The Delphi Technique: A Method for Testing Complex and Multifaceted Topics

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Abstract

Purpose: The aim of this paper is to provide project management students with an example of the Delphi research approach that was applied to a recent doctoral research thesis. The objective is to provide both a description of the approach and an explanation of how it was successfully applied so that researchers in project management (PM) may become more aware and expand their perceptions of methodological options available to them.
Design/Methodology/Approach: It sets out a literature review of the Delphi approach and explains this research method as it was experienced as a research tool. The paper also provides reflection on the experience of being a researcher undertaking a doctoral study.
Findings: The Delphi approach is one of many that may be selected for researching PM issues and problems. It is appropriate for researching complex issues where larger scale quantitative 'hard data' fails to unearth richness in tacit knowledge to help the research understand subtle expert opinion. It does not offer the rigor of clinical testing or quantitative analysis, but it provides a scientific methodology that is well suited to issues that require the insights of subject matter experts. The use of Delphi in this context was successful in that the thesis was passed and so its use in this context may be now considered as proved through rigorous examination.
Practical Implications: The paper provides a solid literature review that may be used or referred to by researchers wishing to adopt this research approach. It also describes the protocols and processes adopted in the doctoral study. Thus, this paper provides the opportunity for PM researchers to expand their repertoire of research tools. Practitioners may also benefit from this paper as it provides a useful approach to assess and validate expert knowledge that could be contestable in a range of practice situations.
Paper Type: Research

Keywords: Delphi technique: Project management; Research Design; Cross-cultural Leadership

Introduction

This paper reviews the use of the Delphi technique as a testing method for complex and multifaceted topics. It is written in the first person to provide a personal perspective of a successful graduate having undertaken a doctoral thesis.

I undertook the Doctor of Project Management Program (DPM) at RMIT University, Melbourne Australia and my area of interest is cross-cultural leadership. The thesis hypothesis states that there are leadership attributes that are *etic*, or universal, (Pike, 1967) and these attributes are effective regardless of the culture (personal, societal, corporate) they are used within. The DPM program was focused on project management, so that is where my

research began. It therefore lies clearly within the interest of project management researchers and practitioners.

Initially a search of the books at Amazon.com for *International Project Management* yielded eleven books (only three on the subject), whereas a search for Project Management yielded over 2,600 books. Only one of the three books on international Project Management (Lientz and Rea, 2003) devotes 70 pages of a 277 page book to the issues of leadership and culture. A further search on the Project Management Institute's (PMI) *Journal of Project Management* and the International Project Management Association's (IPMA) *International Journal of Project Management* was undertaken for the period of 1995 through 2005. The results revealed that over the period of 1995 through 2005 less than 10% of the articles dealt with the issues of culture or leadership, and none with the issue of cross-cultural leadership. Therefore, broader research was required.

Winter, Smith, Morris and Cicmil,(2006: p642) provide a roadmap of research issues that relate to re-thinking project management and among these are a need to re-think 'theory about practice' relating to the lived experience and complexity of projects that typically these days includes the coordination of multi-national multi-cultural teams. Their call for rethinking 'theory for practice' in their Direction 2 is relevant to my study as it relates to projects as social processes and in Direct 4 as regarding broader conceptualizations of projects in terms of multi-disciplinary cultures. Their calls for re-thinking 'theory in practice' relates to moving towards practitioners as reflective practitioners. My study was highly focused on aspects such as understanding culture and its impact as well issues relating to emotional intelligence as it applies to working in cross-cultural teams. Thus, my research topic appears to be highly relevant to current project management debates.

Research methods proposed by Cicmil (2006) support a move towards selecting from a battery of qualitative research methods and in doing so to select the appropriate tool to apply to investigate the phenomena under study. She did not directly advocate using the Delphi technique in that paper. However, she did stress that, when looking at how various experience levels of practitioners approach learning and working "Context-dependent knowledge and experience is at the crux of expert or virtuoso activity; these two final levels in the learning process can be reached only via a person's own experiences as practitioner of the relevant skills" (Cicmil, 2006: p36). The emerging drive for undertaking more qualitative research in project management to better understand the lived experience of practitioners requires a range of research approaches. The focus on how small numbers of experts of virtuosos, as Cicmil (2006) describes them from adapting the stages of professional experience categorized by Dreyfus (in Dreyfus, 2004; and Dreyfus and Dreyfus, 2005), calls for a research approach that can access deep level knowledge. In the next section of this paper I offer an argument that the Delphi approach is suitable and appropriate to access this level of reflective knowledge and expertise as it applies to the problem of cross cultural leadership.

