenets of scientific rigor and canons of science that include (1) construct validity, (2) internal validity, (3) external validity, and (4) reliability. As Ackoff states, “In science, then, every research effort not only has the purpose of answering a question... but also has the aim of testing, evaluating ...” (1999 ,p. 296), Scientific rigor involves the application of the scientific method in a rigorous way.

“Science is best defined as a careful, disciplined, logical search for knowledge about any and all aspects of the universe, obtained by examination of the best available evidence and always subject to correction and improvement upon discovery of better evidence” (Wudka, 2005). From the case study literature, the disciplined logical search for knowledge involves the process of developing “.... a studies question; its propositions... its units(s) of analysis; the logic linking the data to the propositions; and the criteria for interpreting the findings” (Yin, 2003, p. 21). Developing and following the logical search for knowledge, as outlined, constitutes scientific rigor as this dissertation documentations this rigorous effort.

Validation of this comes from the canons of science which provides the guiding rules for testing and evaluation of research results. The following sections present how this research applied these guiding rules.

Validity. Leedy and Ormrod define validity as “...the accuracy, meaningfulness, and credibility – of the research project as a whole,” (2001, p. 103). The overarching research design validation occurs by answering questions such as: Was the research design such that it obtained the data intended for the research? and; Was the research design followed, and was the analysis performed within acceptable methods? Adequately answering each of these questions provides credibility, and ultimately, validity to the overall research. Validation is constructed through application of construct validity, internal validity, and external validity. Each of these is discussed in the following sections.

Construct Validity. From the literature, construct validity is associated with the ability to:

1. Select the specific types of changes that are to be studied (and relate them to the original objectives of the study) and
2. Demonstrate that the selected measures of these change do indeed reflect the specific types of change that have been selected (Yin, 2003, p. 35).

Construct validity processes are said to include the use of multiple data sources and the need to maintain a chain of evidence (Yin, 2003). For this study multiple data sources involve the use of multiple cases which included multiple participants from each case. During data comparison the individual participant’s response are considered in light of the other respondents and the overall set of respondents. In addition to the inclusion of multiple cases and personnel the research relied upon a combination of Likert scale and open ended questions. Utilizing the technique of multiple cases, multiple personnel, Likert scale data and open ended question content analysis provides the ability to triangulate the data towards a common theory. As Yin states “... the most important advantage presented by using multiple sources of evidence is the development of converging lines of inquiry, a process of triangulation...” (2003, p. 98).

While the use of multiple data sources provides a triangulation capability the data for this analysis must be reliable. To achieve this required reliability involves the ability “... to trace the steps in either direction (from conclusions back to initial research questions or from questions to conclusions)...” (Yin, 2003, p. 105). As Yin identifies, the ability to trace, either direction, is closely linked to “... citation of

relevant portions of the case study database – for example, by citing specific documents, interviews.... [and]... be consistent with the specific procedures and questions contained in the case study protocol...” (2003, p. 105).

For this study the primary evidence of this traceability is included in the data gathering and analysis sections. These sections provide direct references to respondents’ answers as well as how the responses are tied to the basic research question. This is evidence how the case study data base was used and this meets the intent of this canon of science construct validity.

Internal Validity. Internal validity involves the factors of research design construction, and repeatability. Research design construction validation involves answering this question: Does the research design gather and analyze the data required to answer the research question? Associated with research design construction is repeatability. This refers to the ability of a different researcher to duplicate the study utilizing the same stated research design. The duplication concept centers on the idea that if a replication was performed, for the same research population, very similar results would be obtained. If the research design complies with these attributes, then the research has internal validation.

The core to internal validation is deriving if the research conclusions are supported by the research design, data gathered and subsequent analysis. If this process develops an accurate conclusion, supported by the research, it will meet the internal validation requirement. Combining a summarization of Valerie J. Janesick’s, *The Choreography of Qualitative Research Design* (Denzin and Lincoln, 2000), and data presented so far, internal validation is achieved by:

1. Formulation of the research question that guides the study. (The study question must be meaningful.)
 2. Identification of a site, participant, or a number of participants. (Multinational project management teams involving project team members from more than one nationality.)
 3. Identification of the data collection strategies. (Application of a combination of semi-guided interviews and self-administered survey research methods.)
 4. Identification and statement of researchers own bias. (Included in following text.)
 5. Documentation of the research plan and analysis methods. (The research method document.)
- (Denzin and Lincoln, 2000)

As these five steps identify, the intent was not to adapt an “anything goes” validation concept but to use a methodical systematic process that follows the tenets of ‘scientific principles.’

Supporting that this design meets the internal validation criteria is reliance on well established and previously verified design methodologies and methods. As an example, interview techniques have been used in social science research from 1800s (Denzin and Lincoln, 2000) and is a technique that is considered “one of the most important sources of case study information...” (Yin, 2003, p. 89). This case study is based on a set of semi-structured interview and open-ended questions that are based on well established and previously verified design methodologies (Denzin and Lincoln, 2000; Stake, 1995; Yin, 2003).

While interviews have been challenged as being subject to biases such as “... the respondent may deliberately try to please the interviewer ... The respondent may err due to a faulty memory ... [and]... the interviewer, whose characteristics or questioning techniques can impede proper communication questions...” (Denzin and Lincoln, 2000, p. 650) this research applied accepted methods to minimize these challenges.

To minimize the literature interview challenges a semi-guided interview process was adopted. Rigorously following the semi-guided process provided a consistent structure to the interview process and provided a framework for consistent analysis. By interviewing several people in each case, this minimized the potential bias effects of the respondent behavior and faulty memory. In regards to the bias effects of the interviewer, while of concern, “...in general, research on interviewer effects has shown interviewer characteristics such as age, gender, and interviewing experience to have relatively small impact...” (Denzin and Lincoln, 2000). The research method was designed to address the identified issues by bringing a consistent structure and the utilization of many different data points. Each adds to a higher level of internal validation.

Internal validation is also achieved if the process is well structured, and again, based on proven methods. Structure to these case studies was designed in, as part of the research method core objective. Reliance on previously validated surveys and standard open-ended questions provided the built in structure and is “the most common adopted approach to conducting comparative research is to decide on a design and replicate it” (Harkness, Van de Vijver and Mohler, 2002, p. 8). These references clearly support the position that this research method meets the tenets of internal validity. External validity is discussed next.

External Validity. While internal validation is one side of the validation coin, external validation is the other. Yet qualitative research external validation concepts are surrounded with as much conflict, between the qualitative factions, as all other canons of science criteria. Some of this conflict indicates that qualitative research external validation has very limited research applicability (Lee and Baskerville, 2003). Other literature sources insist that external validation relies on analytical generalizability to a theory only (Lee and Bakerville, 2003; Yin, 2003).

To better understand generalizability, or external validity, of this research requires a revisit to the research design's intent. The intent of this research was to develop an understanding of the multinational project team communication satisfaction as related to the individual project team members' individual power distance culture attribute. Developing this understanding involves understanding how individuals rate the team communication satisfaction as a function of their individual power distance cultural dimension. This is a discovery process of the social system by a member of the social system, the researcher, who is separate and distinct from the project itself. The result of this discovery process is achieved through an inductive case study research process of discovery and understanding. The resulting theoretical understanding is very much contextually based and presents challenges to the broad generalizability of the findings.

While the objective of this research, in general, was to develop a broader generalizable understanding of the phenomena under study there are three challenges to this effort. First, the developed knowledge will not be tested through the deductive process of hypothesis development and testing. Exploratory case study research is a theoretical building research method and not a deductive hypothesis testing method (Yin, 2003).

Second, this research is contextually based. The research area is specific to multinational project teams that include members from at least two different nationalities. This research area and the research participants all contribute their social and cultural context to the study. If other researchers apply this research method to other culture based projects, they may discover different findings that are driven by the various social and cultural interactions (Lee and Baskerville, 2003).

The third challenge involves the researcher's personal cultural biases. All research is influenced by the researcher (Denzin and Lincoln, 2000; Leedy and Ormrod, 2001). For the social researcher, this is

an acknowledged fact. As Tayeb states, “The researcher’s own cultural values and attitudes could get in the way of understanding their subjects... The best one can do is to acknowledge one’s cultural bias” (2001, p. 102). The selection of this research methodology is intended to minimize this fact, but it will never eliminate the researcher’s cultural effects.

The challenges, just presented, acknowledge that this research results are not statistically generalizable but they are analytical generalizable (Yin, 2003).

Repeatability is discussed next.

Repeatability

The final factor is ‘replication in a different context’ which addresses the question - Can this research design be replicated and the same or nearly the same results obtained? To answer this question requires two views. First, is this research design capable of being applied at exactly the same location, using the same people and obtain the same or nearly the same results – exact replication.

Exact Replication. To conduct an exact replication, which includes not only the research method but the exact questions, each participant in the same setting and conditions, etc. is not possible. Even if this researcher were to attempt an identical replication of the exact project the passing of time will provide new, different, or changed communication factors (Wright, 1979). This type of retest would actually be closer to a longitudinal study than a replication of the first research. As such, the ability to conduct an exact replication is not possible but that does not imply that the research method is not replicable.

From a strictly research method perspective, this research method is replicable. This research method is fully documented and available for others to use. With this document, any other researcher is in position to replicate this research.

The second repeatability view discusses if this research design could be applied at different locations and still obtains the same or nearly the same results. This second type of repeatability involves applying this research design in some other context, i.e. geographic region, different nationalities, etc. While this study involved several projects that included personnel from several nations it did not include every nation or all combinations of interacting nations. Within this limited set of different nations the research method was repeatable. Conversely, without other researches actually performing a replication of this study, in this manner, and in a broader context, the answer, to this criterion, is a theoretical yes. As

stated previously, the research method, and this research application are detailed in the research method, data gathering and analysis sections. Anytime someone wanted to apply the same process, it is fully feasible to perform. The factor that will hinder the replication from achieving the same or nearly the same results is the contextual settings. Social research is contextually based with the results of the research driven by this context (Sackmann and Phillips, 2004). If the context is radically different, the results of the research may in fact demonstrate some other contextual factor at work and create a different end point. Other than the issue above, the social context of this design appears to be fully and easily replicated.

Concurrent to ensuring that this research meets the criteria of internal validation, external validation, and reliability are the concepts of the research meaningfulness and the research credibility.

Wadsworth (1998) discussed the concept that if one studied “Superficial or trivial” items, then the research would be in fact superficial and trivial. His point is that one should research phenomena with real meaning rather than trivial nonsensical subjects. Culture is an area of real meaning where a better understanding of how and why groups interact the way they do is important knowledge (Schein, 2004; Hofstede, 1997; Trompenaars and Hampden-Turner, 1998).

Quoting John Frow and Meaghan Morris *Culture Studies*,

.... Most work in cultural studies has been acutely aware of the danger of positing imaginary social unities as the explanatory basis for its accounts of cultural texts. Its constant impetus is to think of cultures as being processes that divide as much as they bring together. (see, e.g. Carby, 1982/1996; Chambers & Curti, 1996; Gilroy, 1987, 1996; hooks, 1992b; McRobbie, 1981; Steedman, 1986, Williams, 1985; Women’s Studies Group, 1978). (Denzin and Lincoln, 2000, p. 315).

As this quote identifies, culture is a unifying and a dividing set of processes. Unless one understands culture and its contextual interactions, one will, in all probability, continue to make cultural mistakes in multicultural environments. This all lends support to this research design which developed a theoretical understanding multinational project team communication satisfaction and the project team members’ power distance culture attribute.

As outlined in the previous sections, case study research is sometimes referred to as a form of qualitative research and a form of research separate from qualitative research. While acknowledging the

ongoing literature discussions this research identified a set of common attributes that define the case study context. These attributes defined case study research for this study.

The literature also identifies the recurring discussion on applicable canons of science. This effort does not enter into the on going discussion but adopted and applied a set of commonly accepted canons of science that assisted in the development and application of the research. As this section outlines the research meets the intent of these canons and the resulting levels of validity.

CASE STUDY ANALYSIS

Introduction

The following section provides a summary of the discrete case analysis of each and the combined cross case analysis. The intent of this section is to logically and succinctly present the obtained data within the context of the research and the research propositions. The analysis relies on data obtained through surveys and interviews involving two multi-national, cross-culture projects.

The surveys and interviews were conducted in English, regardless of the participants' first language. Using English as the sole language is justifiable and supported from several sources. First, each of the projects stated that English was the official project language. As such, all project written and verbal communications were conducted in English. Second, due to the highly technical nature of the project all participants identified themselves and their team members as highly educated, college graduates, and highly skilled individuals. Third, as identified in other research efforts language skills are typically not a significant factor. Muller and Turner identify "...that the loss of information was independent from the language skills (above a certain level) of the individuals and the amount of information sent by the sender. Rather, '...barriers other than language prevented inter-cultural dyads from getting the information through' (Li, 1999 p. 404)" (2004, p. 406). This position is also supported from the communication discipline as "linguistic fluidity and cultural expertise are not essential ..." (Thatcher, 2001, p. 485). Each of these positions was ultimately supported during the actual interview processes. At no time did language appear to be a communication barrier.

While relying on English as the communication medium didn't appear to be an issue a short discussion on other challenges to this research data gathering is presented next. Following this the discrete case study analysis are presented which is then followed by the combined case study analysis, and data analysis summary.

Research Challenges

While cross-cultural research, in general, is an area that is beginning to receive greater attention (Ofori-Dankwa and Ricks, 2000; Schaffer and Riordan, 2003) in cross-cultural research literature (Thatcher,

2001), project management literature (Makilouko, 2004), and management literature (Schaffer and Riordan, 2003) this is an area full of challenges. As the literature discusses, research in this area is time consuming, expensive, complex, and difficult (Thatcher, 2001, p. 458).

While the various disciplines identify a lack of cross-cultural research, project management cross-cultural research suffers an even lower level of investigation and reporting (Adler, 1983; Ofori-Dankwa and Ricks, 2000). As with the other disciplines several factors are attributed to a lack of research and published literature such as conducting this type of research is difficult to perform (Harkness, Van de Vijver and Mohler, 2002). This research validated these statements as is discussed next.

Difficulty in conducting this research primarily fell into finding two projects that were willing to participate. Obtaining permission to gather project specific information encountered several obstacles from project leadership changes to confidentiality concerns. Table 10 provides a listing of the most commonly encountered obstacles encountered, in the order of frequency.

Table 10. Data Gathering Obstacles

	Obstacle
1	The project is not going well.
2	Our company does not participate in this type of research due to confidentiality concerns.
3	The project team is too busy to participate at this time.
4	New project leaders focus is not on academic participation.

The most common obstacle quoted was that the project is not going well. When this obstacle occurred the project leadership either didn't "want the project team distracted" by this research or they wanted to wait until things were "under control" before participating in outside efforts such as this. If the project was not going well the project leadership clearly did not want external people involved in the project.

The next most commonly referred to access obstacle involved concerns of confidentiality. The firms who were approached to participate in this research can be described as corporations who are

engaged in multi-national, cross-cultural, highly technical and competitive projects. Many of those approached indicated that they are concerned that participating in this type of research could jeopardize their business plans or current progress confidentiality. This concern was encountered at the project level and at the general corporate level. While this research method was designed to maximize confidentiality several firms declined participation due confidentiality reasons.

The project team is too busy to participate was the third most commonly encountered obstacle. This obstacle was encountered alone and in support of the number one stated reason, “The project is not going well.” When used as a stand alone reason, the project team was described as needing to focus on pending major milestone deliverables, critical project junctions, or critical tasks. At other times the project team was identified as understaffed with everyone filling multiple roles. Due to high work loads the project team did not have time to participate.

The final most commonly encountered obstacle was change in project leadership. This obstacle occurred on two projects where approval to conduct the survey and interviews was obtained and subsequently the project sponsor was promoted. The new project sponsor removed the research authorization stating that they “didn’t see any value in participating in this type of activity” and declined to have the projects participate further.

The obstacles encountered presented obstacles to obtaining data and supports the published literature statements.

In the next sections the discrete case studies, cross case, and summary findings are provided.

Case Study #1

Introduction. The following sections discuss Case Study #1, only, and are structured to first provide a general overview of the type of project interviewed followed by a general discussion of the technical system that was installed. The following sections will then briefly discuss the project context and project team demographics. With this background information presented, a discussion on the data gathering method and processes is presented. Following the data gathering a discussion section occurs that presents the derived conclusions of this first case study.

The System. Case Study #1 is a complex high technology project system within the international oil transportation industry. As defined, “... a complex system is a functional whole, consisting of

interdependent and variable parts..... Complexity Theory states that critically interacting components self-organize to form potentially evolving structures exhibiting a hierarchy of emergent system properties” (Lucas, 2000). Relying on this definition, this project consists of software, hardware and human interactions ‘interdependent and variable parts’ that produce a higher level system capability than any component would independently or in conjunction with anything less than all the parts.

The scope of this project is to provide a leading edge software application that allows for remote system operation, alarm monitoring, warning of abnormal conditions, and system diagnostic capabilities. While the core software application has been deployed, in other applications, each installation requires specific system configuration and calibration due to the unique site specific context and environmental considerations. For this application, the project team was required to go beyond the normal configuration and calibration efforts to include development of new algorithms that addressed unique physical attributes that had not been encountered previously. The enhancement of the software system was driven by new environmental influences on the system as a whole.

To support the enhanced software application, the system requires a set of hardware components that are located at various sites throughout the transportation system. These hardware components support the software system by gathering remote field data, time stamping all gathered data - so the software application is able to correlate specific events based on sequential time - and transmitting the time stamped data to a central processing location. This central processing location includes a set of fully redundant central computer processors - where the main software application resides. These central processors support both the core software application and the human machine interface requirements.

The final interacting component of this system is the human operator. The overall system purpose is to provide operations personnel information on the transportation system operation condition as well as alarms and warnings of abnormal conditions. The system also provides operations personnel functional user interface capabilities such as the ability to modify or insert data for missing field information, acknowledge system alarms and warnings, as well as diagnose potential issues by creating unique trend graphics and user defined data tables. These features are accomplished through the context specific human machine interface (HMI).

The interaction of unique software, hardware, and human interaction creates a complex system that produces a purposeful output that is greater than the sum of the individual components.

Project Context. The project context develops an understanding of the physical attributes that surround the project life cycle. It is the intent of this section to provide a high level view of the context that encompasses the project and some of the challenges encountered during implementation.

As a multi-national project team, the personnel involved are from different nations working together in the delivery of this complex system within a defined schedule and an established budget. From a national viewpoint the project involved people in Finland, Russia and the United States.

This multi-national project team operated in each identified country for the project life cycle duration of approximately four years. During the 4 year time frame, the project was taken from a conceptual idea, to field implementation, final system test, acceptance and ownership transfer. As part of the field installation effort a portion of the project team worked under remote conditions with limited communications infrastructure. In the next section the project team is discussed further.

Project Team. Implementation of this project involved the association of a multi-national project team. The team consisted of seven members that provided the project management oversight, technical engineering support, and on site implementation. The project team was reported to be continuous for the complete project life cycle.

Table 11 provides the descriptive statistics of this project team. As Table 11 identifies, the project team members have worked in this type of context from 4 to 13 years with a mean of 9.29 years. The overall project team project experience ranges from 4 to 20 years with a mean of 13.14 years.

Table 11. Project Team Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
q 4 How long doing this type of work (years)	7	4	13	9.29	3.200
q 9 Overall project experience (years)	7	4	20	13.14	6.388
Valid N (list wise)	7				

Table 12 shows the team members' age brackets.

Table 12. Team Member Age Bracket

Age Bracket	Percentage
Under 25	0.00%
Between 25 and 35	14.29%
Between 35 and 45	57.14%
Between 45 and 55	14.29%
Over 55	14.29%
Total	100%

In general, the 'typical' project team member can be described as between 35 and 45 years old. They have performed the same type of project assignment an average of 9.29 years and they have worked in projects, in any capacity, an average of 13.14 years.

In general, the project team members are experienced and seasoned project team members.

Research Method. Case #1 followed the research methodology as outlined in the Research Method Section. This section highlights each step of the process and how it was applied to this project.

As identified in the research methodology section, project team selection followed several steps. The first step was identification of a multi-national project. This was achieved through discussions with the corporate division manager. This individual identified one in process project that involved Russia and the United States. Identification of this project clearly answered the first question that this project involved at least two different nations.

The next step in the project selection process was to determine if the identified project might contain predictive divergent cultural differences. To answer this question, the associated multi-national project national cultural characteristics were compared to Hofstede's power distance index (PDI). As identified in the project selection method, for the project team to be significantly different, the project would involve nationalities from Hofstede's top and bottom quartile index rankings. Case #1 was

identified as a multi-national project involving Russia and the United States. Russia is within Hofstede's top quartile with a PDI of 95 (Thomas, 2003) while the United States approaches the lower quartile with a ranking of 40 (Hofstede, 1997). This analysis established that this project met the selection criterion.

The next step involved determining if the identified team members were assigned to the project equal to or more than 50% of the time. This question was answered in conversation with the corporate manager who indicated that the team members are all assigned to the project on a nearly full time basis.

Finally, the selection process asks the question of "are the project team members available?" The identified project team members were all available for either in-person or telephonic interviews. As such, this project and its associated team members met the full selection criteria and all agreed to participate in the semi-directed interview process.

Following the project team selection process, each identified project team member was interviewed. The semi-guided interviews followed the process of:

1. Interviewer took a few minutes to briefly describe the interview purpose, process, and right to terminate the interview at any time.
2. Interviewer obtained the interviewee's agreement to participate.
3. Interviewer provided the interviewee a copy of the semi-guided questionnaire for reference purposes.
4. Following the semi-guided process each question was asked and ensuing answers and discussion recorded on a blank questionnaire sheet and interview note sheet.
5. At the conclusion of the interview the interviewer went back over the answers to ensure that the correct response was entered on the interview form.
6. The interview was concluded.

Table 4 provides descriptive details of the duration of these interviews. As Table 13 shows, the interview mean was 53 minutes with a standard deviation of approximately 8 minutes. Overall, the interviews were fairly consistent in their durations and scope of discussion.

Table 13. Interview Descriptive Statistics

Case	Mean	Standard Deviation
1	53	8.18

Data Discussion. The following section presents the data gathered during the interview process. The data will be presented through a combination of descriptive statistics and content analysis as defined by Denzin and Lincoln (2000).

The semi-guided interview questions are grouped into sections that determined information on interviewee demographics, overall project communication satisfaction, and the individual's power distance index (PDI). Table 14 provides a categorization of the specific questions and the relationship to these three broad categories.

Table 14. Questionnaire Identification

Question Type	Question #	Source
Demographic information	1-9	Harkness, Van de Vijver, and Mohler (2002)
Individual Power Distance Likert Scale	29, 31, 33, 34, 36, 38-40	Earley and Erez (1997)
Individual Power Distance Open Ended Questions	30, 32, 35, 37	
Project Communication Satisfaction Likert Scale	27	Roberts & O'Reilly (1974)
Project Communication Satisfaction Open Ended Questions	28 and 41	

A principal area of interest that this questioning process examined was the range and typical view of project team communications within a multi-national project.

Analysis of the demographic data indicates that the team members consist of experienced project personnel. Experienced project team personnel means that they have been involved in more than one multi-national project; they have several years of practical experience, and several years of multi-national project experience.

The demographic data reports that the project team members' multi-national project team involvement ranges between 2 and 5 projects with a mean of 3.857. At the same time the project team minimum project work duration, in years, is at least 4 years, a maximum of 20 years, with a mean of 9.29 years. Finally, the project team members have been in this line of work between 4 and 20 years with a

mean of 12 years. In general, the project team members consist of a group that has been exposed to more than one multi-national project context, with several years of practical and multi-national project experience.

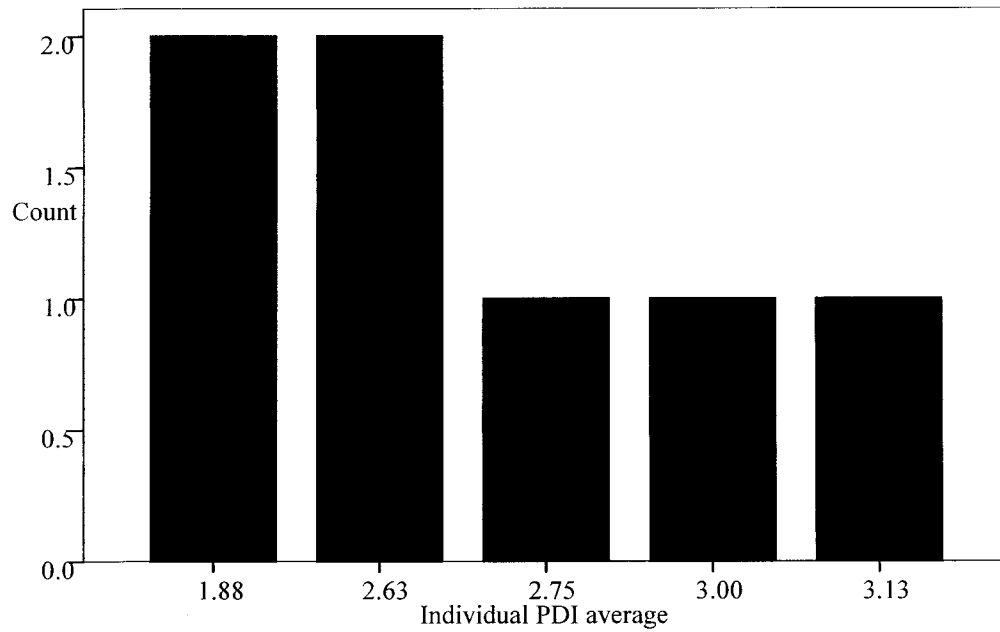
The next question of interest is the individual project team member PDI rating. To determine the individual PDI rating the Earley and Erez PDI survey was utilized. The individual PDI is a 1 to 5 scale where 1 is the lowest PDI rating that indicates a minimal if any mental attribute of power distance between superior and subordinate. Conversely, a rating of 5 is the highest PDI rating that indicates maximum mental attribute of a subordinate and superior relationship. Table 15 identifies the project team's results and how they ranked the overall project communication satisfaction.

Table 15. Individual PDI and Communication Satisfaction

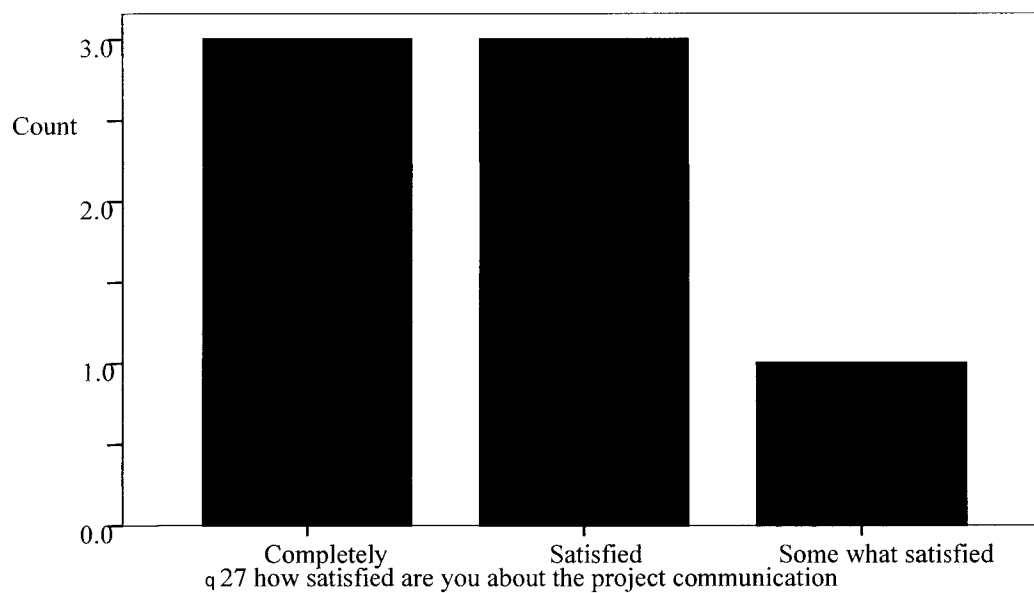
Team Member	Individual PDI	Comm. Satisfaction
1	2.625	1
2	3.125	2
3	2.75	3
4	1.875	2
5	3	2
6	1.875	1
7	2.625	1

This project team PDI ranged from 1.875 to 3.125 or generally from low to just over middle PDI. Each of these team members have a culture trait that acknowledges that power is distributed between subordinate and superior in a general way. This range of acceptance, again, falls in the middle to low range with a mean of 2.55.

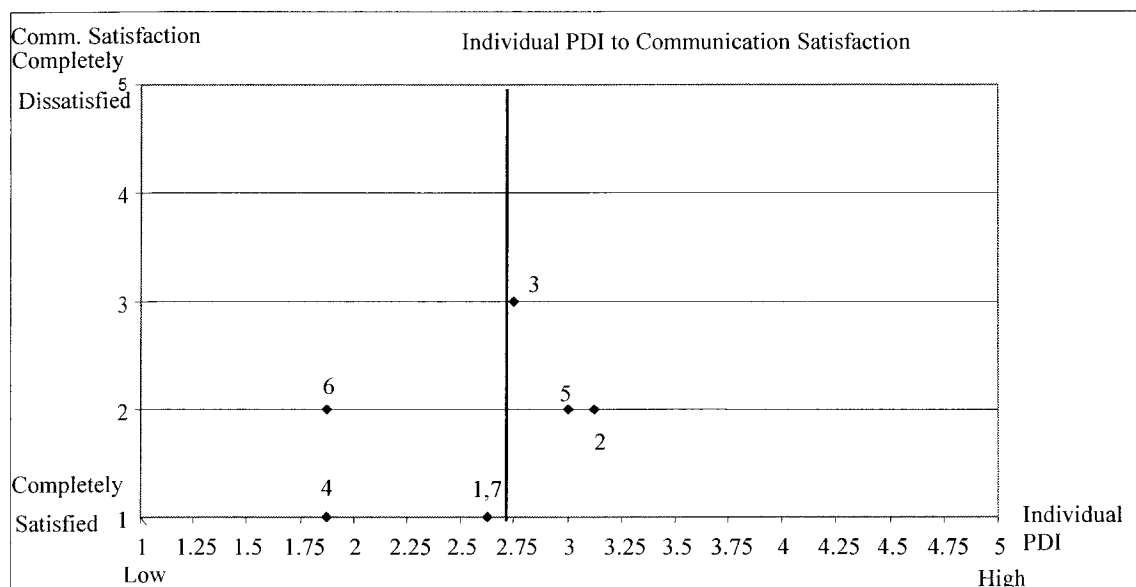
Figure 5 provides another view of the individual PDIs in the form of a bar graph. As the graph shows, 2 people are ranked the same at 1.88 and another 2 are ranked the same at 2.63. This places 4 out of the 7 within or very close to the second PDI quartile. The remaining 3 are firmly located within the third PDI quartile.

Figure 5. Individual PDI

The next area of research interest involves how the team members view overall project communication satisfaction. On question 27 the project team responses ranged from 1 to 3 where a 1 rating is completely satisfied and 5 rating indicated completely dissatisfied. Figure 6 is the team satisfaction bar graph which shows that all but one team member rates the project communication satisfaction as either completely satisfied or satisfied. The project communication satisfaction mean is 1.71 or somewhere between completely satisfied and satisfied.

Figure 6. Project Team Satisfaction

To determine if there appears to be a relationship between the individual PDI and team communication satisfaction Figure 7 is generated. In Figure 7 team communication satisfaction is on the vertical axis and individual PDI is on the horizontal axis.

Figure 7. Individual PDI to Communication Satisfaction

Case Study #1 Data Analysis. While Case Study #1 has a limited number of participants, several tentative observations are available. First, individual PDIs are not clustered in the upper and lower PDI quartiles as was expected from the project selection process. During the selection process this project was selected as the associated nationalities were identified as within Hofstede's upper and lower quartile. The data gathered demonstrates that this project team's PDIs are clustered in the 2nd and 3rd quartiles with 2 team members in the 2nd quartile and 4 team members in the 3rd quartile. While Hofstede clearly identifies that national PDI is not a predictor of any individual PDI, the strong divergence from the national PDI grouping was not an anticipated finding.

These groupings indicate that the individual project team members have a moderate acceptance and mental view of a hierarchical structure within the project team environment and the power relationship between the superior and subordinate. This discovery is supported through content analysis of the open ended questions using ATMOST.ti qualitative content analysis software.

Content analysis of the open ended interview questions identify that there is a hierarchy in the project where the project manager is at the top. Table 16 provides some of the team member responses that demonstrate their views of the project power levels.

Table 16. Respondents' Hierarchical Views

Respondent	Comment
Question 28. #6	...[a weak structure] sometimes caused problems with confusion on chain of command...
Question 30. #1	My response doesn't suggest all decisions are made by consulting
Question 32. #7	Agree with maintaining supervisor relationship and accountability
Question 35. #5	Don't question authority just to question authority

The second observation is that the individuals accept that the project team has a hierarchal structure. This hierarchical structure influence on decision and communications develops the third observation which is expanded on next.

A review of the respondents' Likert scale question responses, to how the team members would rate the overall project communication satisfaction, identifies that all team members rated their satisfaction between somewhat Satisfied to Completely Satisfied. Based on the close grouping of individual PDIs, this result is not unexpected as one of this research proposition's is that individual PDI influences project team communication satisfaction. Table 17 provides a sample of the respondents open ended question responses as to what they attribute this state of team communication satisfaction.

Table 17. Respondents' Project Communication Satisfaction

Respondent	Comment
Question 28. #1	...[team members] had the background information I required and was willing to share it
Question 28. #4	No big problems with communication
Question 28. #6	... communication is good due to a relaxed atmosphere...

The third observation is that the project team communication satisfaction ranges from Somewhat Satisfied to Completely Satisfied. Based on the respondents' responses this range is associated with the project team's willingness to provide information, share information, as well as a relaxed project team atmosphere.

The next analysis step involves developing if there is or is not an apparent relationship between the individual PDI and project team communication satisfaction. To analyze if there is a potential relationship a tripartite analysis effort was conducted which included graphical analysis, cluster analysis, and nonparametric bivariate correlation analysis.

Figure 3 is the data plot analysis of each respondent's individual PDI and individual ranking of project communication satisfaction. The individual PDI range from 1 to 5 on the horizontal axis with 1 indicating a low level of PDI and 5 the highest level of PDI. On the vertical axis the individual project team communication satisfaction ranking is arranged on a range of 1 to 5 with a ranking of 1 equaling completely satisfied and a ranking of 5 is completely dissatisfied.

Graphical analysis is a common analysis technique that has been proposed as providing "... more insight... than traditional techniques such as factor analysis and cluster analysis alone..." (Yuan, Rahn and Zhuang, 2004). Used in combination with descriptive statistical analysis and cluster analysis, graphical analysis helps to develop a richer understanding of the subject matter. Graphical analysis methods are also "... exceptionally useful for discovering surprises in data such as anomalies, outliers, or otherwise exotic values, especially in large data sets...." (Brown and Svyantek, 2001).

As part of developing a heuristic understanding of the data set, a data plot graphical analysis was conducted. Analysis of the plot indicates a slightly positive trend that suggests that as the individual PDI moves towards a higher power distance rating the overall project team communication satisfaction would increase as well or the converse that an increase in project team communication satisfaction the individual PDI will also increase.

Following this graphical analysis process, the data was characterized utilizing cluster analysis technique. Cluster analysis is the process where the data plot points are grouped according to Euclidean Distance calculations. A cluster consists of a group of data points in close proximity to each other. Cluster analysis is a qualitative technique that is intended to identify groups of similar data. It is subjective in nature as different analysis can develop different clusters based on the degree of association assigned. This technique has been called optimization-partitioning "In which the clusters are formed by the optimization of some clustering criterion. The classes are mutually exclusive, thus forming a partition of the set of entities" (Sarbo, 1982). In this case, clustering is based on Euclidean Distance measurements derived from SPSS 13.0 for Windows.

Table 18 provides the Euclidean Distance measurements for all data points identified in Figure 7.

For this analysis the clusters are developed according to the following rules:

1. No data point can be a member of more than one cluster.
2. A cluster will consist of data points that minimize the Euclidean Distance Measurement.
3. Adding a new data point to a cluster can occur by a short Euclidean Distance measurement of any other data point within the cluster.

Table 18. Euclidean Distance Measurement Figure 7

	Euclidean Distance						
	1	2	3	4	5	6	7
1	.000	1.118	2.004	1.250	1.068	.750	.000
2	1.118	.000	1.068	1.250	.125	1.601	1.118
3	2.004	1.068	.000	1.329	1.031	2.183	2.004
4	1.250	1.250	1.329	.000	1.125	1.000	1.250
5	1.068	.125	1.031	1.125	.000	1.505	1.068
6	.750	1.601	2.183	1.000	1.505	.000	.750
7	.000	1.118	2.004	1.250	1.068	.750	.000

Table 19 identifies the two cluster sets derived by following the previous rules.

Table 19. Case #1 Cluster Identification

Cluster identification	Euclidean Distance
Cluster 1: Point 1 to Point 7	0.000
Point 7 to Point 6	0.750
Point 6 to Point 4	1.000
Cluster 2: Point 2 to Point 5	0.125
Point 5 to Point 3	1.031

The two clusters can be identified by referring to Figure 7. Cluster 1 is those points lying to the left of the red line while cluster 2 is those points lying to the right of the red line. Cluster analysis indicates that there is a distinction between those who are in the third PDI quartile over those who are in the second PDI quartile in regards to their ranking of the project team communication satisfaction. Cluster analysis tends to support the graphical analysis and indicates a relationship between an increase in PDI and overall project communication satisfaction.

As two of the three analysis techniques indicate similar data characteristic trends the third analysis process, non-parametric statistical data testing, was applied using SPSS 13.0 for Windows.

SPSS 13.0 for Windows provides two nonparametric statistical relationship processes which include Pearson and Kendall Tau_b. The limitation to “Pearson correlation is unduly influenced by outliers, unequal variances, non-normality, and nonlinearity” (Unesco, 2005) For this limited data set the analysis conducted indicates non-normality may be present. As such, Pearson correlation appears to have limited application. Kendall Tau_b, on the other hand, “...is a measure of correlation between two ordinal-level variables. It is most appropriate for square tables” (Unesco, 2005). This description matches the data set under evaluation as it is two ordinal-level variables that generate a square table.

Table 20 identifies the results of SPSS Kendall Tau_b analysis.

Table 20. PDI and Comm. Satisfaction Nonparametric relationship

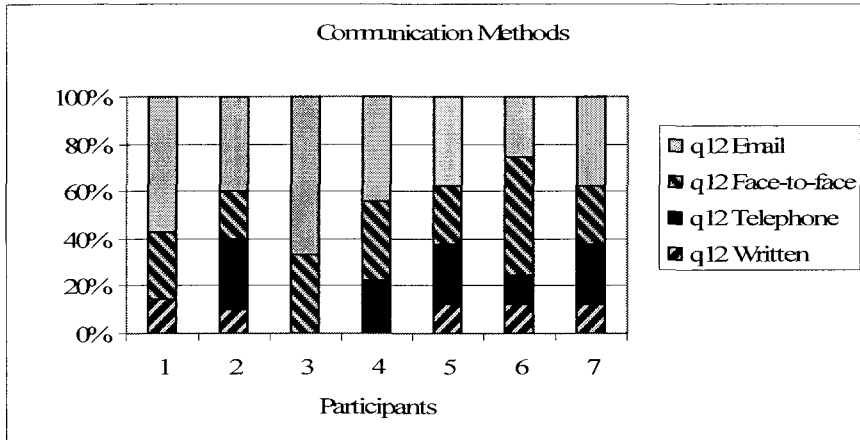
			Comm. Sat.	Individual PDI
Kendall's tau_b	q 27 how satisfied are you about the project communication	Correlation Coefficient	1.000	.355
		Sig. (1-tailed)	.	.157
		N	7	7
	Individual PDI average	Correlation Coefficient	.355	1.000
		Sig. (1-tailed)	.157	.
		N	7	7

With this limited data set Kendall's tau_b shows a slight positive relationship of .355. While this relationship is not statistically significant, .157, it does provide another view to indicate that as the individual PDI or project communication satisfaction ratings increase there will be an increase in the other variable. The selection of a 1-tailed significance test is valid as the underlying concept is that communication satisfaction will increase as PDI increases (Statistic 2005; Pillemer, 1991)

The result of this tripartite analysis develops the fourth observation: there appears to be a positive relationship between individual PDI and project team communication satisfaction. This positive relationship is not statistically significant, but each of the tripartite analysis techniques provides cross analysis support that if an individual's PDI ranking increases, their level of project communication satisfaction ranking also increases.

Project Team Member Communication. A review of the team members' communication styles is shown in Figure 8. As the data show the primary communication medium is Email. The next most common communication method is face-to-face. The least used communication method is written.

Figure 8. Communication Methods



As the data presented indicates, the project team is predominately satisfied to completely satisfied or a mean of 1.71 on a scale of 1 to 5 with 1 = completely satisfied and 5 = completely dissatisfied. A review of the respondents' answers to Question 11, "Please rank the following according to how comfortable you are in interacting with them," provides support for the overall project communication satisfaction level. Table 21 provides a descriptive statistic summary of the respondents' answers.

Table 21. Question 11 Communication Confort Level

	N	Minimum	Maximum	Mean
q11 Immediate Superiors	7	1	3	2.57
q11 Subordinates	7	2	3	2.71
q11 Peers (others at the same job level)	7	2	3	2.86
Valid N (listwise)	7			

For Question 11 a rating of 1= Not Comfortable, 2= Comfortable, and 3 = Very Comfortable. As Table 21 identifies, the project team comfort level spans from 1 to 3 for the immediate superiors and

between 2 and 3 for subordinates and peers. The resulting mean values indicate that the team members are Comfortable with communicating in all hierarchical directions.

Tables 22 thru 24 and Figures 9 thru 11 provide the Kendall's tau_b and graphical representations for the superior, peer, and subordinate communication to individual PDI correlation analysis. In each of these analyses the Kendall's tau_b correlation coefficient identifies a negative relationship; -0.539, -0.283, and -0.548. In each case the correlation significance approaches the significant level of 0.05 with values of 0.062, 0.065 and 0.065 respectively.

Graph analysis also indicates that a relationship appears to exist. As each of the graphs shows up to an approximate PDI value of 2.75, the respondents are very comfortable with communications throughout the project hierarchy. In the region of approximately 2.75, the graphs show a negative trend that as the PDI ratings increase, the communication comfort level decrease.

Table 22. Immediate Superior Communication Comfort Relationship

Kendall's tau_b	Individual PDI		Superior	Individual PDI
		Correlation Coefficient	1.000	-.539
		Sig. (1-tailed)	.	.062
		N	7	7
	q11 Immediate Superiors	Correlation Coefficient	-.539	1.000
		Sig. (1-tailed)	.062	.
		N	7	7

Figure 9. Superior Communication Comfort

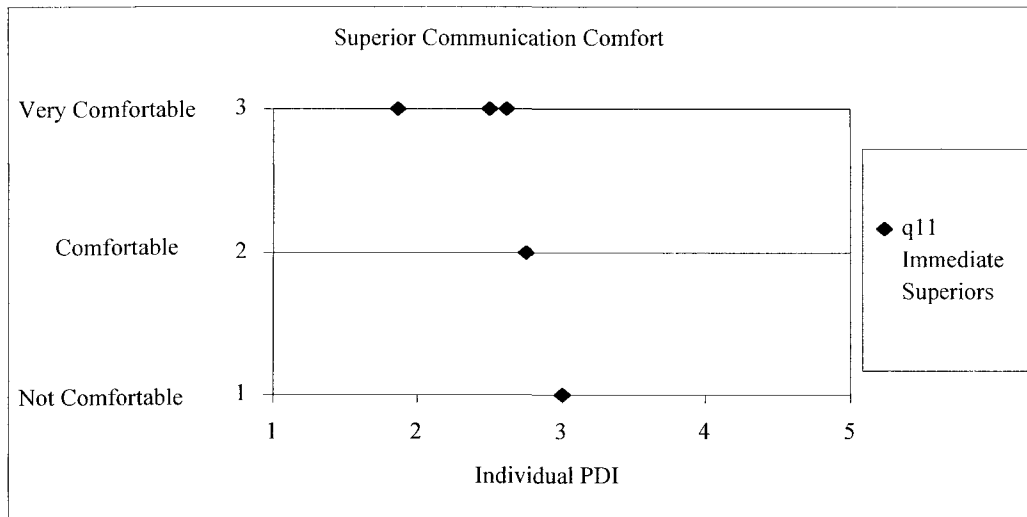


Table 23. Subordinate Communication Comfort Relationship

Kendall's tau_b	Individual PDI	Correlation Coefficient	Individual PDI	Subordinate
		Sig. (1-tailed)	1.000	-0.283
		N	.	.0217
	Q11 Subordinate	Correlation Coefficient	7	7
		Sig. (1-tailed)	-0.283	1.000
		N	0.217	.
			7	7

Figure 10. Subordinate Communication Comfort

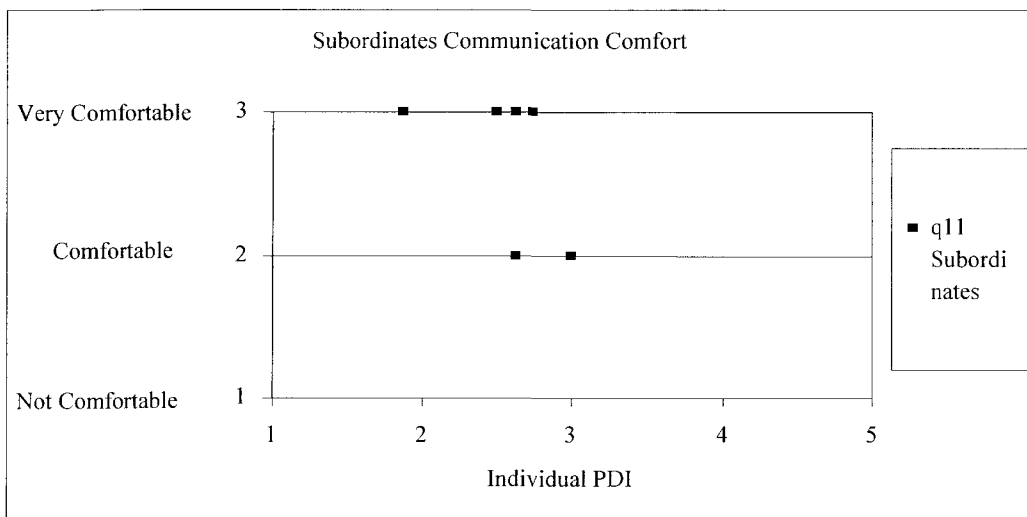
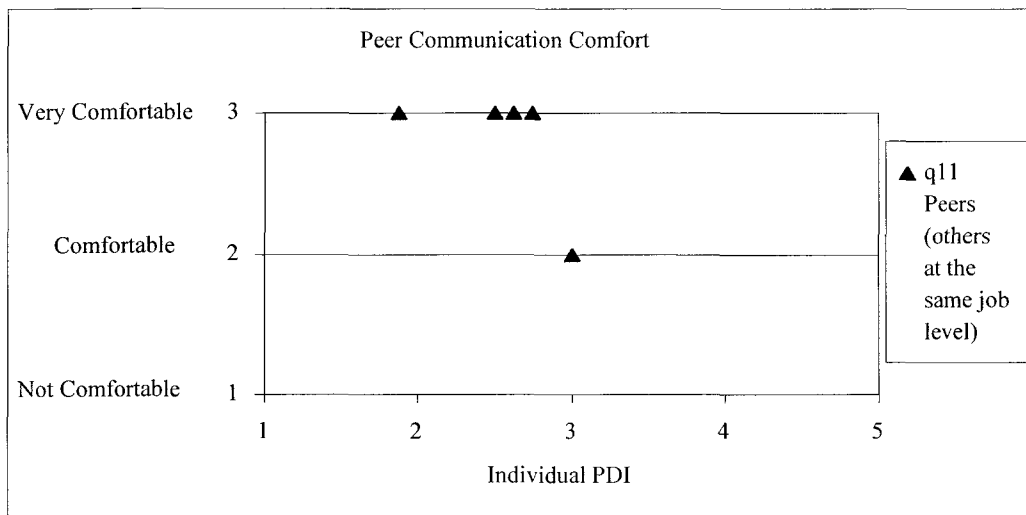


Table 24. Peer Communication Comfort Relationship

			Individual PDI	Peers
Kendall's tau_b	Individual PDI	Correlation Coefficient	1.000	-.548
		Sig. (1-tailed)	.	.065
		N	7	7
	q11 Peers (others at the same job level)	Correlation Coefficient	-.548	1.000
		Sig. (1-tailed)	.065	.
		N	7	7

Figure 11. Peer Communication Comfort

Question 26 asks the respondents what is the level of interaction needed between the respondent and their superiors, subordinates and peers. This need was rated on a 1 to 5 Likert scale where:

- 1 = Very Desirable
- 2 = Desirable
- 3 = Somewhat desirable
- 4 = Not always desirable
- 5 = Completely undesirable

Table 25 and Figures 12 thru 14 provide a correlation view of these interaction needs.