I pursued a broader research approach from that currently found in much of the project management literature. This resulted in a horizontal review of the literature from project management, business, leadership, culture, psychology, philosophy, ethics, anthropology, medicine, poetry, literature, religion, conflict resolution, and more. The resulting challenge for proving or disproving the hypothesis was selecting a method that was appropriate, and

feasible, for such a multifaceted, intertwined, and complex topic. For these reasons, the Delphi technique was suggested to be used for testing the hypothesis.

This paper first presents a review the Delphi literature, when it is appropriate, how to apply it, and provides a brief review of how I applied it to my research.

The Delphi Technique – Literature Review

Dalkey and his associates at the Rand Corporation originally developed the Delphi technique in the 1950s, and named it after the ancient Greek temple where the oracle could be found. The method requires knowledgeable and expert contributors individually responding to questions and submitting the results to a central coordinator. The coordinator processes the contributions, looking for central and extreme tendencies, and their rationales. The results are then fed back to the respondents. The respondents are then asked to resubmit their views, assisted by the input provided by the coordinator. This process continues until the coordinator sees that a consensus has formed. The technique was intended to remove the bias that is possible when diverse groups of experts meet together. In the Delphi technique, the experts do not know who the others experts are during the process.

Mitchell (1991) performed a review the use of the Delphi techniques. He found in an earlier study (Rieger, 1986) that PhD candidates that used Delphi increased from 61 (1970–1974) to 441 (1980-1984), and that they included an incredibly wide range of disciplines and topics. Mitchell's work focused on nascent industries needing to prepare long-term forecasts for products and growth under uncertainty, with little or no historical information. He noted that studies had been undertaken to test Delphi against other group judgment techniques, with indication that the Delphi technique offers superior accuracy (Riggs, 1983). Mitchell's paper provides a wealth of information about the advantages, disadvantages, considerations, and pitfalls associated with the use of the Delphi technique.

According to Buckley (1994) one clear use of the Delphi technique is when the issue under investigation does not lend itself to precise analytical techniques, but can benefit greatly from subjective judgments on a collective basis. Keeney, Hasson et al. (2001: p199)[1] provide a critical critique of the Delphi method in nursing, and concluded that "It is clear from reviewing the advantages and criticisms of the Delphi that the arguments are no stronger or no more valid on one side than the other. This technique must be evaluated against the proposed study and advantages over other methods for this purpose."

Later research in the nursing field, Kennedy (2004: p1), indicates that the "Delphi technique has gained popularity across many scientific disciplines as a method of inquiry." She warns that there has been little or no substantiation of the Delphi technique, by utilizing subsequent surveys or other testing methods. However, she utilized two groups of experts (one composed of nurses and one composed of the recipients of the care) in her research, and then correlated the findings. She found a congruence of 97% between the groups on the responses to the subjective research questions.

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[1] See also Hasson, F., Keeney, S. and McKenna, H. (2000). "Research Guidelines for the Delphi Survey Technique." *Journal of Advanced Nursing*. **32** (4): 1008-1015.

Linstone, Turoff et al. (2002: p559) provide two quotes regarding the scientific view of Delphi as a technique that bear repeating. The first being from a skeptic of the practice, the second being a response from a proponent:

> "The future is far too important for the human species to be left to fortune tellers using new versions of old crystal balls. It is time for the oracle to move out and science to move in." (Sackman, 1974).

> "Science to Sackman means psychometrically trained social scientists. His tradition bound
> attitude is not uncommon; it is in the same vein as the illusion that science is "objective", that only Lockean or Leibnizian inquiring systems are legitimate, and that subjective or Bayesian probability is heretical. Orthodoxy faced with new paradigms often responds with sweeping condemnations and unwitting distortions. Poorly executed applications are brought forth to censure the entire method, quotations are taken out of context, the basis for criticism is left vague, significant supportive research and new directions arc ignored, and irrelevant "standards" are applied. A case in point is Sackman's comparison of Delphi with standards for psychological testing developed by the American Psychological Association: procedures designed to evaluate the testing of individuals are assumed to be meant for evaluation of opinion questionnaires."

The debate continues. The Delphi technique is not a substitute for other scientific testing, but rather an option for complex and intertwined subjects that cross over disciplinary boundaries.

Czinkota and Ronkainen (2005) indicate that the Delphi technique has gained substantial acceptance across disciplines. They report that it has been used as a research tool in the fields of library and information science (Buckley, 1995), in the medical disciplines (Linstone and Turoff, 1975), in multi country studies of communications in Europe (www.feiea.org.uk, 2003), and by actuaries to forecast economic conditions (Actuaries, 1999). The authors report that those experienced with the Delphi technique report that "the method produces useful results which are accepted and supported by the majority of the expert community" (Institut, 1998)[2].