The superior, subordinate, and peer Kendall tau_b correlation values are 0.217, 0.548 and 0.056 respectively. These values indicate some level of positive relationship between the levels of communication interaction and the individuals PDI. In each analysis there is a lack statistical significance

level associated with these correlations. As the significant levels indicate, the need to interaction with the subordinates indicates a 0.548 positive relationship with a close significant level of 0.065.

Table 25. Superior Interaction Need

			Individual PDI	Q26 Superior
Kendall's tau_b	Individual PDI	Correlation Coefficient	1.000	.217
		Sig. (1-tailed)	.	.261
	q26 Immediate Superior	Correlation Coefficient	.217	1.000
		Sig. (1-tailed)	.261	.
Kendall's tau_b				q26 Subordinate
	Individual PDI	Correlation Coefficient	1.000	.548
		Sig. (1-tailed)	.	.065
	q26 Subordinate	Correlation Coefficient	.548	1.000
		Sig. (1-tailed)	.065	.
Kendall's tau_b				Q26 Peers
	Individual PDI	Correlation Coefficient	1.000	.056
		Sig. (1-tailed)	.	.435
	q26 Peers (others at your own job level)	Correlation Coefficient	.056	1.000
		Sig. (1-tailed)	.435	.
		N	7	7

Figure 12. Superior Interaction Need

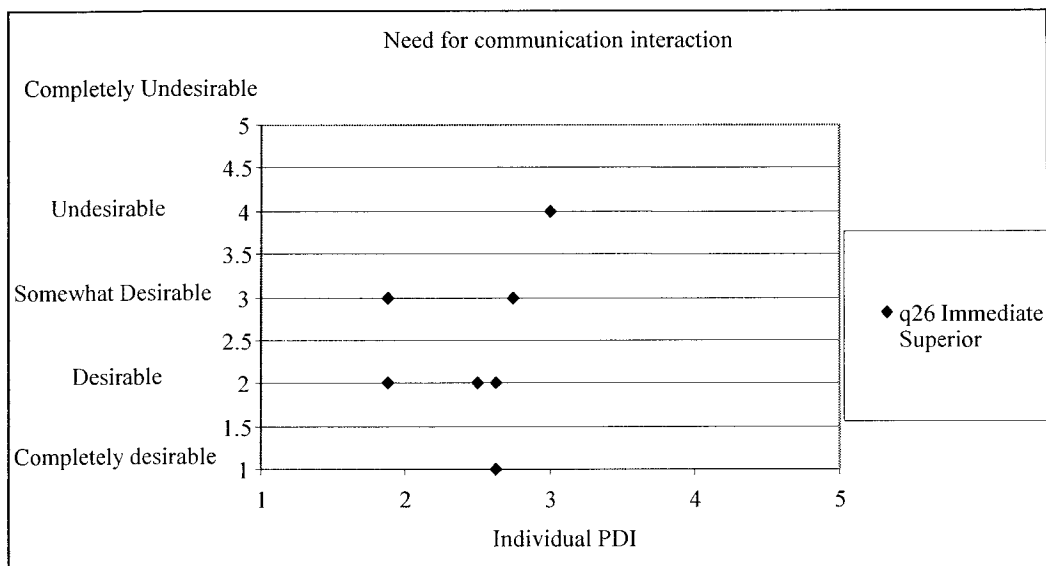


Figure 13. Subordinate Interaction Need

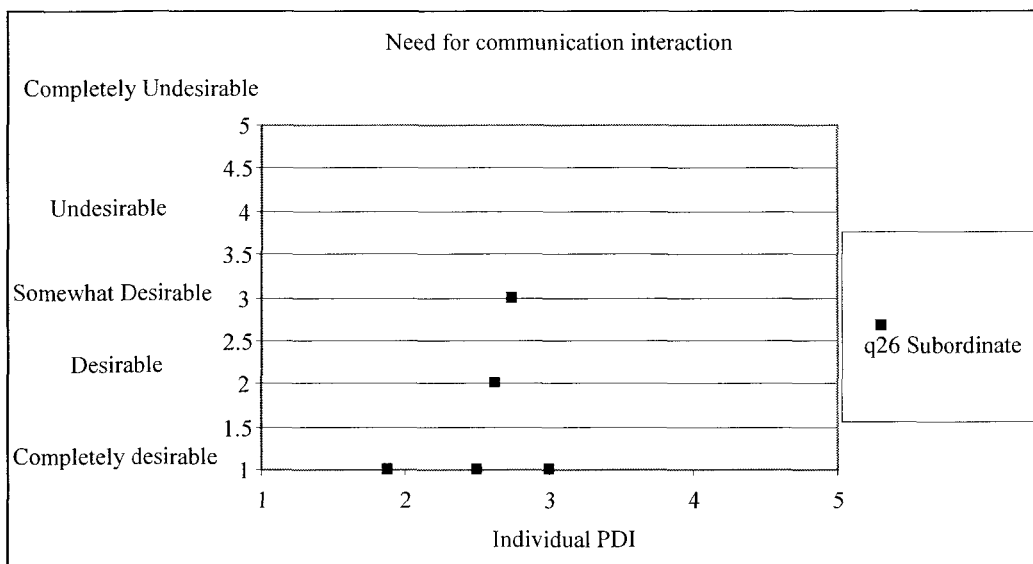
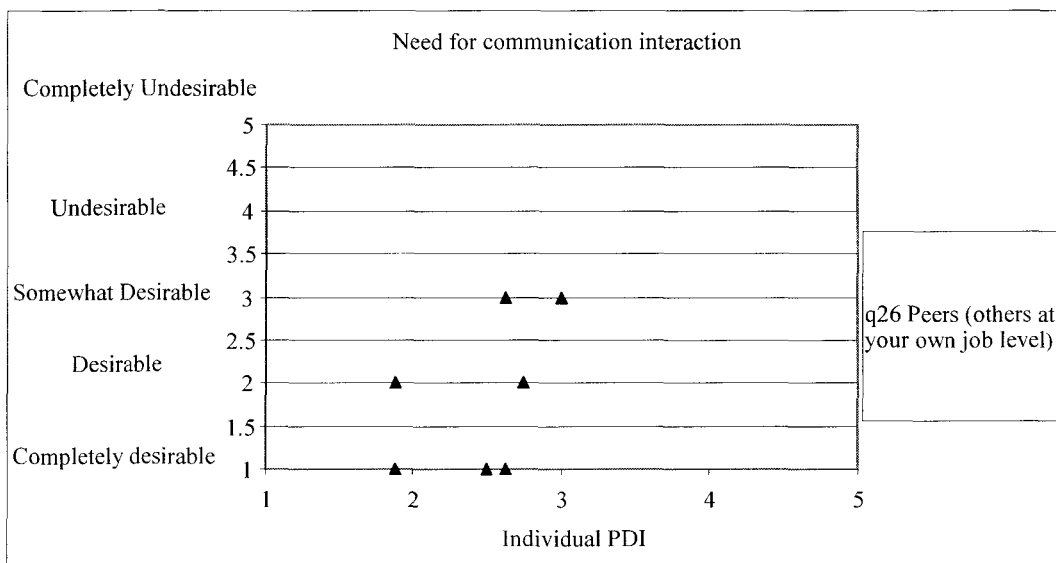


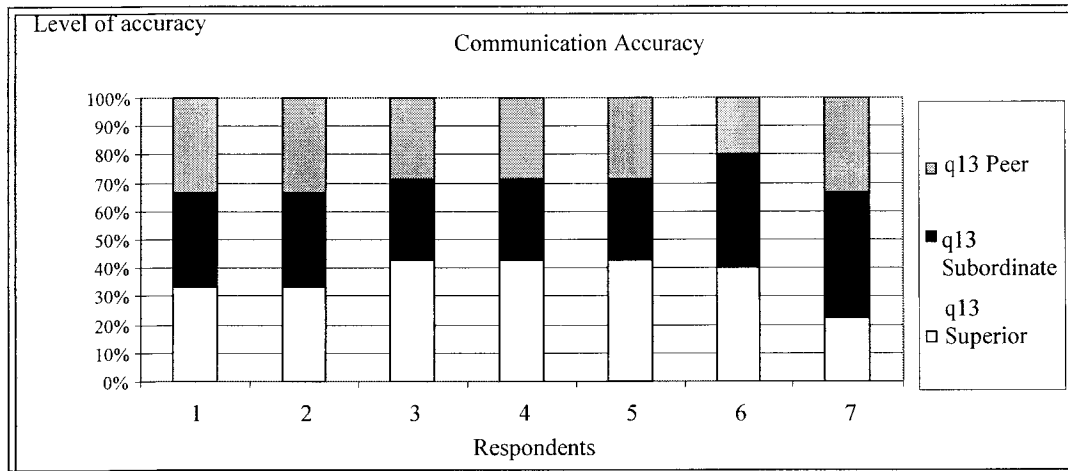
Figure 14. Peer Interaction Need



Questions 13, 14, and 15 involve the accuracy of information received, impact of this information and level of information received. Figure 15 shows that the respondents, in general, indicate that

information received from their superiors is the least accurate, followed by the subordinates and finally their peers, with mean levels of 2.57, 2.43 and 2.14 respectively.

Figure 15. Accuracy of Information Transferred



In general, the respondents indicate that communication accuracy is between Accurate and Somewhat Accurate as they also indicate that the level of information is between Too Little and Always Correct Level of Information, mean of 2.57, and that they rarely receive more information than they can efficiently use, mean of 4.

This set of questions indicates that the information transferred is fairly accurate, that typically does not hinder the project but the volume of information is typically too low.

Questions 17 thru 24 discuss the flow of information and if this information is summarized or not. Figures 16 and 17 provide a visual display of the information to and from the individual project team member. Respondent #1 is the project manager while respondent #3 is the project team lead. In these positions they primarily receive and communicate information to and from their subordinates. The other team members have a range of data flow, but overall the data flows horizontally between peers.

Figure 16. Percentage of Information Received From

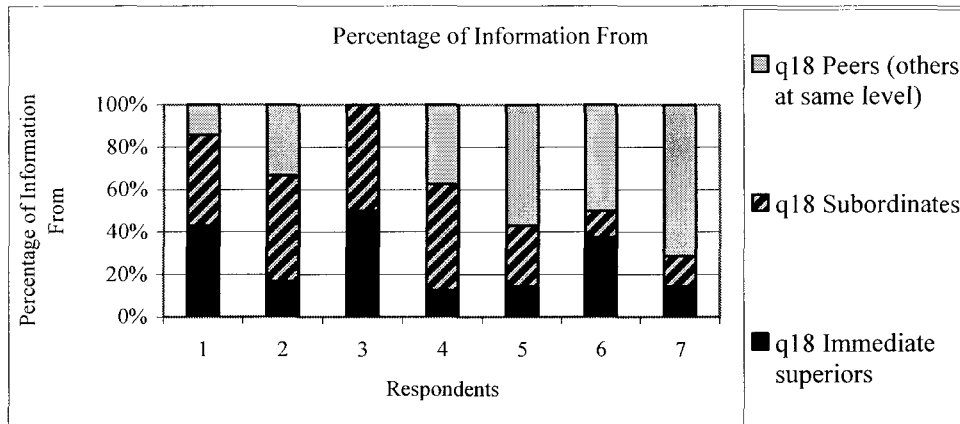


Figure 17. Percentage of Information Provided To

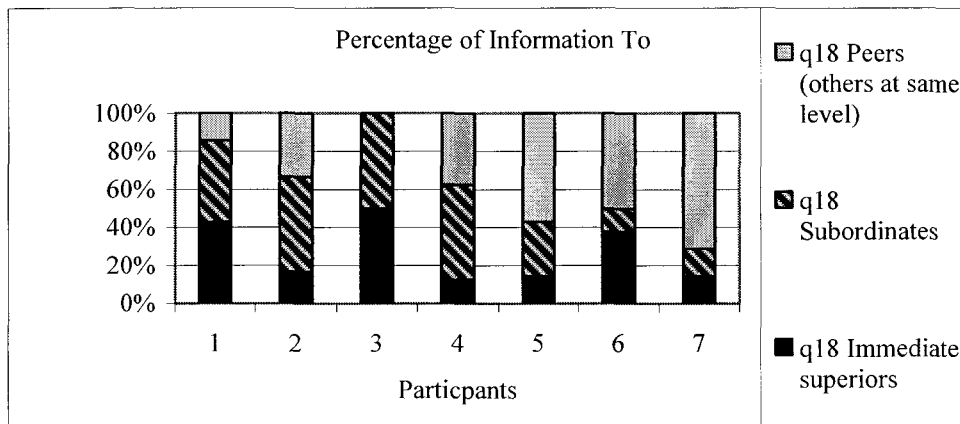
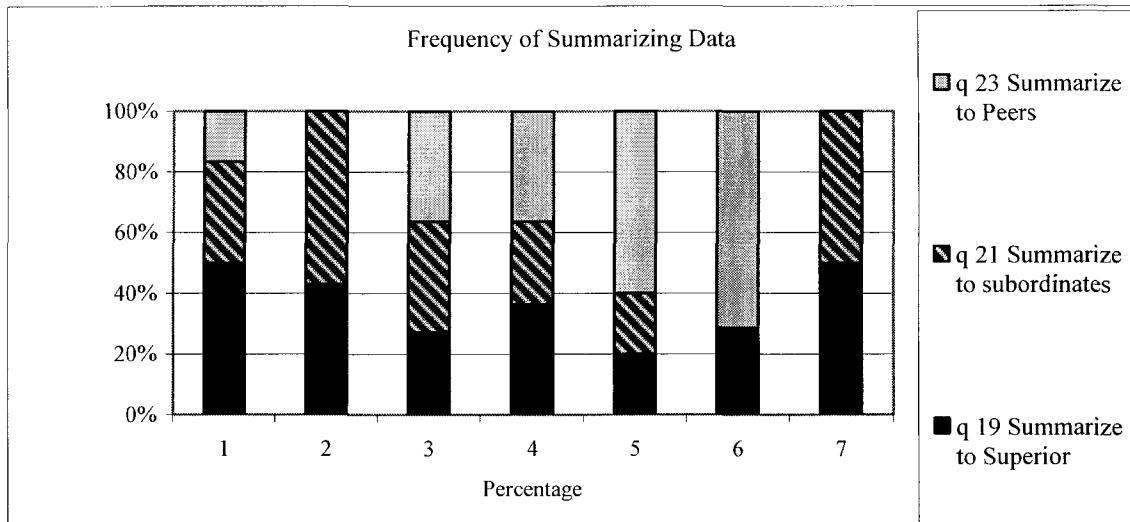


Figure 18 shows the respondents frequency of summarizing data. The responses indicate that all members of the project team summarize the communicated data on a frequent basis. On a scale of 1 to 5 where 1 = Always summarizes and 5 = Never Summarizes the participants summarize data to the Peers somewhere between Occasionally and Never, mean = 3.4. The participants summarize data transfer to their subordinates and superiors between Frequently and Occasionally, mean = 2.5 and 2.43 respectively.

Figure 18. Frequency of Data Summarization



Case Study #1 Summary. In summary, selection of Case Study #1 followed the outlined research methodology section. A divergent multi-national project team was selected based on the nations involved and their fit within Hofstede's lower and upper quartile rankings. The data gathering effort followed the established semi-guided interview process based on the questionnaire outlined in the Appendix.

The data analysis effort was conducted using a tripartite methodology that included graphical analysis, cluster analysis, and non-parametric statistical analysis. The results of this tripartite method generated three principal observations. These observations consist of:

1. The individual PDIs are not clustered in the upper and lower PDI quartiles as expected from the project selection process.
2. The individuals accept that the project team has a hierarchal structure.
3. The project team communication satisfaction ranges from somewhat satisfied to Completely Satisfied.
4. There appears to be a positive relationship between individual PDI and project team communication satisfaction.

From a project team perspective, there appears to be support that the project team overall communication satisfaction has a positive relationship to individual PDIs. From the project team communication comfort level the data indicates that as PDI increases above approximately 2.75 the team member's comfort level begins to drop. This is similar to the overall project team communication satisfaction which data indicates that as PDI increases at the 2.75 point overall project communication

satisfaction begins to decrease. Table 26 provides an overview of these readings. Q27 Kendall's tau_b indicates a positive reading as Q27 ordinal scale is opposite Q11 ordinal scale. For Q27 a rank of 1 is completely satisfied while Q11 rank of one is Not Comfortable. The opposite scale provides a means to check on the respondents answers for consistency.

Table 26. Individual PDI Kenall's tau_b Values

			Q11 Immediate superior	Q11 subordinates	Q11 Peers	Q27
Kendall's tau_b	Individual PDI	Correlation Coefficient	-.539	-.283	-.548	.231
		Sig. (1-tailed)	.062	.217	.065	.253
		N	7	7	7	7

* Correlation is significant at the 0.05 level (1-tailed).

Project team communication in general is reported to between comfortable and very comfortable. The project team reports that the need to communicate appears to have a slightly positive correlation with their PDI but at no significant level except between the subordinates need and the individual PDI at 0.065 significance.

In general the project team responses indicate a slightly insufficient level of data transfer but what data is communicated is generally accurate. The flow of data follows the expected form where the project manager and team manager predominately communicate to and from their subordinates. At the same time the subordinates primary communication paths are to and from their subordinates and peers versus their superiors. This supports the indication that the project team accepts but is not overly influenced by the project team hierarchical relationships.

Based on Case Study #1 several preliminary theoretical constructs are developed as identified in Table 27.

Table 27. Theoretical Construct Case #1

1	There is a limited ability to predict the individual PDI based on their national PDI.
2	Experienced multi-national project teams will exhibit a medium to low hierarchical level relationship project structure.
3	Project team members are willing and find it acceptable to challenge, question, and push back, on project management decisions and communications.
4	There is a positive relationship between the individual PDI ranking and their overall project team communication satisfaction ranking.

The derived observations and subsequent theoretical constructs will be tested further in Case Study #2.

Case Study #2

Introduction. The following sections discuss Case Study #2, only, and are structured to first provide a general overview of the type of project interviewed followed by a general discussion of the technical system that was installed. The following sections will then briefly discuss the project context and project team demographics. With this background information presented, a discussion on the data gathering method and processes is presented. Following the data gathering discussion a summary of this case study is presented.

The System. As with Case Study #1, Case Study #2 is a complex high technology project system within the international oil transportation industry. As defined, "... a complex system is a functional whole, consisting of interdependent and variable parts..... Complexity Theory states that critically interacting components self-organize to form potentially evolving structures exhibiting a hierarchy of emergent system properties" (Lucas, 2000). Relying on this definition, this project consists of software, hardware and human interactions 'interdependent and variable parts' that produce a higher level system capability than any component would independently or in conjunction with anything less than all the parts.

The scope of this project is to provide a process control software application that allows for remote system operation, alarm monitoring, warning of abnormal conditions, and system diagnostic capabilities. While the core software application has been deployed, in other applications, each installation requires

specific system configuration and calibration due to the unique site specific context and environmental considerations.

To support the enhanced software application, the system requires a set of hardware components that are located at various sites throughout the system. These hardware components support the software system by gathering remote field data, time stamping all gathered data - so the software application is able to correlate specific events based on sequential time - and transmitting the time stamped data to a central processing location. This central processing location includes a set of fully redundant central computer processors - where the main software application resides. These central processors support both the core software application and the human machine interface requirements.

The final interacting component of this system is the human operator. The overall system purpose is to provide operations personnel information on the system's operating condition as well as alarms and warnings to abnormal conditions. The system also provides operations personnel functional user interface capabilities such as the ability to modify or insert data for missing field information, acknowledge system alarms and warnings, as well as diagnose potential issues by creating unique trend graphics and user defined data tables. These features are accomplished through the context specific human machine interface (HMI).

The interaction of unique software, hardware, and human interaction creates a complex system that produces a purposeful output that is greater than the sum of the individual components.

Project Context. The project context develops an understanding of the physical attributes that surround the project life cycle. It is the intent of this section to provide a high level view of the context that encompasses the project.

As a multi-national project team, the personnel involved are from different nations working together in the delivery of this complex system within a defined schedule and an established budget. From a national viewpoint the project involved people in Angola and Canada.

This multi-national project team operated in each identified country for the project life cycle duration of approximately three years. During the four year time frame, the project was taken from a conceptual idea, to field implementation, final system test, acceptance and ownership transfer. As part of the field installation effort a portion of the project team worked under remote conditions with limited

communications infrastructure. At the time of this research, the system was being transferred from the project to operations and entering the close out project phase. In the next section, the project team is discussed further.

Project Team. Implementation of this project involved the association of a multi-national project team. The team consisted of four members that provided the project management oversight, technical engineering support, and on site implementation. The project team was reported to be continuous for the project life cycle.

Table 28 provides descriptive statistics of this project team. The project team members have worked in this type of context from 1.5 to 11 years with a mean of 6.875 years. The team members' project experience ranges from 3 to 16 years, with a mean of 10.5 years.

Table 28. Case #2 Project Team Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
q 4 How long doing this type of work (years)	4	1.5	11	6.875	4.44
q 9 Overall project experience (years)	4	3	16	10.5	5045
Valid N (list wise)	4				

Table 29 shows the team members age brackets.

Table 29. Case #2 Team Members Age Bracket

Age Bracket	Percentage
Under 25	0.00%
Between 25 and 35	75%
Between 35 and 45	25%
Between 45 and 55	0.00%
Over 55	0.00%
Total	100%

The 'typical' project team member can be described as between 25 and 45 years old. They have performed the same type of project assignment an average of 6.875 years and they have worked in projects, in any capacity, an average of 10.5 years.

In general, the project team members are experienced and seasoned project team members.

Research Method. Case #2 followed the research methodology as outlined in the Research Method Section. This section highlights each step of the process and how it was applied to this project.

As identified in the research team selection section, project team selection followed several steps. The first step was identification of a multi-national project. This was achieved through discussions with the corporate division manager. This individual identified one in process project that involved Angola and Canada. Identification of this project clearly answered the first question that this project involved at least two different nations.

The next step in the project selection process was to determine if the identified project might contain predictive divergent cultural differences. To answer this question, the associated multi-national project national cultural characteristics were compared to Hofstede's power distance index (PDI). As identified in the project selection method, for the project team to be significantly different, the project would involve nationalities from Hofstede's top and bottom quartile index rankings. Case #2 was identified as a multi-national project involving Angola and Canada. Angola is not specifically identified, within Hofstede's scale, yet scores are provided for the regions of West Africa, PDI=77, and East Africa, PDI=64. As established, Hofstede's top quartile are those countries with a PDI of 68 or more while the lower quartile has been set at 40, for this study. While Angola is not specifically identified in Hofstede's national ranking, Hofstede's rankings indicate a range of 64 to 77 which provides an indication of a higher PDI. Canada, with a ranking of 39 fits within the established lower quartile ranking. This analysis established that this project satisfies the selection criterion.

The next step involved determining if the identified team members were assigned to the project equal to or more than 50% of the time. This question was answered in conversation with the project manager who indicated that the team members are all assigned to the project on a full time basis.

Finally, the selection process asks the question of "are the project team members available?" The identified project team members were all available for either in-person, telephonic interviews, or had access

to the internet. As such, this project and its associated team members met the full selection criteria and all agreed to participate in the semi-directed interview and self-administered questionnaire process.

Following the project team selection process, each identified project team member first completed the on-line questionnaire. The questionnaire responses were analyzed for completeness, trends, and general impressions. Following this preliminary data analysis, a list of questions was developed and interviews were conducted. The semi-guided interviews followed the process of:

1. Interviewer took a few minutes to briefly describe the interview purpose, process, and right to terminate the interview at any time.
2. Interviewer obtained the interviewee's agreement to participate.
3. The interviewer asked open-ended questions that were based on the completed questionnaires.
4. At the conclusion of the interview the interviewer went back over the answers to ensure that the correct response was entered on the interview form correctly.
5. The interview was concluded.

Table 30 provides descriptive details of the duration of these interviews. As Table 30 shows, the interview mean was 38.5 minutes and with a standard deviation of approximately 0.5 minutes. Overall the interviews were fairly consistent in their durations and scope of discussion.

Table 30. Interview Statistics

Case	Mean	Standard Deviation
2	38.5	0.5

Data Discussion. The following section presents the data gathered during the interview process. The data will be presented through a combination of descriptive statistics and content analysis as defined by Denzin and Lincoln (2000).

The semi-guided interview questions are grouped into sections that determine information on interviewee demographics, overall project communication satisfaction, and the individual's power distance index (PDI). Table 31 provides a categorization of the specific questions and the relationship to these three broad categories.

Table 31. Questionnaire Questions Identification

Question Type	Question #	Source
Demographic information	1-9	Harkness, Van de Vijver, and Mohler (2002)
Individual Power Distance Likert Scale	29, 31, 33, 34, 36, 38-40	Earley and Erez (1997)
Individual Power Distance Open Ended Questions	30, 32, 35, 37	
Project Communication Satisfaction Likert Scale	27	Roberts & O'Reilly (1974)
Project Communication Satisfaction Open Ended Questions	28 and 41	

A principal area of interest, examined by this process, was the range and typical view of project team communications satisfaction within a multi-national project.

Analysis of the demographic data indicates that, with the exception of one person, the team members consist of experienced project personnel. Experienced project team personnel means that they have been involved in more than one multi-national project; they have several years of practical experience, and several years of multi-national project experience. One participant was identified that does not fit the overall indication of an experienced multi-national project team member. This individual's responses indicates that this is their first project and their overall work experience is about 3 years.

The demographic data reports that the project team members' multi-national project team involvement ranges between 1 and 10 projects. At the same time the project team minimum project work duration, in years, ranges from 1.5 years to a maximum of 16 years, with a mean of 10.5 years. In general, the project team members consist of a group that has been exposed to more than one multi-national project context, with several years of practical and multi-national project experience.

The next question of interest is the individual project team member PDI rating. To determine the individual PDI rating the Earley and Erez (1997) PDI survey was utilized. The individual PDI is a 1 to 5 scale where 1 is the lowest PDI rating that indicates a minimal if any mental attribute of power distance between superior and subordinate. Conversely, a rating of 5 is the highest PDI rating that indicates

maximum mental attribute of a subordinate and superior relationship. Table 32 identifies the project team's results and how they ranked the overall project communication satisfaction.

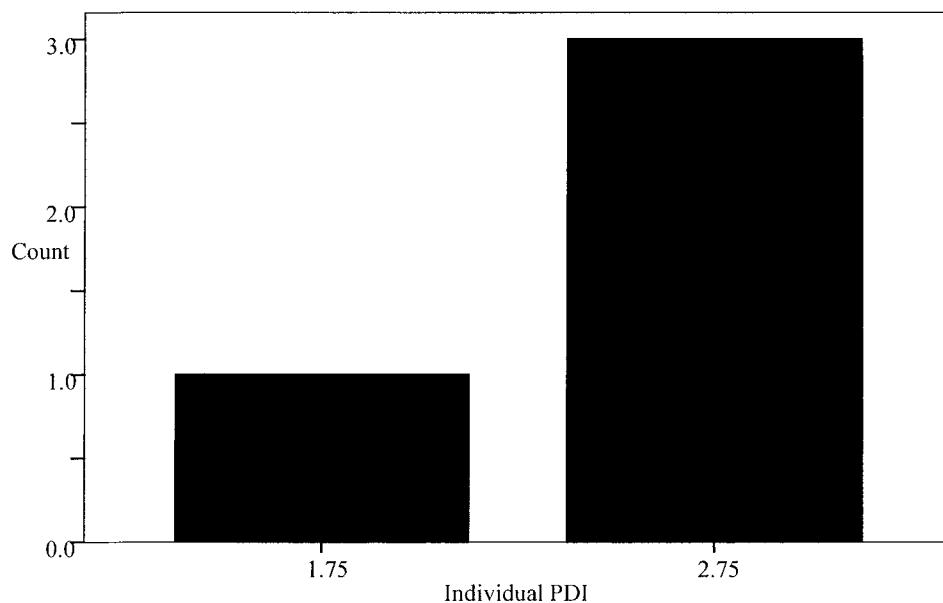
Table 32. Case #2 Individual PDI and Communication Satisfaction

Team Member	Individual PDI	Comm. Satisfaction
1	2.75	2
2	1.75	3
3	2.75	2
4	2.75	2

Project team PDI ranged from 1.75 to 2.75 or generally from low to the middle PDI ranking. Each of these team members has a culture trait that acknowledges that power is distributed between subordinate and superior in a general way. This range of acceptance, again, falls in the middle to low range with a mean of 2.5.

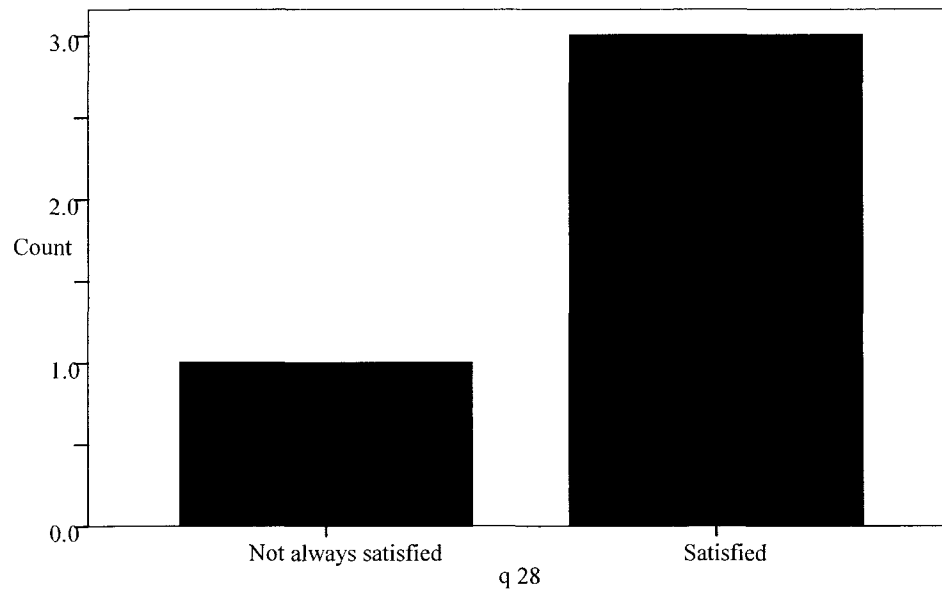
Figure 19 provides another view of the individual PDIs in the form of a bar graph. This places one participant in the first quartile and all others firmly within the second quartile.

Figure 19. Individual PDI



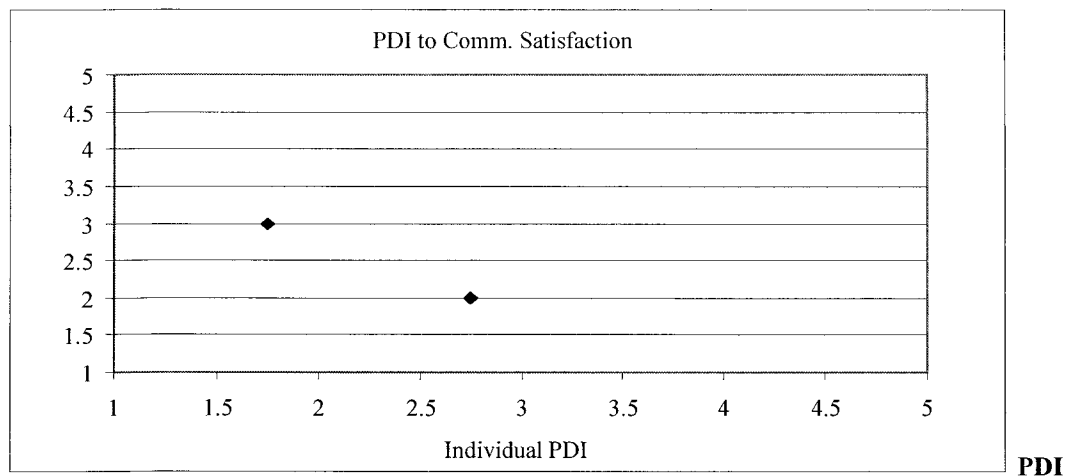
The next area of research interest involves how the team members view overall project communication satisfaction. On question 27, the project team responses were either 2 or 3 where a 1 rating is completely satisfied and 5 rating indicated completely dissatisfied. Figure 20 is the team satisfaction bar graph that shows that all but one team member rated the project communication satisfaction as satisfied.

Figure 20. Communication Satisfaction



To determine if there appears to be a relationship between the individual PDI and team communication satisfaction, Figure 21 is generated. In Figure 21, team communication satisfaction is on the vertical axis and individual PDI is on the horizontal axis.

Figure 21. Team Communication Satisfaction to Individual



Data Analysis. While Case Study #2 has a limited number of participants, several tentative observations are available. First, individual PDIs are not clustered in the upper and lower PDI quartiles as was expected from the project selection process. During the selection process this project was selected since the associated nationalities were identified as within Hofstede's upper and lower quartile. The data gathered demonstrates that this project team's PDIs are clustered in the 1st and 2nd quartiles. While Hofstede clearly identified that national PDI is not a predictor of any individual PDI, the strong divergence from the national PDI grouping was not an anticipated finding.

These groupings indicate that the individual project team members have a moderate acceptance and mental view of a hierarchical structure within the project team environment and the power relationship between the superior and subordinate. This discovery is supported through content analysis of the open ended questions using ATMOST.ti qualitative content analysis software.

Content analysis of the open ended interview questions identify that there is a hierarchy in the project where the project manager is at the top. Table 33 provides some of the team member responses that demonstrate their views of the project power levels.

Table 33. Respondent Hierarchical Views

Respondent	Comment
Question 31. #1	Depending on the decision but if technical, the subordinates typically know more than the manager.
Question 35. #3	The team must follow their leader.
Question 36. #4	...PM has to make a decision without consulting the subordinates. So the subordinates should not question those decisions.

The second observation is that the individuals accept that the project team has a hierarchal structure. This hierarchical structure's influence on decision and communications develops the third observation which is expanded on next.

A review of the respondents' Likert scale question responses to how the team members would rate the overall project communication satisfaction identifies that three of the four team members rated their satisfaction as 'Satisfied.' The fourth team member rated project team communications as Not Always Satisfied. Based on the close grouping of individual PDIs, this result is not unexpected as one of this research propositions is that individual PDI influences project team communication satisfaction. Table 34 provides a sample of the respondents open ended question responses as to what they attribute this state of team communication satisfaction.

Table 34. Respondents' Project Communication Satisfaction

Respondent	Comment
Question 28. #1	It could have been better if it was not a fast track project
Question 28. #4	Adequate communication is happening

The third observation is that the project team communication satisfaction ranges from Somewhat Satisfied to Satisfied. In analyzing the data, the primary difference between the individual who rated project communication Somewhat Satisfied and the others is years performing this work and the number of multi-national projects that the individual has worked on.

As the data indicates, the individual with the lowest satisfaction rating has been involved in this type of work 3 years and this is their first multi-national project. The individual also falls within the 25-35 age bracket and works as an engineer. This profile is divergent from the other team members who report that they have worked on multi-national projects and worked within projects for multiple years.

Table 35. Team Project Experience Characteristics

Project Team Communication Satisfaction	Q 5. How long have you been performing this type of work?	q. 10. How long have you been working on projects, of any kind?
Satisfied	Mean = 8.67 years Std. Dev. = 3.2	Mean = 13 years Std. Dev. = 2.65
Some what satisfied	1.5 years	3 years

The Somewhat Satisfied respondent indicated that communications were not always as clear as they could be. There is some support for this from one of the other respondent's who stated that this was a 'fast track' project where communication was 'not always' as good as it could have been. While the two individuals had closely related views one rated communications as 'some what satisfied' and the other rated it as 'satisfied.'

The next analysis step involves determining whether or not there is an apparent correlation between the individual PDI and project team communication satisfaction. For this analysis a tripartite analysis effort was conducted which included graphical analysis, cluster analysis, and nonparametric bivariate correlation analysis.

Figure 17 is the graphical data plot analysis where each respondent's individual PDI and individual ranking of project communication satisfaction is plotted. The individual PDI range from 1 to 5 on the horizontal axis with 1 indicating a low level of PDI and 5 the highest level of PDI. On the vertical axis the individual project team communication satisfaction ranking is arranged on a range of 1 to 5 with a ranking of 1 equaling completely satisfied and a ranking of 5 is completely dissatisfied.

Graphical analysis is a common analysis technique that has been proposed as providing "... more insight... than traditional techniques such as factor analysis and cluster analysis alone..." (Yuan, Rahn and Zhuang, 2004). Used in combination with descriptive statistical analysis and cluster analysis, graphical

analysis helps to develop a richer understanding of the subject matter. Graphical analysis methods are also "... exceptionally useful for discovering surprises in data such as anomalies, outliers, or otherwise exotic values...." (Brown and Svyantek, 2001).

As part of developing a heuristic understanding of the data set, a data plot graphical analysis was conducted. Analysis of the plot indicates an apparent relationship between individual PDI and communication satisfaction. As the PDI increases the overall project satisfaction also increases. This is counter to the theoretical construct.

It appears that this counter construct is being driven by a single outlying data point. Based on the limited data set and apparent outlier effect, of a single point, the graphical analysis is inconclusive of whether a relationship exists or not.

Following this graphical analysis process, the data was characterized utilizing a cluster analysis technique. Cluster analysis is the process where the data plot points are grouped according to Euclidean Distance calculations. A cluster consists of a group of data points in close proximity to each other. Cluster analysis is a qualitative technique that is intended to identify groups of similar data. It is subjective in nature as different analysis can develop different clusters based on the degree of association assigned. This technique has been called optimization-partitioning "In which the clusters are formed by the optimization of some clustering criterion. The classes are mutually exclusive, thus forming a partition of the set of entities" (Sarbo, 1982). In this case, clustering is based on Euclidean Distance measurements derived from SPSS 13.0 for Windows.

Table 36 provides the Euclidean Distance measurements for all data points identified in Figure

21. For this analysis the clusters are developed according to the following rules:

1. No data point can be a member of more than one cluster.
2. A cluster will consist of data points that minimize the Euclidean Distance Measurement.
3. Adding a new data point to a cluster can occur by a short Euclidean Distance measurement of any other data point within the cluster.

Table 36. Euclidean Distance Measurement Figure 21

	Euclidean Distance			
	1	2	3	4
1	.000	1.414	.000	.000
2	1.414	.000	1.414	1.414
3	.000	1.414	.000	.000
4	.000	1.414	.000	.000

Table 37 identifies the two cluster sets derived by following the previous rules.

Table 37. Cluster Identification

Cluster identification	Euclidean Distance
Cluster 1: Point 1 to Point 3 Point 3 to Point 4	0.00 0.00
Cluster 2: Point 2	1.414

The two clusters can be identified by referring to Figure 21. Cluster 1 is the respondents with identical PDI and project communication satisfaction. Cluster 2 consists of the individual that is working on their first multi-national project with just 3 years total experience in this area. Cluster analysis indicates that there is a distinction between those who are in the 1st PDI quartile over those who are in the 2nd PDI quartile, in regards to their ranking of the project team communication satisfaction. Cluster analysis tends to support the graphical analysis and indicates a relationship exists between increases in PDI and overall project communication satisfaction. As the clusters indicate, as PDI increases, communication satisfaction increases.

The issue with this analysis is that one data set is skewing the rest of the data points. While the cluster analysis indicates that a negative relationship may exist, this conclusion appears to be affected by the single data point which results in invalid conclusions.

As two of the three analysis techniques indicate similar data characteristic trends the third analysis process, non-parametric statistical data testing, was applied using SPSS 13.0 for Windows.

SPSS 13.0 for Windows provides nonparametric statistical relationship processes which include Pearson, Spearman's rho, and Kendall's tau_b. Based on the literature, Kendall's tau_b is the most appropriate statistical correlation analysis method for this data as discussed next.

Pearson's correlation is not the optimum statistical method for the data set, as "Pearson correlation is unduly influenced by outliers, unequal variances, non-normality, and nonlinearity" (Unesco, 2005) For this limited data set the analysis conducted indicates non-normality may be present. As such, Pearson correlation appears to have limited application.

Spearman's rho is also not the most appropriate correlation statistical method for this small data set. From the literature one guiding principal is if sample size is greater than 20 Spearman statistic is an appropriate statistical method. If the sample size is less than 20 then Kendall's tau_b is the most appropriate (NCSU, 2005).

The literature also shows that this statistical method "...is a measure of correlation between two ordinal-level variables. It is most appropriate for square tables" (Unesco, 2005). Kendall's correlation analysis is also most appropriate for data sets of less than 20, as identified previously, and is closely aligned with the data set descriptions previously discussed. As the data set under evaluation consists of two ordinal-level variables that generate a square table consisting of a data set of 4 and less than 20 data points. Kendall's tau_b is used as the third analysis process.

Table 38 identifies the results of SPSS Kendall's tau_b analysis.

Table 38. SPSS Non-parametric relationship output

			Satisfaction	Individual PDI
Kendall's tau_b	q 28 project team satisfaction	Correlation Coefficient	1.000	-1.000(*)
		Sig. (1-tailed)	.	.042
		N	4	4
Individual PDI		Correlation Coefficient	-1.000(*)	1.000
		Sig. (1-tailed)	.042	.
		N	4	4

* Correlation is significant at the 0.05 level (1-tailed).

With this limited data set, Kendall's tau_b shows a negative relationship of -1.00 at a statistical significance of 0.042. From Kendall's tau_b the data indicates that as the individual PDI increases overall

project communication satisfaction increases. The inherent issue with this result is that 3 out of the 4 data sets are identical data sets.

In reviewing Kendall's tau_b calculation the basic formula is:

Formula 2. Kendall's tau_b

$$\text{Kendall's tau}_b = (C-D)/(n/2)$$

C = concordant data set = larger value of X also has larger value of Y

D = Discordant data set = larger value of X does not have larger value of Y

A review of the data set shows that there are no concordant data sets. This leaves one discordant data set.

Kendall's tau_b calculation also takes into consideration data set ties. This is taken into consideration by modification of the calculation denominator as identified in Formula 2.

Formula 3. Data Set Ties

$$\text{Square Root } \left[\left\{ \left(\frac{n}{2} - n_x \right) \times \left(\frac{n}{2} - n_y \right) \right\} \right]$$

N_x = number of paired X values

N_y = number of paired Y values

Combining Formula 2 and 3 results in Formula 4.

Formula 4. Combined Kendall tau_b

$$\text{Kendall's tau}_b = (C-D) / \text{Square Root } \left[\left\{ \left(\frac{n}{2} - n_x \right) \times \left(\frac{n}{2} - n_y \right) \right\} \right]$$

Solving for the Case Study #2 data set produces:

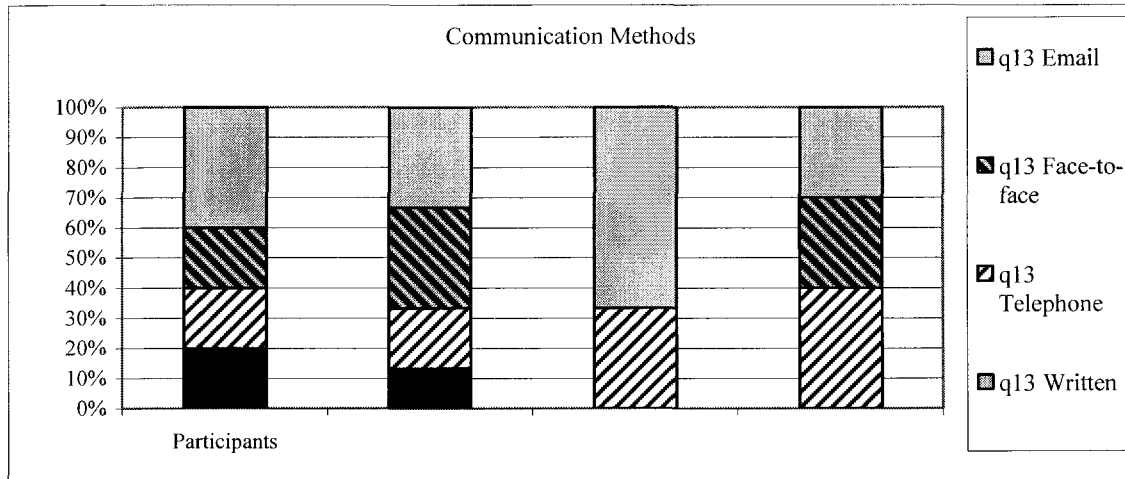
$$\begin{aligned} \text{Kendall's tau}_b &= (0-1) / \text{Square Root } \left[\left\{ \left(\frac{4}{2} - 3 \right) \times \left(\frac{4}{2} - 3 \right) \right\} \right] \\ &= -1 / \text{Square Root } [-1 \times -1] = -1/1 = -1 \end{aligned}$$

With the high number of tied data sets, Kendall's tau_b results are not valid.

The results of this tripartite analysis develop the fourth observation: no relationship can be identified between the project team communication satisfaction and the individual's PDI.