In the business field, the technique has been rated highly by some as a systematic thinking tool, but has also been challenged in its ability to serve as an identifier of strategic issues (Schoemaker, 1993). Czinkota and Ronkanainen believe that "such ambivalence may be understandable in an era in which high-powered quantification of business analyses is desired and admired by many. However, we believe that the study of business remains a social science, and is heavily dependent on the in-depth thoughts, evaluation, vision and imagination of individuals. Their informed consensus is more likely to indicate future directions than the opinions of many uninformed survey participants."

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[2] Fraunhoher Institute for Systems and Innovation Research (Fraunhofer,-ISI) URL http://www.isi.fhg.de/homeisi.htm accessed 7th October 2003

Czinkota (1986) and Czinkota and Ronkanainen (1992; 1997) evaluated the accuracy of the Delphi technique for forecasting in the international business arena by looking at three previous Delphi studies. In the 1986 study, 17 key forecasts were made of which 14 were deemed accurate 5 years later. Despite this 82% accuracy rate, the Delphi panel did not foresee the collapse of the Iron Curtain. This failure to foresee that event could have resulted from the fact that the study drew only on experts from one country. Input on a global panel might have raised the possibility of such an event. In the 1992 study, which did use a global panel, 40 key predictions were made, with a 1997 accuracy of 32 dimensions or 80%. All the inaccuracies, were in the form of overstatements (the anticipation of more rapid transformations), rather than in direction. The 1997 study, 6 years later, showed an accuracy level of 65% of its 69 predictions. Another world-altering event, and its consequences, was not predicted: September 11, 2001. Of course, even the major intelligence agencies around the world missed this. The authors found the average predictive accuracy in the three studies to be 76%, which makes the Delphi method a powerful forecasting tool. The key aspect to the usefulness of this type of research remains in the selection of the participants.

According to Rikkonen, Aakkula et al. (2006) suggested that the Delphi technique is a method for the structuring of a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem (Mohorjy and Aburizaiza, 1997), 1997; see also (Kuusi, 1999; Rowe, 2001; Linstone *et al.*, 2002; Tapio, 2002)).
Brill, Bishop et al. (2006) describe Delphi as a particularly good research method for deriving consensus among a group of individuals having expertise on a particular topic where information sought is subjective and where participants are separated by physical distance (Linstone & Turoff, 1975). The authors state that the Delphi method has been demonstrated in the literature as a reliable empirical method for consensus reaching in a number of areas. Those areas include distance education (Thach and Murphy, 1995), journalism (Smith, 1997), visual literacy (Brill, Kim and Branch, 2000), electronic commerce (Addison, 2003), health care (Whitman, 1990), and others (Cochran, 1983; Linstone and Turoff, 1975). It is has been used in many other disciplines including in information technology research to identify and rank key issues for management attention (Delbecq, Van de Ven and Gustafson, 1975; Brancheau, Janz and Wetherbe, 1996; Keil, Cule, Lyytinen and Schmidt, 1998). It has also been used for scientific study of GIS (Hatzichristos and Giaoutzi, 2005), quality management (Saizarbitoria, 2006), terrorism (Parente, Hiob, Silver, Jenkins, Poe and Mullins, 2005), banking (Beales, 2005), social sciences (Landeta, 2006), privatization of utilities (Critcher and Gladstone, 1998), education (Yousuf, 2997), and more.

A search of Academic Search Premier alone (May 2008) yielded 476 articles, so the use of Delphi in research is an accepted practice. However, as discussed above, it is not appropriate for all research activities.

When to Use Delphi

Linstone, Turoff et al. (2002)[3] published an e-book on the Delphi technique that I found to be a suitable starting point to use the process. They argue that one or more of the following properties could lead to the need for employing Delphi (quoted from Pg. 4):

- The problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis
- The individuals needed to contribute to the examination of a broad or complex problem have no history of adequate communication and may represent diverse backgrounds with respect to experience or expertise
- More individuals are needed than can effectively interact in a face-to-face exchange
- Time and cost make frequent group meetings infeasible
- The efficiency of face-to-face meetings can be increased by a supplemental group communication process
- Disagreements among individuals are so severe or politically unpalatable that the communication process must be refereed and/or anonymity assured
- The heterogeneity of the participants must be preserved to assure validity of the results, i.e., avoidance of domination by quantity or by strength of personality ("bandwagon effect").

How to Use Delphi

Hasson, Keeney et al. (2000) proposed research guidelines for using the Delphi technique. From their experience, they recommend that the following topics be addressed in designing a Delphi approach:

Research Problem Identification

Turoff (1970) outlined four objectives that call for the use of the Delphi technique. One of those objectives was to correlate informed judgments on a topic that spans a wide range of disciplines. Reid (1988) contended that the decision to use the Delphi technique must center upon the appropriateness of the available alternatives. Reid argued that the use of experts in the field under study is a technique perfectly suited to this hypothesis for two main reasons. First, the technique has not been utilized in the past, based upon the research performed. Second, it offers the opportunity to check the validity of the cross-disciplinary (social, psychological, ethical, managerial, cultural, anthropological, etc.) nature of the issue.