Project Team Member Communication. A review of the team members’ communication styles is shown in Figure 22. As the data shows, the primary communication medium is Email. The next most common communication method is face-to-face. The least common method of communication is written.

Figure 22. Communication Methods



As the data presented indicates, seventy-five percent of the project team is satisfied while the remaining participant is Somewhat Satisfied, mean of 2.25 on a scale of 1 to 5 with 1 = completely satisfied and 5 = completely dissatisfied. A review of the respondents’ answers to Question 11, “Please rank the following according to how comfortable you are in interacting with them,” provides support for the overall project communication satisfaction level. Table 30 provides statistic summary of the respondents’ answers.

Table 39. Question 11 Communication Confort Level

	N	Minimum	Maximum	Mean
q11 Immediate Superiors	4	2	3	2.50
q11 Subordinates	4	2	3	2.75
q11 Peers (others at the same job level)	4	3	3	3.00
Valid N (list wise)	4			

For Question 11 a rating of 1= Not Comfortable, 2= Comfortable, and 3 = Very Comfortable. As Table 31 identifies, the project team comfort level spans from 2 to 3 for the immediate superiors and

subordinates with a rating of 3 for peers. The resulting mean values indicate that the team members are between Comfortable and Very Comfortable with communicating in all hierarchical directions.

Support for the position that the Kendall's tau_b is not valid comes from graph analysis, Table 40 and Figures 23 through 25. On a scale of 1 to 3, where 1 = Not Comfortable, 2 = Comfortable, and 3 = Very Comfortable, the superior, subordinate and peer mean values are 2.5, 2.5 and 3.0 respectively. The combination of a very homogeneous comfort level and Individual PDI hinders the ability to develop a correlation rating or analyze the graphs for any trends.

Table 40. Communication Comfort to Individual PDI

			Individual PDI	Q12 Superiors
Kendall's tau_b	Individual PDI	Correlation Coefficient	1.000	.577
		Sig. (1-tailed)	.	.159
			Individual PDI	Q12 Subordinates
Kendall's tau_b	Individual PDI	Correlation Coefficient	1.000	1.000(*)
		Sig. (1-tailed)	.	.042
			Individual PDI	Q12 Peers
Kendall's tau_b	Individual PDI	Correlation Coefficient	1.000	.
		Sig. (1-tailed)	.	.
		N	4	4

Correlation is significant at the 0.05 level (1-tailed)

Figure 23. Superior Communication Comfort

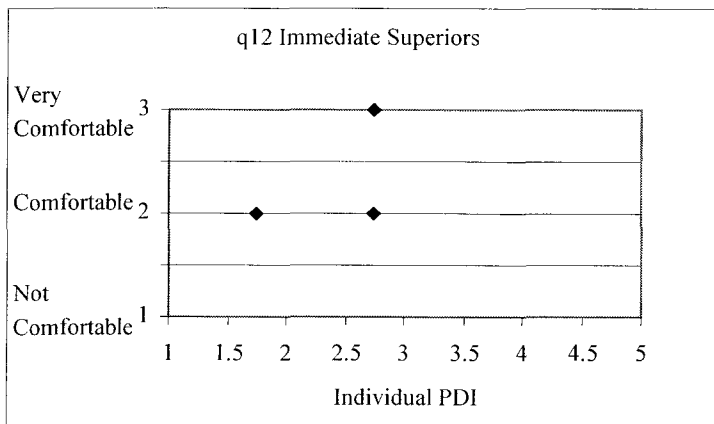
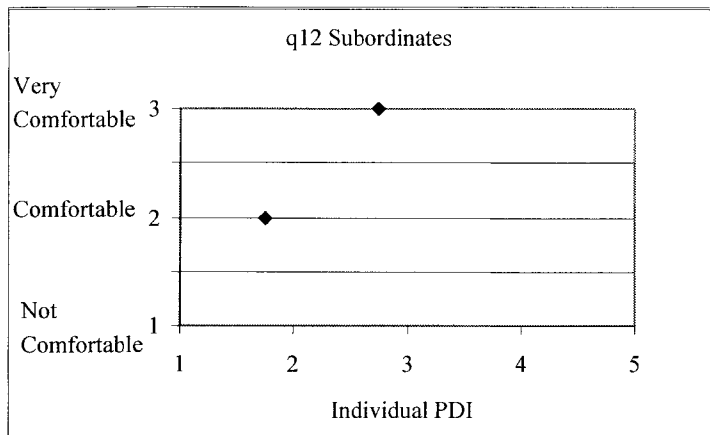
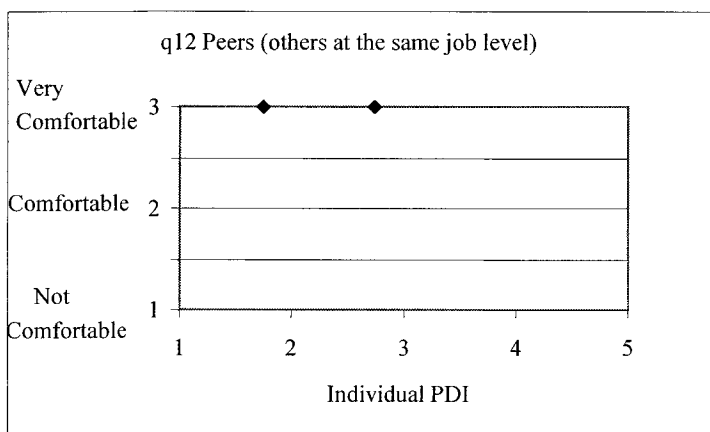


Figure 24. Subordinate Communication Comfort**Figure 25.** Peer Communication Comfort

Question 26 asks the respondents what is the level of interaction needed between the respondent and their superiors, subordinates and peers. This need was rated on a 1 to 5 Likert scale where:

- 1 = Very Desirable
- 2 = Desirable
- 3 = Somewhat Desirable
- 4 = Not always Desirable
- 5 = Completely Undesirable

Table 41 and Figures 26 thru 28 provide a correlation view of these interaction needs.

The superior, subordinate, and peer Kendall tau_b correlation values are -0.577, -0.577 and 0.333 respectively. These values indicate some level of negative relationship exists between the superior, subordinate and the individual's PDI while the peer Kendall tau_b indicates a positive relationship to the individual PDI. None of these correlation values are significant as they are all being influenced by the homogeneity of the respondents PDI ratings.

Reviews of the individual graphs indicate that there is no strong correlation associated with these responses. In general, the superior, subordinate, and peer mean responses, 2.5, 1.25 and 1.25 respectively indicate that respondents Somewhat Desire to communicate with their superiors, but there is somewhere between a Desirable and Very Desirable need for frequent interaction with subordinates and peers. This appears to support the concept that there is a hierarchical project management organization, but hierarchy does not tend to drive communication desires.

Table 41. Communication Interaction Needs

			Individual PDI	Q26 Superior
Kendall's tau_b	Individual PDI	Correlation Coefficient	1.000	-.577
		Sig. (1-tailed)	.	.159
Kendall's tau_b			Individual	Q26 Subordinate
	Individual PDI	Correlation Coefficient	1.000	-.577
		Sig. (1-tailed)	.	.159
Kendall's tau_b			Individual	Q26 Peer
	Individual PDI	Correlation Coefficient	1.000	.333
		Sig. (1-tailed)	.	.282
		N	4	4

Figure 26. Superior Communication Interaction Needs

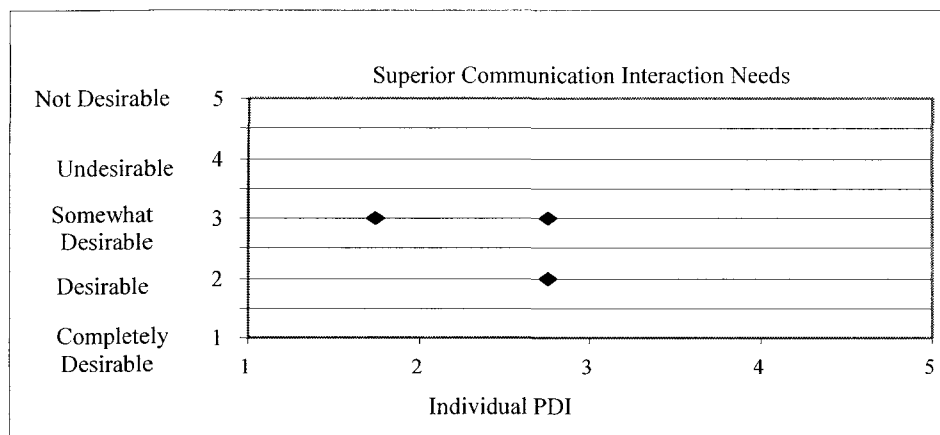


Figure 27. Subordinate Interaction Needs

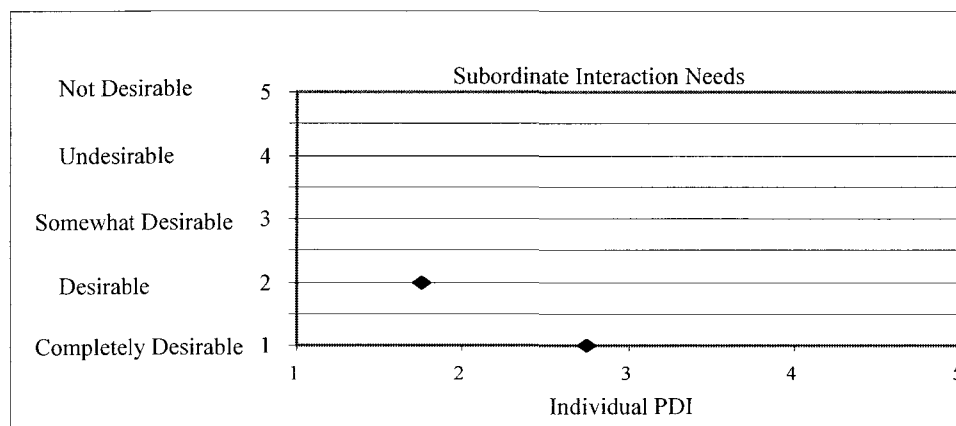
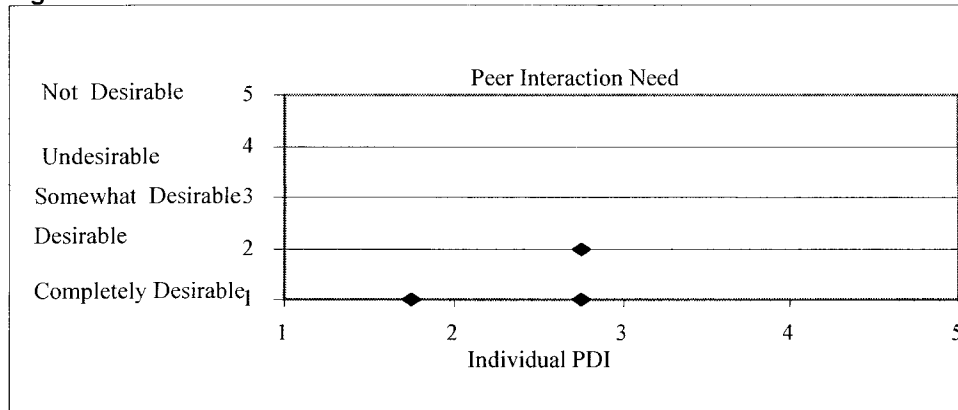
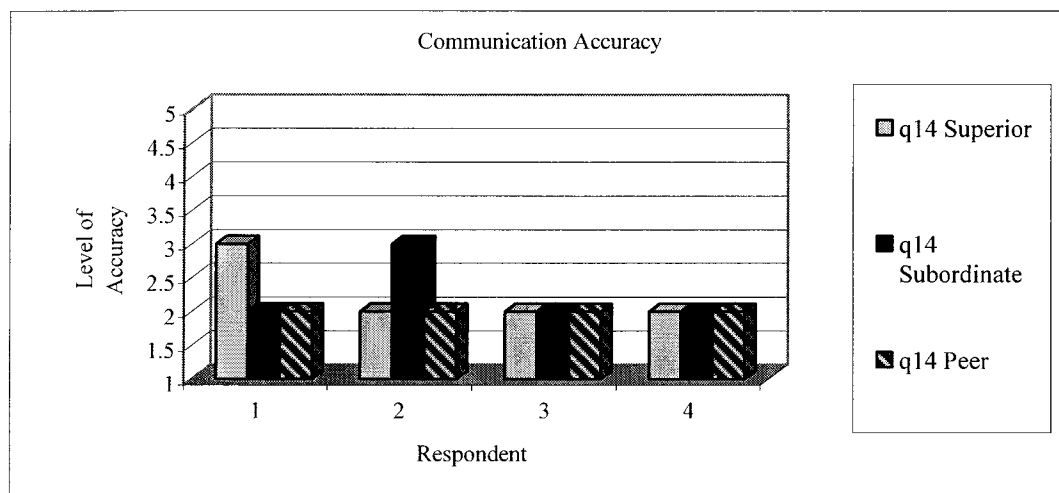


Figure 28. Peer Interaction Needs



Questions 13, 14, and 15 involve the accuracy of information received, impact of this information and level of information received. Figure 29 shows that the respondents, in general, indicate that the accuracy of information received, from all parties, is typically accurate. The two exceptions to this are the project manager indicates that the information accuracy from their boss is only Somewhat Accurate the same as one engineer's indication on the information they receive from their subordinates. Overall, the superior, subordinate, and peer indication of accuracy mean values are 2.25, 2.25 and 2 – on a scale of 1 to 5 where 1 = Completely Accurate and 5= Completely Inaccurate. As the mean values indicate the respondents, on average, indicate that the accuracy of information is typically Accurate.

Figure 29. Accuracy of Information Transferred



In general, the respondents indicate that communication accuracy is approximately Accurate and they also indicate that the level of information is between Too Little and Almost never have too much information, mean of 1.75, and that they Some Times receive more information than they can efficiently use, mean of 3.25

This set of questions indicates that the information transferred is fairly accurate, that it typically does not hinder the project and the volume of information is typically almost the correct level.

Questions 17 thru 24 discuss the flow of information and if this information is summarized or not. Figures 30 and 31 provide a visual display of the information to and from the individual project team members. As the graphs indicate, the majority of information is from their peers while they primarily communicate to their subordinates.

Figure 30. Percentage of Information Received From

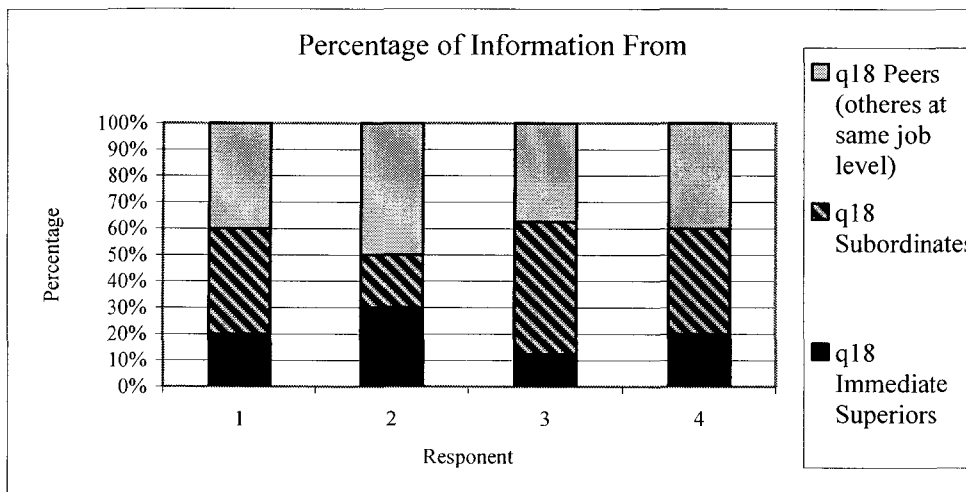


Figure 31. Percentage of Information Provided To

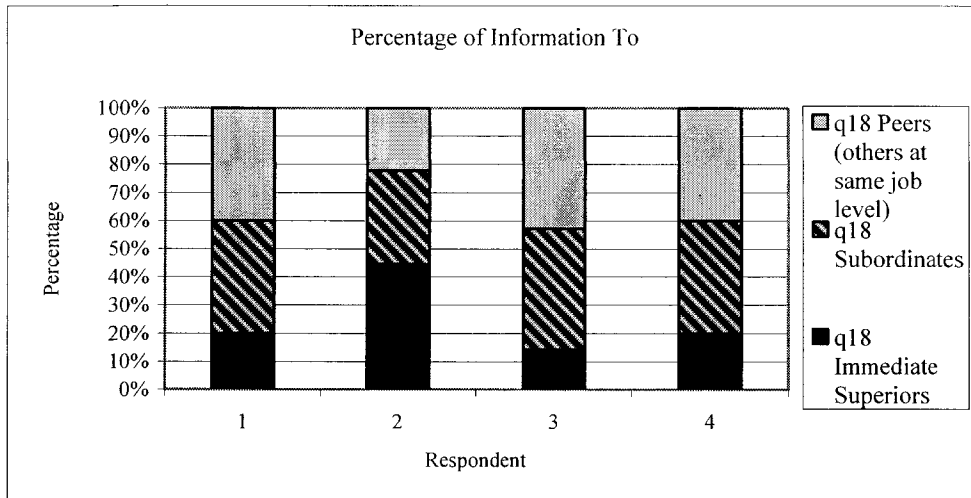
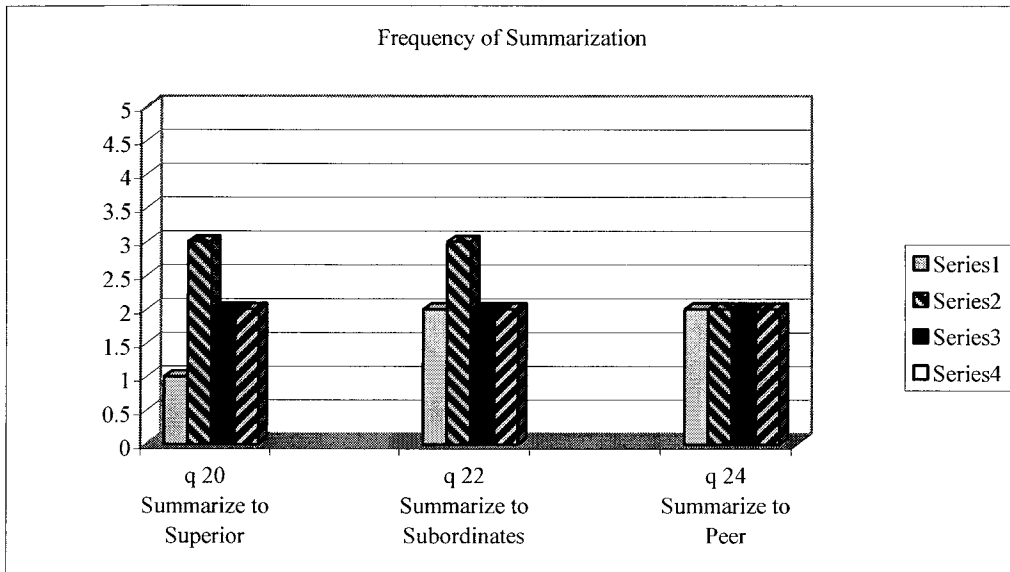


Figure 32 is the respondents' frequency of summarizing data. On a scale of 1 to 5 where 1 = Always summarizes and 5 = Never Summarizes the participants summarize data to the Superior a mean of 2.00, Subordinates a mean of 2.25, and Peers a mean of 2.00.

Figure 32. Frequency of Data Summarization



Case Study #2 Summary. In summary, selection of Case Study #2 followed the outlined research methodology section. A divergent multi-national project team was selected based on the nations involved

and their fit within Hofstede's lower and upper quartile rankings. The data gathering effort followed the established semi-guided interview process based on the questionnaire outlined in the Appendix.

The data analysis effort was conducted using a tripartite methodology that included graphical analysis, cluster analysis, and non-parametric statistical analysis. The results of this tripartite method generated three principal observations. These observations consist of:

1. The individual PDIs are not clustered in the upper and lower PDI quartiles as expected from the project selection process.
2. The individuals accept that the project team has a hierarchal structure.
3. The project team communication satisfaction ranges from Somewhat Satisfied to Satisfied.
4. The project team is very homogenous in their PDI and overall project satisfaction rating.

Due to the homogenous respondent data, no correlation analysis ratings are meaningful. From a project team perspective, there appears to be support that the project team overall communication satisfaction is predominately satisfactory. This support can be seen in the project team communication comfort level data which indicates the team members comfort level is approaching Very Comfortable.

Additional support between the project team members and their overall project communications satisfaction occurs from the need to interact across the various hierarchical structures. As question 26 identifies, the project team indicates a general desirable need to interact across all levels of the project team. The lowest level of reported interaction needs is between the supervisor and the rest of the team which ranges from Somewhat Desirable to Desirable. For the interaction between subordinates and peers the range is from Desirable to Very Desirable.

From a level of communications the project team responses indicate a general insufficient level of data transfer but what data is communicated is generally accurate. The data flow is highest individual to their peers and conversely, the data flow to the individual comes from their subordinates. In general, the lowest data flow is between the individuals and their superiors. This supports the indication that the project team accepts but is not overly influenced by the project team hierarchical relationships.

Based on Case Study #2 several preliminary theoretical constructs are developed as identified in Table 42.

Table 42. Case #2 Theoretical Constructs

1	There is a limited ability to predict individual PDI based on national PDI.
2	Experienced multi-national project teams will exhibit a medium to low hierarchical level relationship project structure.
3	Project team communications are in generally satisfactory.
4	No specific relationship between the variables can be determined due to the homogeneous nature of the project responses.
5	The project team members are willing to and find it acceptable to challenge, question, and push back, on project management decisions and communications.

Cross Case Analysis

This section provides a cross case comparison between Case Study #1 and Case Study #2. The intent of this section is to identify those areas of cross case similarities and differences. This analysis follows Yin's cross-case synthesis technique which first "... treats each individual case study as a separate study ..." and then "... aggregate[es] findings across a series of individual studies [cases] ..." (2003, p. 134).

In the previous sections, Case Study #1 and Case Study #2 were analyzed as discrete, individual cases. This analysis developed a fuller, richer understanding of the case which allowed for the development of case specific theoretical constructs. Individual case specific analysis is the first step in the overall cross case analysis method. This section builds on these early findings and develops the aggregate findings and resulting theoretical constructs.

To accomplish the aggregate analysis, the cross case analysis relies on the series of Tables and corresponding narrative analysis. The utilization of cross case table comparison provides an effective means of focusing on specific topic areas, individual case study data, and identification of cross case similarities and differences. The corresponding narratives elaborate on the tables and associated interviewee's specific responses.

The cross case analysis is arranged to first look at the project specific context which is then followed by a discussion on the project team characteristics. These sections are then followed by the cross case analysis of the paper's primary proposition involving the relationship between the individual's PDI and overall project team communication satisfaction

Following the PDI and project team communication satisfaction are sections that look at the project team communication comfort level, communication accuracy and data sources, and finally how data summarization is used within the projects. This section concludes with the development of the aggregate theoretical constructs.

The project specific context cross case analysis is presented next.

Project Specific Context Cross Case Analysis. Table 43 provides a cross case project context comparison. The intent of this analysis was to develop an understanding of how these projects are or are not similar. Table 34 clearly shows that the projects are very similar in their overall context. The results of this analysis provide aggregate cross case project characteristics where the projects are defined as highly technical projects that involve personnel from multiple nations. The projects are in similar project life cycle stages where the project team is about to turn over the system to operations and maintenance. While the projects are entering the closing phases, overall project durations lasted between 4 and 3 years, respectively. Project teams were comprised of members from divergent national culture backgrounds, as identified from Hofstede's national culture index.

Table 43. Project Context

Category	Sub-Category	Case 1	Case 2	Similar	Comments
Project	Project Type	High Tech.	High Tech.	Yes	Software/Hardware process – control systems
	Industry	Crude oil transport	Crude oil transport	Yes	Same industry
	Duration	4 years	3 years		
	Life Cycle	Turn over	Turn over	Yes	Projects were being turned over to client for operational use
Culture	Nation #1	US	Canada	Yes	Low National PDI
	Nation #2	Russia	Angola	Yes	High National PDI

From a cross case comparison these are similar project contexts. The project team demographic characteristics are analyzed in Table 44, next.

Table 44. Project Team Demographic Information

Category	Sub-Category	Case 1	Case 2	Similar	Comments
Demographic Information	Age	25-35=14.29% 35-45=57.14% 45-55=14.29%	25-35=75% 35-45=25%	No	Case Study #2 is younger overall.
	Years in projects - mean	9.29	6.88	No	Case Study #2 has fewer years in projects
	Duration on this project	1.75 to 4 years	1 to 3 years	Yes	Similar time span for both projects for team members
	Years in this type of work - mean	13.14	10.5	No	Case Study #2 has fewer years in their respective fields
Duration of interviews	Mean	53 min.	38.5 min.	No	Case Study #2 completed survey before interviews. Less time was involved on just the open ended questions

As Tables 43 and 44 and their associated narrative discuss, the project are very comparable. The next step is to lower the analysis from the high level project context to the project team as shown in Table 32.

The major finding of the project team demographics is that Case #2 is a younger team for all demographics. As Table 44 shows, Case #2 team members predominately fall within the 25-35 age bracket, on average they have 2.41 fewer years in projects, and, on average, they have 2.64 fewer years in this type of work. The one area of similarity is the project team members have been associated with their respective projects for comparable durations.

While Case #2 project team members are, in general, younger than Case #1 members, they are still, with one exception, experienced project team members that have, on average, 10.5 years of discipline specific work experience and 6.88 years of project experience. The one exception to this overall description is one team member that this is their first multi-national project and their work history extends just 3 years with 1.5 years of this within projects. This one individual is distinct from all other team members within either case.

On the one level, Case #2 is a younger project team but overall both cases consist of experienced members with extensive background and exposure to projects in general and multi-national projects overall.

Table 45 and the following discussion is the cross case analysis of this research principal proposition – is there a relationship between the individual PDI and overall project communication satisfaction.

Table 45. Individual PDI and Project Communication Satisfaction

Category	Sub-Category	Case 1	Case 2	Similar	Comments
Project Comm. Satisfaction	Mean	1.71	2.25	Yes	Both cases fall within the 1 st or 2 nd quartile on equal spacing from Satisfied.
Individual PDI	Mean	2.55	2.50	Yes	Both cases develop very similar PDI means
Relationship Analysis	Graphical	Slight positive trend	2 data points	Yes	Graphically, all PDIs fall within same quartiles, all comm. satisfaction fall within same quartiles
	Cluster	2 clusters maximum distance= 1.031, slight positive trend	2 clusters maximum distance = 1.414	Yes	All clusters fall within the same quartiles
	Correlation	0.355 p=0.157	N/A	N/A	Kendall's tau_b rankings cannot be compared as Case #2 is a homogenous team with no correlation relationship. All team members developed identical ratings.

Kendall's tau_b is not valid due to extensive number of X and Y ties.

Table 45 is the cross case comparison of the overall project communication satisfaction and the individual's PDI rating and associated tripartite data analysis.

Overall project communication satisfaction is measured on a 1 to 5 point Likert scale where:

- 1 = Completely Satisfied
- 2 = Satisfied
- 3 = Somewhat Satisfied
- 4 = Not Always Satisfied
- 5 = Completely Dissatisfied

Case #1 and Case #2 mean satisfaction levels are grouped, evenly spaced on the Satisfied rating.

Case #1 overall is a little more satisfied with project communications than Case #2, yet both, in general, are Satisfied. Case #2 satisfaction mean is being influenced by the youngest team member who did not judge overall project communications as satisfactory as the other team members. When asked about this, the responses included, - the team member was not comfortable with the level of ambiguity that projects have – the team member wanted a higher level of personal communications. In contrast, the more experienced

team members were of a common mind that while the level of communications could have been higher, this is the case on virtually all projects and they are very comfortable working within the environment and as a group felt that the project communications were satisfactory. As Case #1 did not have a comparable team member there is no supporting evidence that the team members' age and experience is related to their overall satisfaction with the project team communications. Further research is required in this area to provide further clarification and understanding.

Case #1 team members are also of a common theme that project communication levels can be increased. As one participant stated, "There can not be too much information in a highly technical project." Another Case #1 participant provided the view that "one can never have enough information." The view of always desiring more information did not reduce the overall project team communication satisfaction which is slightly better than satisfied. The project team communication satisfaction ratings ranged from Very Satisfied (3 each), Satisfied (3 each), and Somewhat Satisfied (1 each).

The individual who ranked overall project communications the lowest stated that "... there can never be too much information." From a demographic perspective, this person was in a lead position who relied, 40-59%, predominately on information to and from their peers rather than their subordinates (20-39%) or superiors (0-19%). This individual also indicated that they summarized less often than the other team members as they Rarely summarized information to their superiors and peers and only Occasionally summarized data to their subordinates. While this individual is Comfortable to Very Comfortable in communicating at all hierarchical levels, their need for more in depth information sets them apart from the other team members.

The other primary variable, other than project communication satisfaction, is the individual PDI rating. Case #1 and Case #2 generated very similar PDI means, 2.55 and 2.50 respectively. On a 1 to 5 Likert Scale, 2.5 falls in the second quartile indicating that the project team does not have a strong PDI. A low PDI, falling within the 1st quartile between 1 and 2, "... does not believe that it is acceptable for one person to order another about, and they expect to have input concerning company policies that are important to them" (Earley and Erez, 1997, p. 26). Conversely, those who score high on the PDI, within the 4th quartile between 4 and 5, believe that it is not only acceptable but expected that a person of a higher position will order the lower position around and that the lower position person does not have a right to

provide input concerning their company policies. For those individuals that fall within the 2nd and 3rd quartiles their views are slightly modified from the polar types.

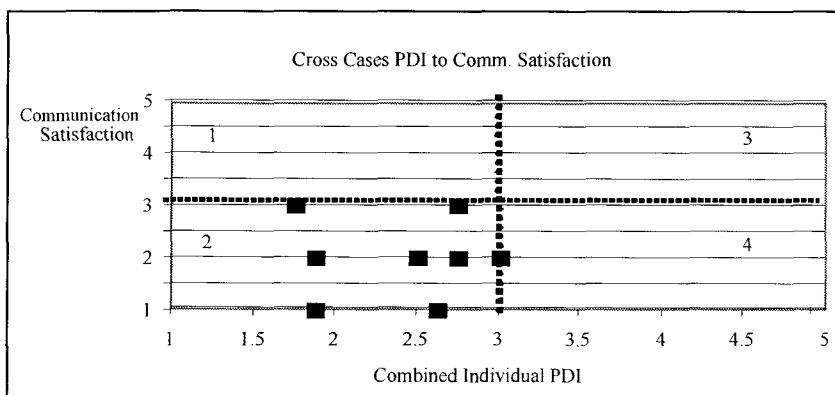
For Case #1 and Case #2 the project teams' mean PDIs fall almost precisely within the middle of the 2nd quartile. Falling within this rating scale indicates that the project team acknowledges that a hierarchy exists but they still have strong understanding that they should have an input and that questioning decisions is acceptable. As one Case #1 team member stated, "Project work is based on team work not dictatorship." Support for this position is found from a member of Case #2 who stated that the team member should not questions decisions if "they have been consulted and the decision rationale explained to them."

In general Case #1 and Case #2 have comparable PDI ratings and their view of overall project team hierarchical relationships and power differential are very similar. The similarities of the case studies provide a firm foundation for analyzing the potential relationship between overall project communication satisfaction and individual PDI.

Analysis of the communication satisfaction and PDI relationship was conducted on three levels. First a graphical analysis is conducted to see if there appears to be any relationship. The second analysis step is to use cluster analysis techniques to identify any apparent clusters of data. The final step applied SPSS version 13 software correlation statistical analysis tools to identify any statistically significant relationships.

Figure 33 is the graphical analysis tool for the first analysis step. As shown, all team members' PDI to project communication satisfaction are grouped in area 2. This area is associated with medium to low PDI and Somewhat Satisfied to Completely Satisfied.

Figure 33. Cross Case Individual PDI to Communication Satisfaction



There are two significant findings with this graphical analysis. First, all project team members' PDIs are in the medium to low range. These individuals accept that the project has a hierarchical relationship, but they are comfortable with challenging decisions and they want to participate in the decision process. This discovery is opposite to the predicted results that the team members' PDIs would resemble their national PDI ratings. If the individual's PDI did follow the national PDI ratings, they would be identified in either area 3 or 4. As none of the participants fell within areas 3 and 4, these individuals demonstrate a divergence from the predicted results.

The second significant point is that the team members rate overall project communication satisfaction within the same quadrant, 2. Identification that all participants, in general, are satisfied with the project communications was not an expected finding as other research has identified that different PDI values create significant issues. One example of this is where Muller and Turner presented that "...analysis revealed that the assertive style of the western culture was perceived as not listening by the eastern counterparts, which eventually caused the joint venture to fail." (2004, p. 406). From one other source, Sennara quotes Schramm in saying that "Cross-culture communication is considerably more challenging than single culture communication since the communicators have less "grounding" due to the differences in their cultural background (Schramm, 1980)" (Sennara, 2002, p. 43). Thus, determining that these cross-cultural project team members rated project communication satisfaction, a mean of 1.91, Satisfied, is significant.

The second analysis step involved cluster analysis of the combined projects responses. Relying on Figure 29, there appears to be two specific groups based on Individual PDI. Group 1 falls between .5 and 2 while Group 2 falls within 2 and 2.5, on the Individual PDI scale. Group 1 generates a mean project communication satisfaction value of 2, Satisfied, while Group 2 develops a mean project communication satisfaction value of 1.875, slightly better than Satisfied. Based on cluster analysis, both groups have very similar satisfaction levels. While two clusters are identified, each cluster exhibits similar overall communication satisfaction and each cluster falls within the lower PDI ratings. Cluster analysis supports the graphical analysis determination.

The third analysis process involved the use of statistical nonparametric correlation analysis using SPSS version 13 software. Table 46 provides the results of this analysis.

As with the discrete case analysis, Kendall's tau_b is an acceptable correlation analysis method. This determination is based on the facts that the analyzed data is ordinal data and Kendall's tau_b "...is a measure of correlation between two ordinal-level variables" (Unesco, 2005) when there are fewer than 20 data points (NCSU, 2005). Other support for the use of Kendall's tau_b is that the data is nonparametric, and the data is not normally distributed, Figures 34 and 35.

From the published literature, nonparametric statistical tests are called for when "statistical test procedures ... use ranks of observations to perform tests [ordinal data]...[and] for situations in which we collect a small sample ($n < 30$) from a non-normal population... we must resort to nonparametric procedures" (Sincich, 1990). The data is ordinal and as Figures 34 and 35 shows, the data is non-normally distributed. The Individual PDI is negatively skewed and the communication satisfaction is positively skewed.

Table 46. Cross Case Correlation Analysis

			Individual PDI	Communication Satisfaction
Kendall's tau_b	Individual PDI	Correlation Coefficient	1.000	0.097
		Sig. (1-tailed)	.	.360
		N	11	11
	Communication Satisfaction	Correlation Coefficient	.097	1.000
		Sig. (1-tailed)	.360	.
		N	11	11

Figure 34. Individual DI Histogram

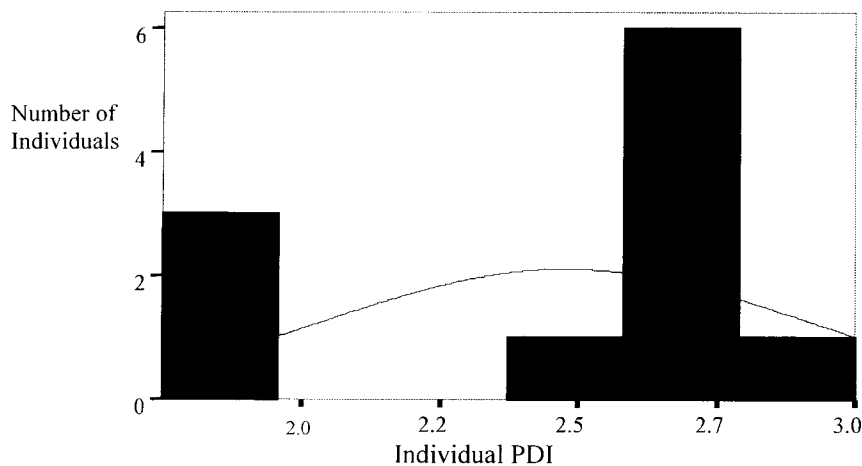
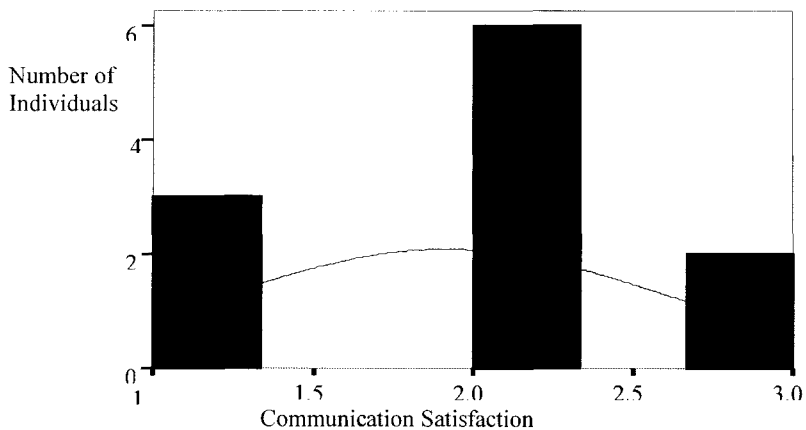


Figure 35. Communication Satisfaction Histogram

When the multivariate Kendall's tau_b analysis is conducted, it indicates a slight positive relationship between the Individual PDI and the project team communication satisfaction variables of 0.097. Yet, this result is not statistically significant at the 0.05 level, 0.360. The nonparametric correlation analysis indicates that there is not strong correlation between the variables.

The lack of correlation is counter to this research's basic proposition that as the individual PDI increases there will be an effect on communication satisfaction. This is the third significant finding of the overall three phases Individual PDI to Communication Satisfaction analysis.

In general, this analysis indicates that the research participants have a closely aligned PDI and overall project communication satisfaction. The cross case analysis supports the discrete case findings where all scatter plot points fall within area 2 of the plot.

In the next sections, a cross case analysis of general communications methods, communications comfort levels, communication accuracy, data transfer sources, and level of data summarization is discussed. These sections provide a broader view of the overall project communication attributes and add to the understanding of the communication processes that support the general findings.

While the project teams indicate similar satisfaction levels, they do differ on the methods that communication occurs. Table 47 provides a cross case comparison of the communication methods and comfort levels.

Table 47. Communication Comfort Level Comparison

Category	Sub-Category	Case 1	Case 2	Similar	Comments
Communication Methods	Written	71% least common	75% most common	Yes	Policies, procedures, instructions, and directions
	Face-to-face	71% 2 nd most common	50% most common	No	Case #2 involved less face-to-to face time than case #1
	Email	57% most common	50% 2 nd most common	No	Case #2 relied on Email due to lower levels of direct interaction
	Telephone	Mixed but 3 rd common	Mixed 3 rd most common	Yes	Both teams relied on the telephone 3 rd most common

As Table 47 shows, for both cases either Email or face-to-face communication are the predominate communication method. The reliance on one or the other was reported a function of the physical location of the project team members. For Case #1 the team spent the majority of their time in close proximity. As such, the Case #1 team members were able to use face-to-face communications more frequently than Case #2 members.

Case #2 members worked in several different countries and relied on Email as the primary communication method. Due to time zone challenges and regional telephone challenges Email communication reliability was higher than telephone or written communication means

The two cases diverge in the second and third most commonly applied communication methods. Case #1 relied heavily on face-to-face communications with 71% of the respondents listing it as their second communication method. Case #2, on the other hand identified Email as the second most commonly used communication method with 50% of the respondents relying on this method.

Case #1 and Case #2 agreed that the telephone was their third most commonly used communication method. The least commonly relied on communication method, for both cases, was the written form. This form of communication is identified as policies, procedures, and instructions in a written form other than Email.

Table 48. Communication Comfort to Individual PDI

Category	Sub-Category	Case 1	Case 2	Similar	Comments
Communication comfort level	q11 Immediate Superiors	2.57	2.50	Yes	Both project teams are generally Satisfied with communications comfort levels
	q11 Subordinates	2.71	2.75	Yes	
	q11 Peers (others at the same job level)	2.86	3.00	Yes	
Individual PDI to Individual communication comfort level	Immediate Superiors	.217	N/A	N/A	Case #2 was homogeneous with no correlation
	Peers	.056	N/A	N/A	
	Subordinates	.548	N/A	N/A	Case #1 Subordinate approaches statistical significant at 0.065

Table 48 provides two views of the individual's communication comfort levels. The first view involves how comfortable the individual is communicating across the project hierarchy. This question is intended to understand if the individual is comfortable communicating to their superiors, to their subordinates, and across the team to their peers. It is an indication of how the individual perceives project hierarchy and is willing to accept or challenge the decisions and communications at each level.

Table 39's second view is what relationship exists between the individual's PDI and their communication comfort level across the project hierarchy. The intent of this view is to identify any relationship between the specific hierarchical levels and the individual PDI. This view helps provide a richer view of the project communications overall.

Conducting the cross case comfort level analysis identifies a very consistent rating between cases. Communication comfort level is rated on a 1 to 3 scale where 1 = Not Comfortable, 2 = Comfortable, and 3= Very Comfortable. Between each case the extreme difference occurs between the respondents and their peers which identify a 0.14 mean difference between cases – 2.86 versus 3.00. For the superior and subordinate the between case mean differences are 0.07 and 0.04 respectively. For all three cases the project teams approach Very Comfortable in their communications between all hierarchical levels. This information supports the earlier analysis that the team recognizes a hierarchical structure but they are very comfortable communicating across the hierarchical levels.

Taking a different view of the communication comfort level attribute, a SPSS correlation analysis was conducted, as shown in Table 49. From a cross case perspective, no analysis can be performed. Case #2 is homogeneous, in nature, where no correlation analysis is performable. As such, a case to case comparison is not possible. When the two cases are combined, the correlation values of -0.341, 0.030 and -0.461 are developed for the superior, subordinate, and peer hierarchical relationships. Of the three correlations, the peer correlation approaches a 0.050 statistical significance.

Analyzing the superior, subordinate, and peer scatter plot graphs, Figures 36 through 38, show that there does not appear to be a correlation between the variables. For the Peer graph, Figure 38, the one comfort rating of 2 is driving the negative correlation value at the 0.052 level. The Kendall tau_b correlations fail to show any statistical significance as supported by the graphical analysis.

Table 49. Combined Correlation Analysis

Combined Kendall's tau_b	Q11 superior	-0.341
Individual PDI to communication comfort level	Q11 superior sig. (1-tailed)	0.108
	Q11 subordinate	0.030
	Q11 subordinate sig. (1-tailed)	0.458
	Q11 peer	-0.461
	Q11 peer sig. (1-tailed)	0.052
	N	11

Figure 36. Superior Comfort Level to PDI

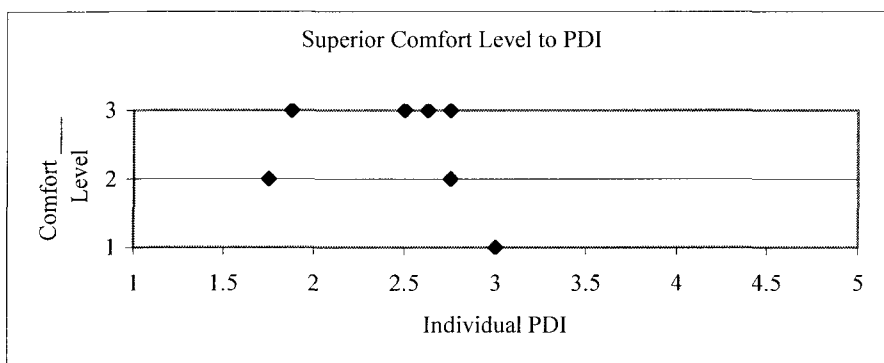
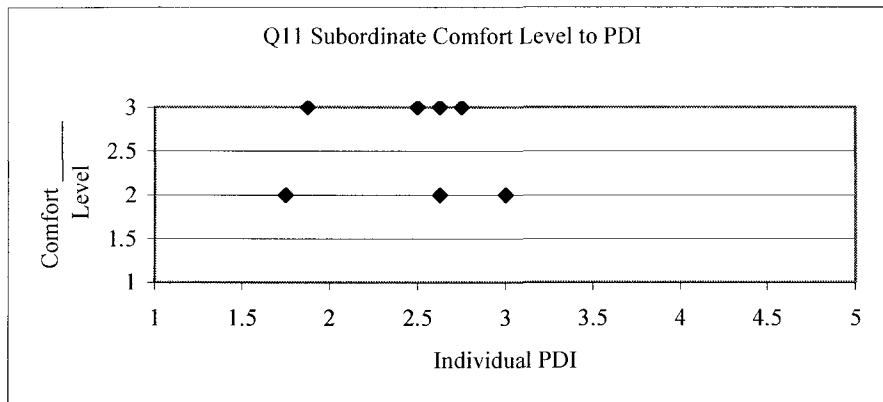
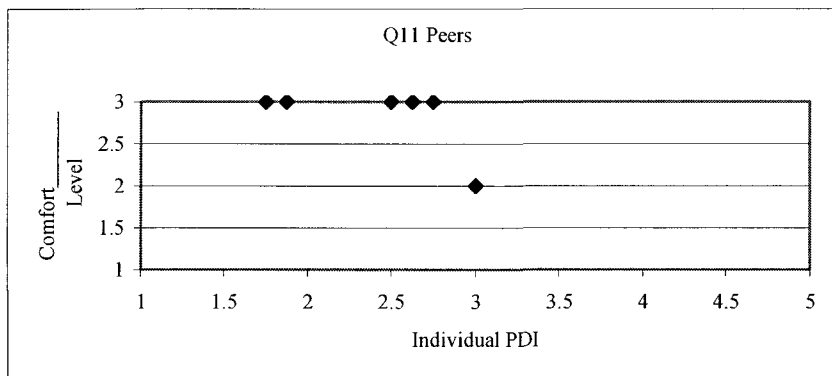


Figure 37. Subordinate Comfort Level to PDI**Figure 38.** Peers to PDI

Analysis of the project team members' communication comfort level indicates that the team members are Very comfortable communicating across all hierarchical levels. This supports the overall project communication satisfaction and PDI analysis results.

Next, the participants' responses to how accurate the project data is and where the data is transferred is discussed.

Table 50 provides the cross case analysis on how the project teams view overall accuracy of the data supplied and where the source of data is.

Both project teams indicate that their peers provide the most accurate information. The subordinates provide the next most accurate level of information with the superiors providing the least. Yet, while the projects are in agreement on the ranking of accuracy, each project indicates that the overall

accuracy is between 2 and 3 on the 1 to 5 Likert scale where 1 equals Completely Accurate and 5 equals Completely Inaccurate.