Understanding the Process

The Delphi technique is a multistage process designed to combine opinion into group consensus (McKenna, 1994). The process being:
- Pilot Testing – small group
- Initial questionnaire – qualitative comments solicited
- Initial feedback – quantitative after statistical analysis of the initial opinions
- Subsequent questionnaire – qualitative comments solicited again
- Subsequent feedback – quantitative after statistical analysis. This provides

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[3] This on-line book is a revised version of the original book by Linstone, A. and Turoff, M. (1975). *The Delphi method: Techniques and applications.* .Reading, MA Addison Wesley.

participants the opportunity to change their opinions.

Selection of Experts

It is important to select panel members who have a balance between impartiality, and an interest in the topic. Some studies have over 60 experts, some as few as 15. Selection of people knowledgeable in the field, and their commitment to multiple rounds of questions on the same topic are essential.

Informing Experts

It is important to explain what is required of them, how much time it will require, what they will be required to provide, what the purpose of the study is to be, and what will be done with the information.

Data Analysis - Discovery of Opinions

According to Green, Jones et al. (1999) two or three rounds are preferred. The authors suggest that an 80% consensus should be the goal. Others such as Crisp, Pelletier et al. (1997) suggest that percentages should not be used, but rather the process should stop when stability of the data occurs.

Data Analysis - Process of Determining the Most Important Issues

According to Duffield (1993), the study undertaken provided pre-existing information for ranking purposes.   Duffield designed a Delphi technique to make use of two panels of experts. The questions (168 each subdivided into categories) provided to the experts on both panels were predetermined from a review of the literature. Initially the method was tested for validity with four nurses that did not serve on the panels.

Data Analysis - Managing opinions

Analytical software is utilized to analyze the responses, and provide feedback to the participants on the central tendencies (means) and on the levels of dispersion (standard deviation). Based upon the work of Lincola and Guba (1985), the criteria for qualitative studies such as the Delphi technique should be credibility (truthfulness), fittingness (applicability), audit ability (consistency), and confirm ability.

Presentation and Interpretation

The author indicates that there are a number of methods for presenting the data, with two of which being graphical and statistical.

The following section provides an overview of how the Delphi technique was used in my thesis[4].

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[4] Editor's note: see (Grisham, 2006) for this thesis available on URL http://adt.lib.rmit.edu.au/adt/public/adt-VIT20061116.125205/

Methodology

<u>Research Design</u>

The design of the methodology for testing my hypothesis was formulated based upon a review of Delphi literature, some of which is noted above. While there was significant research on cross-cultural leadership from a cultural perspective (House, Hanges, Javidan, Dorfman and Gupta, 2004), and on leadership itself (Bass and Stogdill, 1990), there had been little research that attempted to merge the two into a model of cross-cultural leadership attributes. The question that was posed by House and Javidan in the introduction to the Global Leadership and Organizational Behavior Effectiveness (GLOBE) survey (2004: p9) was "What principles and laws of leadership and organizational processes transcend cultures, and can such principles be discovered and empirically verified?" The first part of the question was answered by the thesis, the second part remains unfulfilled, and a work in progress.

From an epistemological perspective the question was if the cross-cultural leadership model was in fact valid: How much bias was introduced because of my experience: Did my research embrace enough of the published literature? How would I test the hypothesis in the most unbiased way possible? Likewise, each of the Delphi panel brought their own biases and experience. The epistemological foundation of the Delphi techniques is to reduce the effects of personal bias. This is done by assuring that all expert feedback is anonymous. By doing so, the technique captures the opinions, experience, and knowledge of each panel member. Personal knowledge is harvested, interpersonal interaction biases are stripped away.

The answers to these questions lie in the basic approach to the research. From the beginning, I sought to find literature from as many disciplines as possible. This avoided the bias of focusing only on Project Management literature or on what I thought would be a fit for the hypothesis. I pursued the various disciplinary pathways by attempting to identify connections, and to follow the leads out to other disciplines. Once I found the references pointing back to previous pathways, I moved on to other disciplines.

Hofstede (2001) did his pioneering global survey of IBM personnel, and the GLOBE survey (House *et al.*, 2004) utilized researchers located around the globe. The topic is so diverse and complex that a survey of managers, subordinates, etc. could not hope to provide a complete and integrated view of the international marketplace in a single survey. What was needed was group of trained professionals from academia and practice who understood the issues of culture and leadership in a holistic manner. My coach, and thesis supervisor[5], suggested that I investigate the Delphi technique, and after careful review, we decided this would be the best technique for testing the hypothesis. All of the reasons outlined by Linstone, Turoff et al. (2002) to use the Delphi technique were present.

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[5] The role in a professional doctorate program such as the DPM of the supervisor is more mentor, coach and sounding board as the candidate is already in the Dreyfus and Dreyfus (2005) typology, a proficient and highly competent performer. The coach/supervisor/mentor contributes wisdom about research methods and approaches as well as practical insights.

For the design of the Delphi technique I started with the outline suggested above by Hasson, Keeney et al. (2000). In designing the research and testing for cross-cultural leadership, there were primary issues that had to be initially addressed that included:

- How the questions will be created –there are many different approaches available here, and literature citations above provide an overview of them. Questions regarding bias, both in the panel and the researcher, need to be considered.
- How the information will be distributed and responses collected. Technology must be addressed alongwith the location, schedule and time zones of the panel. Websites fail, as do connections to them, so it is important to have a stable platform for the panel to minimize frustration.
- What quantitative assessment will be conducted.

My research started with a basic premise: to prove or disprove the validity of the hypothesis that there are *etic* (universal) attributes for cross-cultural leadership that are effective regardless of culture. From personal experience based on over three decades of working in cross-cultural project management teams, I knew that there is significant diversity in the international markets, with many of my projects having included teams working in four or more countries, and those teams consisting of individuals from a dozen or more cultures. What I witnessed was that there appeared to be cross-cultural leadership dimensions that are *etic*, and that they were trust, empathy, power, and communication skills. As I progressed through the coursework and research, and reflected back on my experience, I began to see the added dimension of transformation emerge. The research hypothesis then became cross-cultural leadership intelligence (XLQ) had the dimensions of trust, empathy, power, and communication, and transformation. Later in the research, I added the last component of conflict management as it became clear that this ability spanned all of the attributes.

Figure 1 below illustrates the model developed from the thesis (Grisham, 2006: p254)
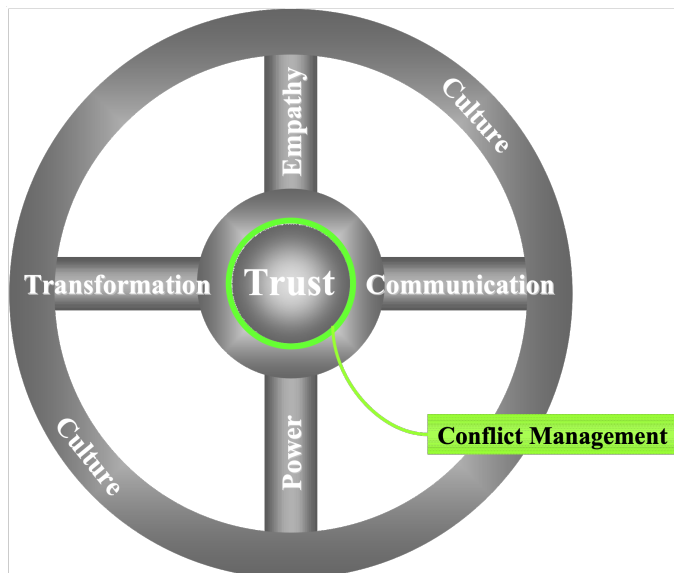

Figure 1 - Cross-cultural Leadership Intelligence (XLQ)

The literature research consumed approximately two years, and utilized the exegetical approach. According to www.wikipedia.com: "Exegesis (from the Greek ἐξηγεῖσθαι 'to lead out') involves an extensive and critical interpretation of a text, especially of a holy scripture, such as of the Old and New Testaments of the Bible, the Talmud, the Midrash, the Qur'an, etc. Traditional exegesis requires the analysis of significant words in texts, examination of the general historical and cultural context, confirmation of the limits of the passage, and lastly, examination of the context within the text. The research included the literature from project management, business, leadership, culture, psychology, philosophy, ethics, anthropology, medicine, poetry, literature, religion, conflict resolution, and more. The meaning was drawn from that research and the findings associated back to the hypothesis.

What emerged was a list of micro cross-cultural leadership (XLQ) attributes that were then associated with the macro attributes of the dimensions. Having correlated the micro to the macro, the next step was to try to relate the XLQ attributes back to a broad international study. The GLOBE study was selected because it considered leadership and culture, and because it asked about how things were in different cultures and how they should be. This indirect measure of globalization was a consideration that I felt was essential in testing the hypothesis. By using the GLOBE as a benchmark, the premise was to benchmark the hypothesis back to the broad international survey.

Thus, the questions for the Delphi panel were constructed from the exegetical research for the aspect leadership attributes of trust, empathy, power, and communication, transformation, and conflict management, and from the cultural aspect dimensions of the GLOBE survey. Those being power distance, uncertainty avoidance, institutional collectivism, group collectivism, gender egalitarianism, assertiveness, future orientation, performance orientation, and humane orientation.