Table 50. Communication Accuracy and Source

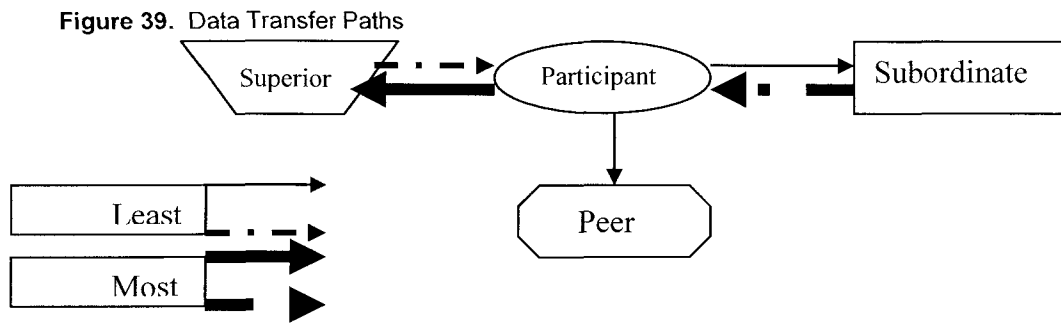
Category	Sub-Category	Case 1	Case 2	Similar	Comments
Communication Accuracy	Superior - mean	2.57	2.25	Yes	On a scale of 1 to 5 both cases resulted in mean accuracy levels between Accurate and Somewhat Accurate
	Peer - mean	2.14	2.00	Yes	
	Subordinate - mean	2.48	2.25	Yes	
Source of information	From Superior – mean	1.85	1.75	Yes	
	To Superior – mean	2.0	3.0	No	
	From Peer – mean	2.43	3.00	Yes	
	To Peer – mean	2.0	2.75	No	
	From Subordinate – mean	2.71	3.5	Yes	
	To Subordinate – mean	2.88	2	No	

Combining the cases generates a set of accuracy means equal to:

Superior = 2.45
 Subordinate = 2.34
 Peer = 2.09

The aggregate values place the combined case accuracy between Somewhat Accurate and Accurate with the mean values closer to Accurate. This is an indication that the team members believe they are receiving accurate information and it supports the overall project communications satisfaction rating of Satisfied.

As the project teams indicated, the data they receive is accurate while Question 18 and 19 asks where does the information come from and go to. Figure 35 provides a representation of the commonality between the projects information flows.



As Table 50 and Figure 39 identify, Case #1 and Case #2 data flow paths are in agreement on the least data received from, Superior 0-19%, most data received from, Subordinate 60-70%, and the most data transferred to, Superior 3-39%/40-59%. This data indicates that the project communication path is predominately up the project hierarchy rather than down or across.

The participants indicate that instructions flow down while status reports, requests for assistance/clarification/additional data/etc. flow up. The flow of information up the hierarchical chain occurs at a greater frequency than down the project hierarchy.

With an understanding of the information data flow, the final question is how often this information is summarized. Table 51 provides a cross case comparison to this question.

Table 51. Data Summarization

Category	Sub-Category	Case 1	Case 2	Similar	Comments
Data Summarization	Superior	2.43	2.00	Yes	Both Cases Frequently summarize data
	Peer	3.4	2.00	No	Case #1 differs from Case #2 in that the team members approach Rarely in summarizing information to Peers
	Subordinate	2.5	2.25	Yes	Both Cases Frequently summarized Subordinate data

The frequency of summarization was ranked on a 1 to 5 Likert scale where:

- 1 = Always
- 2 = Frequently

- 3 = Occasionally
- 4 = Rarely
- 5 = Never

As Table 51 shows, both teams utilize the technique of data summarization but at different levels depending on where the data is being transferred to. In both cases the participants summarize data to the superior on the most frequent basis. As the respondents stated, they summarize data to their superior because:

- “Superior is too busy to interpret large amounts of data”
- “So their time and mine isn’t wasted.”
- “To avoid providing too much detail that will not be understood or used.”

Summarizing Subordinate data transfer is similar to the Superior in that the participants Occasionally to Frequently summarize data in this communication path. This summarization is carried out for all the same reasons as to the Superior.

The least frequently summarization data path is to the participant Peers. For this data path the level of summarization ranges from Rarely to Frequently. Some of the reasons for this difference are stated to be:

- “Never can have too much information.”
- “Generally the more information the better the interaction.”

Overall, the use of data summarization is a commonly used tool that does not appear to hinder or hurt overall communication satisfaction.

Cross Case Summary. The cross case analysis identifies a high consistency between and across these cases from the general project description, project team descriptive statistics, and PDI ratings. Each project fits the general description of a highly technical project that involved personnel from more than one country. Relying on Hofstede’s PDI index the team members’ national PDIs indicate a significant difference in how the project team members will view and interact in a hierarchical project structure.

The members of the project team are also very comparable. With one exception the project team members can be generally described as project experienced, multi-national project experienced, and discipline experienced individuals.

The cross data analysis also indicates that these experienced project team members are consistent on their PDI rankings, project communication satisfaction as well as how comfortable they are

communicating across the project hierarchy. The consistency of the participants helps validate the finds as Hofstede states “comparisons of countries or regions should always be based on people in the same set of occupations” (Hofstede, 1997, p. 29). As all participants are involved in the occupation of highly technical projects this establishes a common reference point.

While the project teams are very consistent on their PDI rankings, this finding is significantly different than the research proposition. The research proposition was based on the concept that multi-national project team members from divergent national cultures would result in a broader range of individual PDI rankings. Based on the predictive range of potential PDI ranks, the resulting PDI graphs would show participants falling within all four PDI quartiles. Yet, the data obtained places all participants within the 2nd PDI quartile.

Participants falling within the 2nd PDI quartile accept that the project has a hierarchical structure but this does not hinder their willingness or comfort level in communicating across all hierarchical project levels. This finding is supported by asking the participants how comfortable they are in interacting with their superiors, subordinates and peers. Consistently, the participants indicate that they are Comfortable to Very Comfortable. Responses to open ended questions indicate that the team members believe they should challenge decisions, directions, and input if it is in the best interest of the project. As Hofstede states, “in the small power distance situation subordinates and superiors consider each other as existentially equal; the hierarchical system is just an inequality of roles established for convenience...” (Hofstede, 1997, p. 36). This appears to apply to these project teams.

The willingness and apparent acceptable behavior of communicating and challenging across the project hierarchy, contributes to the consistent overall project communication satisfaction. The consistency of this rating is also different than the project management literature indicates. As an example, Trompenaars and Hampden-Turner state that “There are a variety of problems of communication across cultural boundaries...” (Trompenaars and Hampden-Turner, 2000, p. 75), and Sennara says, “Cross-culture communication is considerably more challenging than single culture communication since the communicators have less “grounding” due to the differences in their cultural background...”(2002, p. 43). Analysis of the research data provides additional support for the overall consistency of communication

satisfaction from the areas of communication methods, data accuracy, data flow paths and summarization techniques.

The cross case analysis of communication methods identify that the project teams utilize all identified methods that include Email, face-to-face, telephone and written. The predominate method of communication varied based on project context. For the project where the team was located in close proximity face-to-face communication was the most commonly relied method. Where the project team was often dispersed the members relied on Email as the primary communication means. Due to the slightly different project context the second most commonly relied on communication method was either face-to-face or Email. Consistently, between the project teams' telephone usage was third with written communications the least common communication means.

Regardless of communication medium, the communication paths were across all hierarchical boundaries. Predominate data flow was up the hierarchical data chain and this is in line with communication paths in general. Typical project communication paths show the higher hierarchical levels communicate directions and needs down and the lower levels communicate status, requests for clarification, requests for additional needs, and problem reports up. The upward flowing communication occurs more frequently in comparison to the downward flowing data path. This consistency provides support for the overall finding that communications occur across all hierarchical boundaries in a comfortable and satisfied manner.

In analyzing the data path flows, accuracy of information received was considered. Overall, the project team members rate the data accuracy as generally Accurate. While the respondents were consistent in that the accuracy of data was slightly higher from the peers than the subordinates and the subordinate data accuracy was higher than the superiors, overall accuracy was still consistently Accurate. Accurate information can be assumed to contribute to the general communication satisfaction as well.

The final area of consideration was how often the project team summarized the data that is transferred. While the frequency of summarization varied from Rarely to Always, the project teams were consistent in that they summarized data to the Superior most often. The team members indicated that they summarized to minimize the amount and level of data sent to the superior as they felt more detailed information would either confuse or not be used. On the other end of the rating, the participants provided

their Peers summarized data on a less frequent basis. The accounting for this involves the level of data and level of detail that the Peers felt was most appropriate for the interactions.

Thus, the projects, project team, and data comparison develops a very consistent view of each and across the projects. The data identifies significant findings in that while the project team members come from divergent national cultures, their individual PDI ratings are fairly homogenous and their overall project communication satisfaction ratings are also homogenous as satisfied overall. In analyzing other aspects of the project communication, support for these significant finds are found in the overall communication interaction comfort level, methods of communication, accuracy of data, and how the data flows across the hierarchical boundaries.

In the next section the research conclusions are discussed.

CONCLUSION

Cross-cultural, multi-national, project team communication is an area that has not been extensively researched. As identified in the literature review, while project communications are critical (Muller and Turner, 2004), and communication is affected by culture (Muller, 2003), a project management literature gap exists between the assertions that culture is critical to the project team and a theoretical understanding of the interaction between communication and culture. While project management literature exhibits a gap, general management research and cross-culture research literature indicate that communication satisfaction appears to be influenced by the individual's culture attribute (Appelbaum, Asmar, Chehaveb and Konidas, 2003; Ford 2004). As an example, Schein states that "most communication breakdowns between people result from their lack of awareness that at the outset they are making basically different assumptions about meaning categories" (2004, p. 112). In this example, these attributes are the "...core... that can be thought of as the cultural paradigm or the governing assumptions" (Schien, 2004, p. 21), the organization's culture.

The project management communication and culture literature gap has been contributed to a lack of culture and cross-culture empirical studies (Ollila, 2002; Sennara, 2002) and a guiding theoretical construct (Swigger, Alpaslan, Brazile and Monticino, 2004). The literature identifies several contributing factors for this gap such as it is difficult to perform cross-cultural research (Harkness, Van de Vijver and Mohler, 2002), there is a lack of applicable methods (Schaffer and Riordan, 2003) and it is time consuming and costly (Harkness, Van de Vijver and Mohler, 2002).

This empirical research partially fills this gap as its core proposition is that multinational project team communication has a cultural dimension as related to the definitions of communication, culture and power distance as previously presented.

The following supports this proposition:

1. First, we all engage in multiple communication methods that include processes such as face-to-face verbal communication, phone calls, body language, and written forms that include E-mail, memos, letters, policies, and procedures.
2. Second, we all carry culture within us that was assimilated in our formative years.

3. Third, while culture researchers present varying definitions and views of culture, i.e. organizational culture by Schein or national culture by Hofstede, each tend to discuss specific attributes over a range of measurements along some continuum.
4. Fourth, that as all people demonstrate common cultural dimensions or universally shared problems, the physical manifestations of these will vary by factors such as the individual's nationality, geographic location where they were raised, and organizational participation. As a result, each individual's identified cultural attribute, like power distance, can be identified on the respective cultural researcher's continuum scale, discussed in item three above.
5. Fifth, core cultural values develop during the individual's formative years. These early cultural assimilations provide modifying and influencing effects on all tasks one undertakes from what they are thinking to communication interpretation. Due to the formative years' assimilations, the knowledge is tacit in nature, and predominately the individual is not directly aware of the affects. These deeply rooted cultural assimilations are thus, difficult to change.

These five items establish this research's core proposition foundation that we all carry within us a cultural component, that is largely based on our formative years, is difficult to change and will influence the project team's way of thinking, feeling and communicating. Furthermore, the research proposition postulates that when a project team consists of people from different nationalities they will, individually, exhibit cross-cultural characteristics in the way they communicate. Collectively, the combination of the individual's power distance and their interpersonal communication will assist in developing the team's multi-national project team communication satisfaction. As the literature indicates, "... members of multicultural teams have different perceptions of the environment, motives and intentions of behaviors, communication norms, stereotyping, ethnocentrism, and prejudices. The consequences of such differences are manifested in lower team performance due to impeded social cohesion (Shaw, 1981)" (Matveev, 2004, p. 255) and "most communication breakdowns between people result from their lack of awareness that at the outset they are making basically different assumptions about meaning categories..." (Schein, 2004, p. 112)

This proposition supports the research question:

- (1) What is the relationship between the individual's power distance rating and their perception of the overall project team's communication satisfaction?

- (2) What is the relationship between the individual's power distance rating and the individual's communication comfort level?

To answer these questions, an exploratory case study was conducted that included two multi-national project teams where one included Russians and Americans while the second project team consisted of Angolans and Canadians. This exploratory case study employed the data gathering processes of self-administered survey, open-ended questions, and interviews.

The gathered data was analyzed at the individual case level and as a cross-case analysis. Each of these analysis efforts utilized a crystallization process where the data was viewed from multiple directions such as graphical analysis, cluster analysis, descriptive statistics, nonparametric correlation statistics, and textual content analysis. The data gathering and data analysis efforts were interactive where the evolving trends provided input for the next set of interviews to obtain a holistic view of the projects culture and communications interactions. While the data analysis does not statistically support the research communication satisfaction question, the overall crystallization process does provide support for the research proposition. An synopsis of the data analysis process is presented in the following paragraphs.

Data Analysis Synopsis

Statistically, from Case Study # 1 Kendall's tau_b shows a slight positive relationship, 0.355, with statistically significant value of 0.157. Contributing to this statistical analysis is that the project team's culture PDI ranged from 1.875 to 3.125 or generally falling within the 1st and 2nd PDI quartiles. The project communication satisfaction ranged from 1 to 3 or Very Satisfied to Somewhat Satisfied where six out of the seven respondents rated communication satisfaction either Very Satisfied or Satisfied. The project team is very homogenous in their cultural and communication attributes.

Case #2 presents an even greater homogeneity in that three out of the four participants had a PDI rating of 2.75 with the fourth participant developing a PDI of 1.75. The teams' communication satisfaction rating exhibited the same homogeneity with three out of four indicating they were Satisfied with the project communication while the fourth person was Somewhat Satisfied. Case #2 nonparametric correlation statistics were not possible due to the homogeneity of data.

A significant finding is that the team members' culture trait did not follow the indicated national PDI ratings. While the culture literature clearly shows that there is a significant difference between each

case nationality, the individual measurements did not reveal this same significant difference. The lack of 3rd and 4th quartile PDI ratings hinders the correlation analysis across the broader range. While lacking the extreme high PDI data, the obtained data provides the research proposition support. The proposition stated that those with lower PDI would exhibit higher levels of overall project communication satisfaction. A slight positive trend is indicated in Case Study #1 which provides support for this proposition.

Graphical analysis and cluster analysis provides support of this proposition as well. From Case Study #1 the X-Y scatter plot indicates a positive trend. As the PDI rating increases, the graph shows the communication rating increasing, in general, as well. Cluster analysis provides two distinct data clusters as well. The clusters are grouped according to PDI and communication satisfaction where lower PDI ratings develop a lower communication satisfaction value as well.

The final analysis process utilized textual content analysis. Analyzing the respondents open-ended questions answers, shows a consistency. The low PDI participants are consistent in that they stated that “communication difficulty isn’t internal,” “project communications is satisfactory.” Those participants that scored in the upper portion of the 2nd quartile were also consistent in that “Adequate communication is happening” and “[communication] could have been better if it was not a fast track project.” The textual analysis indicates a change in satisfaction level in relationship to the PDI rating.

While there is a lack of divergent PDI ratings, crystallization analysis - which combined statistical correlation analysis, graphical analysis, cluster analysis, and textual content analysis - provides support that there is a relationship between the project team communication and the individual PDI. This relationship says that for team members who have medium to low PDI ratings, they will tend to be Satisfied to Very Satisfied with the overall project communication, yet as PDI increases towards the medium level, communication satisfaction levels tend towards the Satisfied to Somewhat Satisfied rating. This answers question #1 in that:

- (1) What is the relationship between the individual’s communication satisfaction and their perception of the overall project team’s communication satisfaction?

(A: While no statistical significant relationship was identified, at the 0.05 level overall crystallization analysis indicates a slight positive relationship. Further more, this relationship follows the

proposition that those with lower PDI ratings will tend to be more satisfied with the overall project communication satisfaction.)

To answer the second research question, the case study participants' PDI ratings were compared to their individual communications comfort level. These research questions identify how comfortable the team members were in interacting across the project hierarchical structure, which include their superiors, subordinates and peers.

Statistically, Case #1 nonparametric Kendall tau_b analysis produced consistent negative correlation relations. The various ratings include the superior rating of -0.539 (significant level of -0.062), subordinate rating of -0.283 (significant level of 0.217), and peer rating of -0.548 (a significant level of 0.065). Kendall's tau_b indicates that as each individual's PDI increases, their communication comfort level decreases yet this finding is not significant at the .05 level.

Statistically, the lack of Case #2 variability prevents a meaningful Kendall tau_b correlation analysis. The participants are a homogeneous group where 3 out of the four participants rate all hierarchical communication interactions as Comfortable and the fourth person rated it Very Comfortable. Kendall tau_b is a rank correlation statistical method that counts the number of pairs out of order. For this homogeneous set of data, there are only two points in the rank order. Two points will always identify a relationship that is not valid for the overall data set. Nonparametric correlation analysis was not possible due to the homogeneity of PDI and communication comfort ratings.

In the graphical analysis, the project teams' responses are grouped in the lower left graph quadrant that is related to medium to low PDI and Very Comfortable to Somewhat Comfortable ratings. Case #1 graph indicates that as the individual PDI increases, the all hierarchical comfort levels decrease.

Case #2 graphic analyses are hindered by the homogeneity of data, similar to the statistical analysis. With three out of four respondents indicating the same comfort level trend analysis is not possible.

Cluster analysis does develop two cluster groups in the superior, subordinate, and peer group. The clusters are formed around the PDI ratings. Cluster one includes those PDI ratings between 1.5 and 2, while cluster two is associated with those PDI ratings between 2.5 and 3. Each cluster includes Comfortable to Very Comfortable levels.

Overall, the crystallization analysis identifies that these cases show a high level of consistency where the project team members are comfortable interacting across the project hierarchy. While not statistically significant at the .05 level, graphical and cluster analysis provides results that as PDI increases, the project team comfort level does slightly decrease. This finding is in alignment with the literature that as PDI increases, the individual's communication comfort level will decrease. As each of the project team members' PDI is medium to low, the basic proposition is that the individual would be comfortable with communication interactions.

Thus, the answer to research question #2 is:

(2) What is the relationship between the individual's power distance cultural attribute and the individual's communication comfort level? (A: While no statistically significant relationship was identified, at the 0.05 level, graphical analysis and cluster analysis indicate a negative relationship does exist between the team member's comfort level and their PDI rating. The negative relationship is in alignment with the literature and research proposition.)

A general research finding is that the project teams lack higher PDI ratings, 3rd and 4th quartile ratings, and there exists homogeneity of responses to all questions. Consistent responses are identified in the participants culture, communication satisfaction, and communications comfort levels. This finding indicates a very consistent project team member culture regardless of the participants' nationality.

This finding was not anticipated as the projects were selected based on divergent national cultural ratings. It was anticipated that this divergence would be indicated in the participants' ratings. This discovery indicates that higher national PDI participants do not exhibit cultural measurements in alignment with their nationalities, within these multi-national project team contexts. Rather, the data indicates that the project teams have developed unique project cultures that exhibit a PDI rating comparable to low PDI nations such as Canada and the United States.

Additionally, project team consistency was also identified in the project teams' demographic data that included project experience, age, discipline skill experience, and experience in multi-national projects. Table 1 highlights these observations.

Table 52. Case Classification

Classification	Case #1/ Case #2
Experienced project team member	9.25/6.9 mean years
Mature project team members	25-45/25-45 years old
Experienced Skill Set	13.14/10.5 mean years
Multi-national project team members	Yes/Yes

Each team can be described as comprised of experienced multi-national project team members with extensive exposure and experience within their disciplines, projects and multi-national project contexts. Combining the demographic data, PDI ratings, communication satisfaction ratings, and communication comfort level ratings generates a holistic cultural view of an experienced, multi-national, low PDI project team. The next section identifies the theoretical construct of why experienced multi-national project teams will exhibit a low PDI culture.

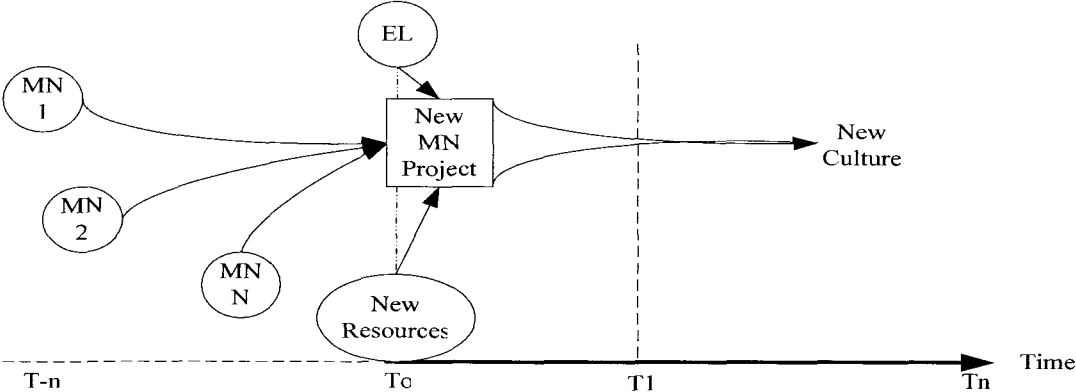
Theoretical Construct

The data analysis has identified high similarity in and between the cases. This within and between case homogeneity was not an expected finding as the cases were selected on the factors of national diversity and research accessibility. Based on the national culture and cross-cultural literature and distinct composition of each team, greater variability in participants' responses was expected. The anticipated data analysis finding was that differences in project team PDI would be greater than found as the members' nationalities are within Hofstede's top and bottom rating quartile and the nations involved included extremely diverse nations of Russia and Angola. While Hofstede clearly states that the national ratings can not be used on an individual basis, his ratings provide an indication of how the average individual may respond as "Such cultures are difficult to change, unless one detaches the individual from his/her culture. Within a nation or a part of it, culture changes only slowly. This is because what is in the minds of the people has also become crystallized in the institutions..." (1984, p. 685).

If a person’s national culture is difficult to change and will influence the individual’s interactions, this data analysis generates the question: Why are these projects’ culture and communication results so similar? The answer to this question is a new theoretical construct on multi-national project team cultures.

The theoretical multi-national team culture construct is that Western base, low PDI characteristics project teams cultures quickly form in multi-national project contexts. These new cultures foster a communication environment which promotes comfortable communication across project hierarchical boundaries which generates general overall communication satisfaction. Figure 1 depicts the theoretical culture transformation process as supported from the literature and the research data.

Figure 40. New Project Culture Formulation



In Figure 1, time T_0 indicates the formation of a new project that involves the merging of several elements such as experienced team members, new team members and experienced project managers. It is the merging of these elements that fosters rapid culture transformation towards a new model. These various elements become critical project transformation factors.

The first critical effect appears to be associated with inclusion of experienced multi-national project team members in the new project. This effect is depicted by the time period between T_{-n} and T_0 and includes the depicted set’s previous multi-national, MN_x , projects. Schein describes the inclusion of these experienced personnel as the DNA foundations for the new organizational culture (Schein, 2004). In this new project management theory, the experienced multi-national project team DNA forms the core from which the overall project team’s culture will grow. While this core DNA is a critical factor, other elements

assist in the rapid culture transformation, such as the inclusion of an experienced multi-national project team leader.