Communicating the Process
Knowing that schedules and time zones would be an issue for the panel, I needed to find a flexible platform that would make it as easy as possible for them to respond to the questions, keep track of their responses, and download the information for subsequent analysis. I used a commercial online site (www.SurveyMonkey.com) to accomplish this.

The site enables researchers to create a customized survey with a wide range of question formats. The site can provide direct email invitations, and if used the respondents can be tracked individually without the other participants knowing who they are – critical to my Delphi approach. The first round was conducted by the direct notification, but some of the panel members had the notifications blocked by SPAM screens. On the second round, email links were provided with the panel members having to provide their names to eliminate the blockers, but still maintaining anonymity. The site enables downloads of the survey data in Excel® spreadsheet format. Unfortunately, the tool does not provide for the feedback of medians and standard deviations so a personal spreadsheet had to be constructed for each panel member that provided their response to the first session along with the median, average, and standard deviation of the scores for the entire Delphi panel.

The next step was to create an invitation brochure that introduced each potential panel member to the Delphi approach and included answers to the following questions:

- What is a Delphi panel
- What is the subject of the research
- What if I have comments on the questions
- How much of my time will it consume
- How many rounds should I anticipate
- When must I complete each round
- Will it be online or will I have to contend with paper
- Will I know the results
- Why should I participate

In addition to providing a full discussion on each of these questions, the invitation brochure was designed to stimulate interest in the research topic. Research has consistently shown, beginning perhaps with Maslow (1943), that self-realization (aspiring Buddha enlightenment) is a strong motivator for those who seeking understanding. I included a detailed account of the number of rounds and the time required for each in the invitation brochure, to be respectful of the panel member's time, and to make sure they knew what to expect. Two critical considerations are highlighted as follows:

1. *Make sure to plan for change in designing the communications*: Schedules change, priorities change, and the deadlines for each round can thus change – this was certainly my experience. The researcher must make certain that each Delphi panel member is kept abreast of the current schedules. As deadlines change, the researcher must be ready to make adjustments considering the overall progress, and to inform the panel promptly. For example, one panel member cannot complete round one until the end of June, which will push round two out until the end of July. At which time three other panel members become unavailable. The researcher should consider such realities in planning the communications.

2. *There needs to be a balance struck between intrusive communications, and a paucity of communications*: Often Delphi panels consist of experts in their field, and so showing consideration for their time is of utmost importance, least one looses panel members. Therefore, a respectful balance is necessary to keep everyone informed without becoming a burden.

Analysis

Dorfman, Hanges, et al. (2004) utilized a 7-point Likert scale for measuring Culturally Endorsed Implicit Leadership Theory (CLT). For their analysis, they considered the cultural endorsement of leadership dimensions proven if 95% of the averages exceeded a mean of five on the 7-point scale. I agreed that a 7-point scale provides for more latitude and nuance in a qualitative survey, so this approach was adopted for the survey.

On each session, the Delphi panel was first asked to rank the questions on a scale of 1 to 7 for the leadership dimensions, and a similar scale was utilized for the cultural questions. This scale was selected to provide for more granularities in the results, so nuances of the panel members opinions could be more accurately captured. At a level of 6.0 or above, the hypothesis had strong confirmation from the Delphi panel. At a level of 5.0 and above, the hypothesis was confirmed similar to the CLT approach. At a level above 5.0 to 4.0, there was weak confirmation, and at or below 4.0 the hypothesis was rejected.

Once the design of the approach is in place, it is essential to determine how information will be provided to the Delphi panel members.

Selection of Experts
This is arguably the most important consideration in designing a Delphi panel. For purposes of my work, an expert was defined as a person that has at least 20 years of practical experience working in an international/multicultural environment, in any industry; or a person that has an advanced degree in leadership or cross-cultural studies with over 20 years of research, teaching, publication experience; or a combination of the two.

There is a schism between the academic community and the practicing community over leadership and cross-cultural issues. Both have perspectives that are not only valid, but also essential for consideration in research such as this. Therefore, the expert panel I selected included both views of the research problem – theory and practice. In addition, the global nature of the cross-cultural issues argues that there should be people on the panel from different cultural backgrounds. Taking guidance from Dorman, Hangs, et al. (2004), the experts sought represented as many regions as possible from Eastern Europe, Nordic Europe, Germanic Europe, Latin Europe, Latin America, Confucian Asia, Southern Asia, Anglo, Sub-Saharan Africa, and the Middle East.

With globalization, the borders of cultural distinctness are more blurred. Organizations hire from a global pool, and people are culturally cross-trained and contaminated with new values and norms. With this reality, it is necessary to capture such attitudes and views in the panel members. Therefore, I looked for people with such experience. It was also important to capture views from a variety of business backgrounds (personal care products to power generation), academic disciplines, and NGO's. Table 1 provides an overview of the panel member demographics for the 25 panel members who participated. The "Panel Culture" column means the culture in which a person was primarily raised. Whereas, the "Panel Experience" column looks at the years of work and/or academic experience a panel member had in the area. So for example, for Eastern Europe I had panel members with experience there, despite the fact that they were not raised in the culture.

Table 1 – Delphi Panel Demographics

Panel Demographics		
Cultures & Experience	**Panel Culture**	**Panel Experience Years**
Cultures		
Eastern Europe (Albania, Georgia, Greece, Hungary, Kazakhstan, Poland, Russia, Slovenia)	0	17
Nordic Europe (Denmark, Finland, Sweden)	0	11
Germanic Europe (Austria, Germany East, Germany West, Netherlands, Switzerland)	1	13
Latin Europe (France, Israel, Italy, Portugal, Spain)	2	59
Latin America (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, Venezuela)	1	21
Confusian Asia (China, Hong Kong, Japan, South Korea, Singapore, Taiwan)	3	95
Southern Asia (India, Indonesia, Iran, Malaysia, Philippines, Thailand)	3	71
Sub Saharian Africa (Namibia, Nigeria, South Africa, Zambia, Zimbabwe)	0	14
Middle East (Egypt, Kuwait, Morocco, Qatar, Turkey)	1	49
Anglo (Australia, Canada, Ireland, New Zealand, South Africa, United Kingdom, United States)	13	349
English Carribean	1	
Years of Experience		
Academia - Number of Years		206
Business - Number of Years		376
Government - Number of Years		69
Non-Profit - Number of Years		9

I was extremely fortunate to have such a diverse range of expertise on the panel. One of the panel members was a lead in the GLOBE survey, another a leading global expert in executive coaching, and others executives in international business and academic leaders. Originally, there were panel members from Africa, Eastern Europe, and Nordic Europe but ultimately they could not participate due to scheduling issues.

As with other previous work, e.g. Duffield (1993), there was an initial list of questions that was developed from the research. The first round provided the panels with a list of 45 questions with multiple parts, 156 total questions including the three on panel member demographics. The questions explored the leadership dimensions first, and then queried the connections between the leadership dimensions and the GLOBE cultural dimensions. The panel was asked to connect the hypothesis categories of truth, empathy, transformation, power, and communication, to the GLOBE survey dimensions of culture. The panel members were also provided the opportunity to provide a commentary on the dimensions themselves.

Once the question bank was established the thesis supervisor, tested it. He reviewed the questions with regard to clarity and applicability to the research hypothesis. He was able to spot ambiguities and areas where more definition was required and pilot the tuning of the survey. The survey questions were adjusted to include his comments, and then reviewed again before being finalized. The first round was left open for well over two months to enable members to reconcile schedules, and to enable those academics in the southern hemisphere to return from holiday.

Analysis

The first round was conducted, and the software bugs worked out. The scores of the panel members were analyzed to find the statistical median of each question, the average, and the standard deviation. The results of the first round indicated a reasonably tight grouping of opinion on most of the questions, with a few outliers. The first round data was inspected to determine which leadership and cultural dimensions had a standard deviation greater than 2.0. As there were only four such points, I decided to narrow the control limits. By inspection, on all but 19 out of 153 questions, the standard deviation was less than 1.7 or 87.6% concurrence. I re-set the control limits so that half the standard deviation ($\sigma/2$) was less than 1.0, and then prepared scatter plots for each of these 19 dimensions.