Figure 1's circle EL is the Experienced Leader critical element affect. From organizational and management cultural literature, the leader is the one who is identified as responsible for establishing the organization's culture through the imposition of their own values and assumptions on the new organization (Schein, 2004; Young, 1999). As was identified in the case studies, the project manager was a key factor as a one textual content analysis result identified a recurring theme that "My immediate supervisor was invaluable as he had the background information and was willing to share it" and "We had a strong project manager that set the stage for how the project was to run." The literature and this research information provide a foundation that the project manager is a critical effect component.

The remaining new project input block shows the inclusion of new project team members. These would be those project team members that have not worked in multi-national projects previously. Theoretically, these individuals may have divergent cultural attributes than the other new project inputs depending on their overall cultural background (Hofstede, 1984; Schein, 2004)

In Figure 1, the time line between T_0 and T_1 is the culture convergence time period. This convergence time is associated with the various team members working together, experiencing challenges and issues and developing a common set of core assumptions. As the organizational culture literature discusses, the team culture emerges over time as the team works through problems and challenges. Each of these items will be initially addressed based on the experienced project team member's assumptions and the project manager's directions of what will work, all based on historical precedence. As each issue is resolved, the results will validate which processes worked and which did not. This building of shared knowledge allows each member to form a core interaction knowledge base of shared experiences. This is the new project team culture evolutionary process.

The data indicates that there appears to be several critical keys to the project culture evolution. First, while not shown on Figure 1, a common Western based training appears to be a critical key. The literature is clear that project management is a Western based discipline (Muriithi and Crawford, 2003; Voropajev, 1997) and the case study project managers and project team members have been exposed to

project management training. As project management is a Western based discipline it reflects the Western culture, which has a low PDI. This key element provides the first hypothesis for this new theory:

H₁: Multi-national project team member training is Western based which modifies non-Western based project team members' national culture attributes.

This hypothesis says that the individuals who receive Western based project management training will be conditioned towards a Western based culture. In this case, a medium to low PDI culture.

The second critical key is that incorporating experienced multi-national project team members will form a core culture that will drive the final project culture. This critical key element forms the second hypothesis:

H₂: Inclusion of experienced project team members will develop a project team communications culture that is comfortable to the participants.

This hypothesis is based on the concept that multi-national experienced personnel will have a culture based communication style that will foster harmony across the project team. This experience based communication process will be based on what worked previously. This historical based interaction knowledge will form a catalyst to the overall project team communication comfort and ultimately, communication satisfaction.

The third critical key is the utilization of an experienced multi-national project manager. As the management literature discusses, the leader is primarily responsible for establishing or is the architect of the team's culture (Schein, 2004; Thamhain, 2004). As the architect of the overall team culture, an experienced multi-national project manager is a critical key and establishes the third hypothesis:

H₃: Utilization of a Western trained and experienced multi-national project manager will guide development of the project team culture to an overall Western characteristic project team culture.

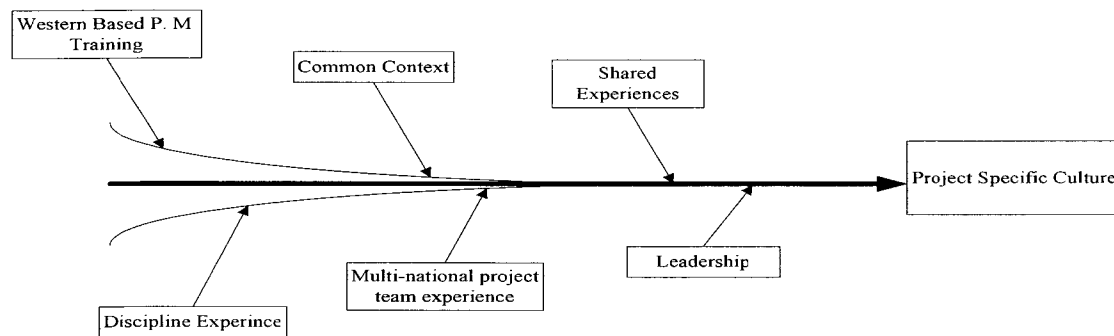
This new theoretical construct and subsequent hypotheses are supported from other disciplines such as national culture research and organizational culture research.

A leading national culture researcher, Hofstede, provides support for this hypothesis in that the final organizational culture "... will very likely be affected by other factors besides nationality: for example, by education, gender, age, type of work organization..." (Hofstede, 1997, p. 255). As the theoretical construct states, Western based, low PDI characteristics project teams' cultures quickly form in

multi-national project contexts. Three hypotheses support this construct and they are in alignment with Hofstede's statement that Western based project management training and multi-national experienced project team members will all affect the overall project team culture. It is the convergence of the combination of factors that will quickly construct a common project team culture.

Figure 2 is a cause and effect time line of how these various factors, theoretically, influence the development of the common multi-national project team culture.

Figure 41. Converging Project Team Culture



Schein, as one of organizational culture's leading researchers, provides support for this project management culture convergence model from a leadership cultural development perspective. Schein states that culture "... springs from three sources: (1) the beliefs, values, and assumptions of founders of organizations, (2) the learning experiences of group members ... and (3) new beliefs, values, and assumptions brought in by new members and leaders" (2004, p. 225).

Each of Schein's statements directly supports the project management theoretical construct. As an example, the project manager can be viewed as the founder of the project team. The project manager is the "... social architect who understands the interaction of organizational and behavioral variables, facilitates the work process and provides overall project leadership for developing multidisciplinary task groups into unified teams, and fostering a climate conducive to involvement, commitment and conflict resolution" (Thamhain, 2004, p. 534).

As to the second point, learning experience of group members, these are the lessons learned that the experienced multi-national project team members bring to the new project. These members bring to the

team a set of core experiences that worked in other multi-national project contexts and act as the catalyst for the new team. This catalyst is based on the inherent project management learning process and is closely aligned with the project management tools and learning processes (Kotnour, 1990). This learning process provides for the emergence of a set of shared experiences and core assumptions on how things interact, a new culture.

The organizational culture literature provides additional support that “An effective multicultural team has a strong emergent culture as shared member expectations facilitate communication ...” (Earley and Mosakowski, 2000) and “A strong organizational culture can overcome barriers in a national [setting]...” (Hofstede, 1984, p. 700).

The proposed theoretical model identifies how project team culture emerges from the complex interactions of the project context, environment, team member experience levels, team member’s multi-national experience, and the disciplines foundation. While the team culture continues to evolve throughout the project life cycle, Figure 1 indicates a rapid culture emergence between T_0 and T_1 which is congruent with Schein’s (2004) discussion on the ability of an organization to rapidly establish cultural change through leadership guidance and shared team experiences, which further supports the theoretical construct.

Project management literature provides a level of theoretical construct support, as well. The literature states, project management is a Western based discipline (Jaeger and Kanungo, 1990; Voropajev, 1997; Sennara, 2002) which has been expanding globally. As a Western based discipline, project management training is also based in the West (Carbone and Gholston, 2004). A common training foundation is a critical key component of this theory. As the project team members receive a common training experience they modify their culture to fit the trained to project team model. Training forms a core assumption that guides the team’s interactions such as communications.

Project management literature also identifies that experienced project managers provide a catalyst for project success (Wang, Chou and Jiang, 2005). As Makilouko proposes, “Project.... leadership [is] the change agent even more than we may expect in organizations with continuing leader and follower roles” (2004; p. 388). This theory expands this literature in that experienced multi-national project managers are critical key factors in establishing the new multi-national project team culture.

While the project manager leads and guides the team's culture development, experienced project team members have also been identified as critical key factors through learning and knowledge transfer. As Newell discusses, "Cross-project learning can be enhanced if project reviews focus on capturing lessons related to the processes and procedures that have been successfully used, and if these lessons are shared through social networks that project members can make use of when they need help with a problem that cannot be easily solved using the existing knowledge and expertise of team members" (2004, p. 12). This theory expands on this statement in that experienced multi-national project team members will provide the new project team a cultural development catalyst by bringing their lessons learned and multi-national project team culture experience to the new project. This catalyst assists the overall team work through their shared experiences towards a new multi-national project team common culture.

The new project team culture theory is also based on an understanding of the case study's data and subsequent data analysis. This research encompassed two different project teams that included personnel from different nations. Based on national culture ratings the participants would have divergent cultures which influence their communication interactions. The research proposition stated that a comparison between the project team member's PDI and their communication satisfaction, as well as a comparison between the project team member's PDI and their communication comfort levels would identify a relationship.

The subsequent data analysis identified that a relationship appears to exist, but limiting this conclusion is the fact that all team members PDI fell within the 1st and 2nd PDI quartiles. The data analysis also identified that the team members, in general, were satisfied with project communications and were comfortable with communicating across the project hierarchy. Again, a lack of ratings that indicate a lack of project communication satisfaction and uncomfortable communication relationships limits the overall research conclusions. These findings were not expected and, while indicating support for the research proposition, a lack of extremes, limits the final conclusion.

In developing an understanding of the homogeneous data findings, the theoretical project culture formation construct was developed. This construct is based on the research data findings which indicate a set of specific factors are influencing the overall project team culture formation. Based on the data, the project team cultures appear to be a closer match to Western homogeneous project teams that have medium

to low PDI cultures, versus predicted divergent PDI project cultures. Data analysis indicates that the factors of team project experience, multi-national team experience, leadership, and project management training are influencing the project team culture results.

Identification of these factors resulted in the generation of a theoretical construct that Western base, low PDI characteristics project teams cultures quickly form in multi-national project contexts. Support for this theory was identified in organizational literature, national culture literature and project management literature.

In association with this theory, three hypotheses have been proposed for further testing. These hypotheses included:

H₁: Multi-national project team members training is Western based which modifies non-Western based project team members national culture attributes.

H₂: Inclusion of experienced project team members will develop a project team communications culture that is comfortable to the participants.

H₃: Utilization of a Western trained and experienced multi-national project manager will develop an overall Western characteristic project team culture.

The following section provides a discussion on future research that will assist in developing this theory further.

Future Research

This research identified that there appears to be a relationship between PDI, communication satisfaction and comfort levels, as well as developed a new theory that there is a set of critical factors which converge to rapidly implement a new multi-national project team culture. These results are based on a two-case study and future research is needed to develop them further. Future research should be undertaken to:

1. Extend this research to other multi-national project team contexts, replication of this study.
2. Test the proposed hypotheses.

Replicating this research, to other multi-national project team contexts, will test the theory that there is a relationship between PDI and the communication variables. While the current research data analysis indicates that this is valid, extending this to other multi-national contexts will determine if this is valid with different nationalities, other than the Angolan, Canadian, Russian, and American context

included in this study. This future research would be a replication effort that is feasible with the documented research method.

Future research should also test the supplied hypotheses validation. This future research could take the form of a series of longitudinal studies. These longitudinal studies would follow the project life cycle culture development process. Conducting a longitudinal study would allow the researcher to view how the multi-national project team's culture evolves over time.

Another research effort would look at the correlation between project team members project management training. This research would specifically look at the relationship between Western based training and culture development. The project management literature clearly states that the project management discipline and published information is Western based. This research theoretical construct is that this foundation affects the formation of the multi-national project team member's culture. Due to the training influence the team members whose national culture indicates a higher PDI index result in a modified PDI rating closer to the Western nation PDI ratings.

The proposed set of future research allows for further delineation of the theories developed and a greater understanding of the unique multi-national project context. Enhanced understanding of this context is important to close the literature knowledge gap. Globalization will only continue to increase as will the use of global project teams. Understanding these project team's social interactions will help increase the probability of project success.

This research partially closes the identified literature gap. It is based on a research design that has been applied in other cross-cultural contexts and it has utilized a set of previously validated research questions. While the research design and implementation is valid, there are a set of research challenges that can be raised. These challenges are briefly discussed next with an associated explanation of how the research was designed and implemented to minimize the potential effects.

Research Challenges

While this research design is in alignment with cross-cultural design literature, every research design is open to review and criticism. These criticisms can range from the philosophical reasons surrounding the research question to criticisms on the research design method. The following paragraphs briefly discuss each of these design criticism categories and how the study minimized the challenges.

From a philosophical research criticism view, the first criticism example is associated with the research question: Why is this research?

Why this research? or Why is it important for the project management body of knowledge to be expanded by the information developed through this effort? The answer to this rests in literature, both internal and external to the project management discipline. The following is just some of the information that is available in scholarly journals that provides an answer to this question.

“... cultures tend to use the forms of communication (such as orality, writing, e-mail, and hypertext) differently based on how rhetorical features of the forms correspond to the larger cultural patterns” (Thatcher, 2001, p. 463).

“The scholarly debate about the relationship of cultural patterns and communication media has been a long and fruitful one” (Thatcher, 2001, p. 463).

“The authors of many published cross cultural studies do not give relevant details of the culture or cultures within which their studies are conducted, before going on to discuss their implications for their focus of investigation” (Bates, 2004, p. 15).

As these quotes demonstrate, there is a body of literature that supports the concept that we don't fully understand communications and further research is required. Internal to project management, there is support that communication has been linked to project performance and success (Pinto and Slevin, 1989; Finch, 2003). From these literature sources comes the understanding that while communication is important to projects, there is a lack of empirical research on how culture influences communication in the project team environment and specifically multi-national project team contexts.

A theoretical understanding of project management team culture, in general, and specifically, what are its influences on communication in the multi-national project management environment, are areas that have not received much research attention. Numerous literature surveys, between 1960 and 2003, of project management literature identify that culture is presented between 4 and 8%. This indicates that while project management, organizational, national, and management literature all state that understanding culture is important, there is little empirical research being reported.

As the literature identifies, communication is important (Jiang, Motwani and Magulis, 1997); there is a cultural component to communications (Kendra and Tapin, 2004) and there is a lack of empirical

research in this area (Matten and Geppert, 2004). This information provides a firm foundation that this research is important and a gap does exist.

Moving beyond the research question, the next criticism is associated with why this research method and not one of the many others research methodologies and associated methods available to assist the researcher uncover the truth about the phenomena of interest. The answer to this criticism is associated with the phenomena data. As Leedy and Ormrod point out, "... the data dictate the research method" (2001, p. 100) and the data of interest is driven by the research question.

The response to this criticism is that this research question is intended to develop a theoretical understanding of the cultural influencing dimension of power distance within the context of the multi-national project team context. Specifically, the data of interest is associated with a richer theoretical understanding of the power distance dimension relationship to overall project communication satisfaction and hierarchical interaction comfort. As such, the data requirements select the need for a qualitative study versus a quantitative study.

While case study literature is divergent, if this research method is qualitative research or not, it is a well recognized methodology for building a richer understanding of the phenomena of interest. Case study methodology allows the research to use a range of data gathering methods that include methods such as interviews and self-administered surveys. Using a variety of data gathering methods and data analysis processes, the research converges on the solution. This process is sometimes called triangulation or crystallization. Triangulation or crystallization is a process that is well established and accepted in the cross-cultural research literature.

The research design can also be challenged from an application point of view. This challenge involves the concept that the population of interest may not want to participate in the research. Thatcher (2001) identified that people of different power distances, as measured by Hofstede's scale, might react differently to the request for participation. Those with a high power distance cultural dimension might elect not to participate or provide 'desirable' versus real responses during any interchange.

This criticism is valid for any field research that involves the interaction of researcher and those within the study. The researcher could find themselves in the position where the subject of interest does not want to participate or provides desirable versus real answers. While problematic, it does not prevent the

research from proceeding. Relying on numerous data sources and analysis techniques provides a means that minimizes the potential undesirable effects.

Another potential research design criticism is the ethnocentrism of the researcher. Ethnocentrism of the researcher can result in attempts of the researcher to transfer their own beliefs and values to the local population of interest. Historically, this has been a dismal failure (Thatcher, 2001). The mitigating aspect of this criticism rests in the researcher's cultural awareness and professionalism and an avoidance of romanticizing the participants.

Romanticizing the participants "... is widely recognized . . ." (Thatcher, 2001, p. 485). What this issue relates to is the researcher's "... dismissal of most of the daily, sense-making behaviors ... instead ... [showing] more interest in going to visit the natives... or poor" (Thatcher, 2001, p. 485). Romanticizing the participants' is a process that can generate flawed and biased data resulting in a flawed and or invalid conclusion. The mitigating aspects are to maintain objectivity and awareness. In the case of this research, each case study involved a different set of nationalities.

Another criticism can be associated with linguistic skills. The research design is set up to occur in a multi-national project context where English is not all participants' primary or first language. In this context, the criticism is the lack of the researcher's fluent multi-national language skills, spoken and reading/writing. The argument is made that since the preponderance of research data comes through communication and observations, there is a need to be bi-lingual. On the surface this is a valid criticism and one that needed to be taken seriously.

The response to this criticism has two points. First there is the view of qualitative communication researchers. When this discipline is consulted, one view that is presented is that "linguistic fluidity and cultural expertise are not essential, but some linguistic and cultural knowledge seems necessary" (Thatcher, 2001, p. 485). Supporting the position that bi-lingual skills are not required is that for each case study the official language was English. As the official language, all participants' communication interactions occurred in English.

The second part to this challenge response is the participants' education and experience background. In each case study, the participants consisted of highly skilled and trained personnel who all used the English language on a daily basis. As the literature states, relying on English does not provide a

significant barrier to communications, within this type of context (Thatcher, 2001). During the research the reliance on English did not appear to present any issues.

The preceding discussion is not all inclusive of all potential criticisms that might be brought against this research design. From a holistic view, the research design was patterned to match other research and to follow recommended design guidelines and principles such as that from Gary King, Robert O' Keohane, and Sidney Verba's *Designing Social Inquiry: Scientific Inference in Qualitative Research (1994)*, as reported by Munck (1998). As recommended, the design process was cyclic in nature allowing the theory to build, shape, change, expand, or contract based on new data and the evolving interaction of data. The challenges noted are not uncommon to qualitative research such that my proposed design was formed to address them to the extent currently visible.

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APPENDIX A

COPYRIGHTS

ROBERTS AND O'REILLY – ORGANIZATIONAL COMMUNICATION SCALE

Morgan:

The survey is in the public domain, so you are perfectly free to use it.

Good Luck,

Charles

At 07:08 AM 7/18/2005, you wrote:

>Greetings Dr. O'Reilly,

>

>This Email is to request your permission to use Dr. Roberes and Your
>"Organizational Communication Scale" survey in my doctoral research efforts.

>

>By way of introduction I'm a PhD student at Old Dominion University
>conducting research on project team communications. In consultation with
>my Advising Committee your survey instrument would help develop a better
>understanding of communications within this process.

>

>I appreciate you taking a few minutes to consider this request.

>

>Regards,

>Morgan Henrie

>PhD Student,

>Old Dominion University

>Norfolk, VA

PROJECT MANAGEMENT JOURNAL

Dear Mr. Henrie:

Thank you for your permission request of 17 June. Please accept this email as written approval of your requested use of the article "Project Management: A Cultural Literary Review" of which you are co-author.

Please feel free to contact me if you have any additional questions or requests.

Best Regards,

Christopher Roan
Permissions Coordinator
Project Management Institute
Four Campus Boulevard
Newtown Square, PA 19073-3299 USA
Phone: +1-610-356-4600 ext. 1127 / Fax +1-610-356-4647
E-Mail: christopher.roan@pmi.org

Have you registered for the upcoming Mega SeminarsWorld <
http://www.pmi.org/prod/groups/public/documents/info/pdc_sw_ld_orlando1.asp>® in Orlando, Florida,
USA? In addition to 34 seminars being offered 11-14 July, keynote speaker James Johnson, Founder of The
Standish Group, will present CHAOS research findings on why projects succeed or fail. PMI members can
register at a discount until 27 June.

EARLEY AND EREZ – POWER DIFFERENTIAL SURVEY

Morgan E Henrie wrote:

> Hello Dr. Earley,
>
> Briefly, this Email is to request approval to use Professor Erez and
> Your Power Differential Survey as part of my PhD research.
>
> By way of introduction, my name is Morgan Henrie and I'm a PhD
> candidate at Old Dominion University, Norfolk, VA, USA. My research
> topic is Power Distance Influence on Multi-national project team
> communications.
>
> I believe, and my doctoral committee agrees, that the survey, as
> provided in _The Transplanted Executive,_ Appendix page 179, is very
> applicable to my research. Thus, I'm writing to request your
> permission to use it.
>
> Thank you for considering this request.
>
> Morgan
>
> _____
>
> This email has been scanned by the MessageLabs Email Security System
> on behalf of the London Business School community.
> For more information please visit <http://www.messagelabs.com/email>
> _____

No problem -- good luck with your work. chris

APPENDIX B

INSTITUTIONAL REVIEW BOARD EXCEPTION

No.: 05-042

**OLD DOMINION UNIVERSITY
HUMAN SUBJECTS INSTITUTIONAL REVIEW BOARD
NOTIFICATION OF EXEMPT RESEARCH**

To: Charles Keating DATE: April 21, 2005
Responsible Project Investigator *IRB Decision Date*

Re: Power distance influence on multinational project team communications
Name of Project

Please be informed that your research proposal has been considered by the Institutional Review Board and was found to be EXEMPT for the following reason(s):

interview research, 45CFR46.101(b)2



IRB Chairperson's Signature 4.21.05
date

Contact the IRB for clarification of the terms of your research, or if you wish to make ANY change to your research protocol that might alter its exempt status.

VITA

Morgan E. Henrie, PMP

3431 Amber Bay Loop, Anchorage, Alaska 99515
Cell (907) 229-5469 henrie@alaska.net

Engineering Management and Systems Science
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Old Dominion University, Norfolk, VA

EDUCATION

M. S. Project Management **The George Washington University**, Washington, D.C., May 2000

B. S. Electronic Engineering **Kennedy-Western University**, Cheyenne, WY May 1997

B. A. Technology Management **Eckerd College**, St. Petersburg, FL. May 1996

REFERREED JOURNAL PUBLICATIONS

Hedgepeth, Oliver and Morgan Henrie. Exploring Cultural Implications of Teaching Logistics and Project Management in the Russian Far East. *The Journal of Learning in Higher Education*. 1(1). Fall 2005. pp. 31-36.

Henrie, Morgan and Andreas Sousa-Poza. Project Management: A Cultural Literary Review. *Project Management Journal*, 36 (2). June 2005. pp. 5-14.

Hedgepeth, Oliver and Morgan Henrie. Russian Far East War Game: The Praxis of a Business War Game to Detect Tensions in Knowledge Structure of Russia. *International Journal of Knowledge, Culture and Change Management*. 4. 2004.

Henrie, Morgan and Oliver Hedgepeth. "Size Is Important In Knowledge Management." *Journal of Knowledge Management Practice*. 4. 2003.

PROFESSIONAL EXPERIENCE

Project Manager, MH Consulting, Inc., Anchorage, AK 1997 – Present
Provide project management services to oil and gas industry and telecommunication industry.

Project Manager, Alyeska Pipeline Service Co. 1983 – 1997
Last position was project manager on an 800 mile fiber optic telecommunication project. Other duties included operations supervisor, control system engineering, security system engineer and control systems technician.

HONORS AND AWARDS

Best Engineering Management Paper Award. The Institute of Industrial Engineers. IIE Annual Conference – May 14-18, 2005, Atlanta, Georgia. Project Management Soft Systems Cultural Literary Review.

Best Paper Award. Academic Business World Conference – 2005. Exploring Cultural Implications of Teaching Logistics and Project Management in the Russian Far East.

Epsilon Mu Eta (The Engineering Management Honor Society)

Phi Kappa Phi (All Discipline Honors Society)