On the second round, the median, average, and standard deviation for each question from the first was provided to each panel member. Scatter graphs were also provided on the questions where the standard deviation was, greater than 1.7 to enable the panel members to visualize the responses. In addition, each panel member was given their answers to the first round of questions. Then the panel members were then asked to reassess their first session answers and to adjust them as they saw fit. The panel members were again provided the opportunity to provide a commentary on the dimensions. Of the 25 panelists who agreed to participate, only a portion was able to make time in their schedules to complete the survey. Fifteen panel members completed both session 1 and 2. The remainder completed either the first session or the second session.
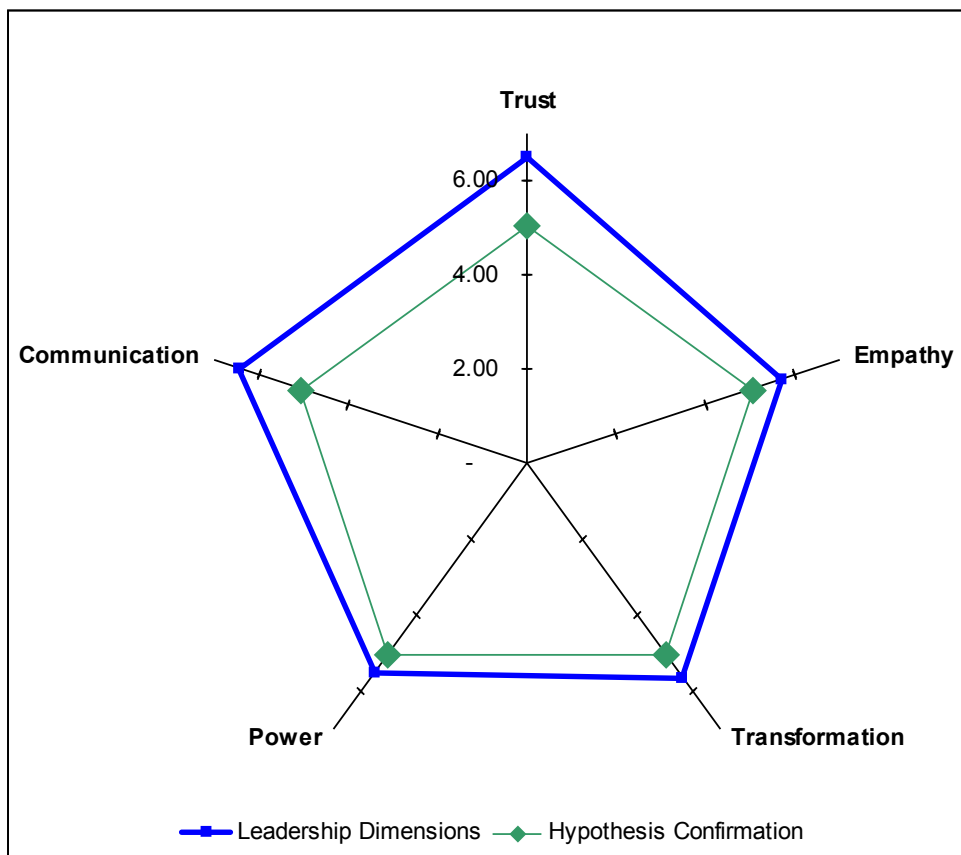
Figure 2 – XLQ Aspect Leadership

Only two rounds were necessary, as the standard deviation of the responses on the second round were very close indeed to those of the first round. Overall, the findings of the test results are provided for the leadership aspect and the cultural aspect of XLQ in Figure 2 and Figure 3.
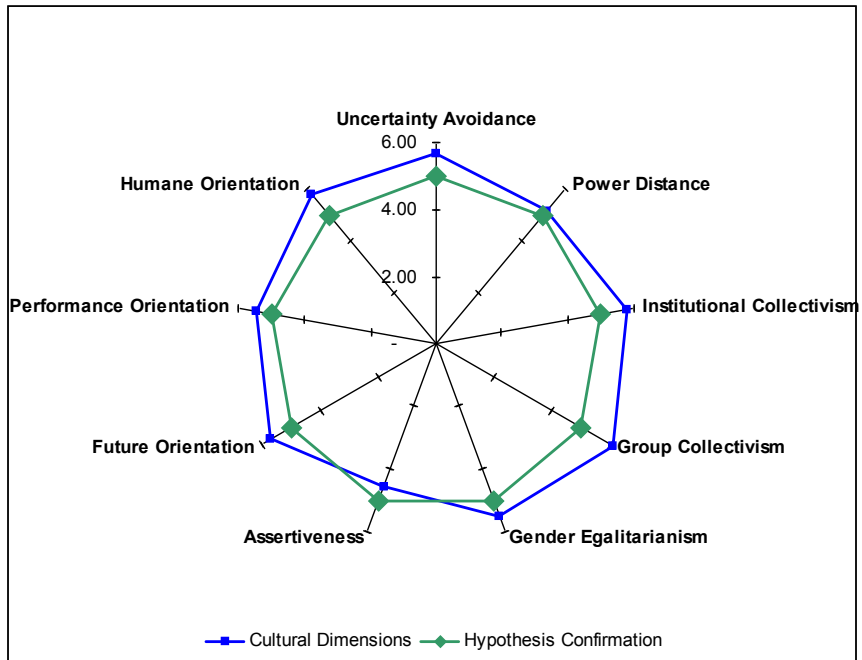

Figure 2 - XLQ Aspect culture

The relevance of illustrating the above results from the research is to show how the Delphi technique permitted me to gain access to a very rich pool of expertise with which the hypotheses could be tested in a credible, valid and rigorous manner.

Figure2 and Figure 3 illustrates that the hypothesis is confirmed on all attributes of both aspects, with the only exception being on assertiveness. The testing inter-related both aspects as well.
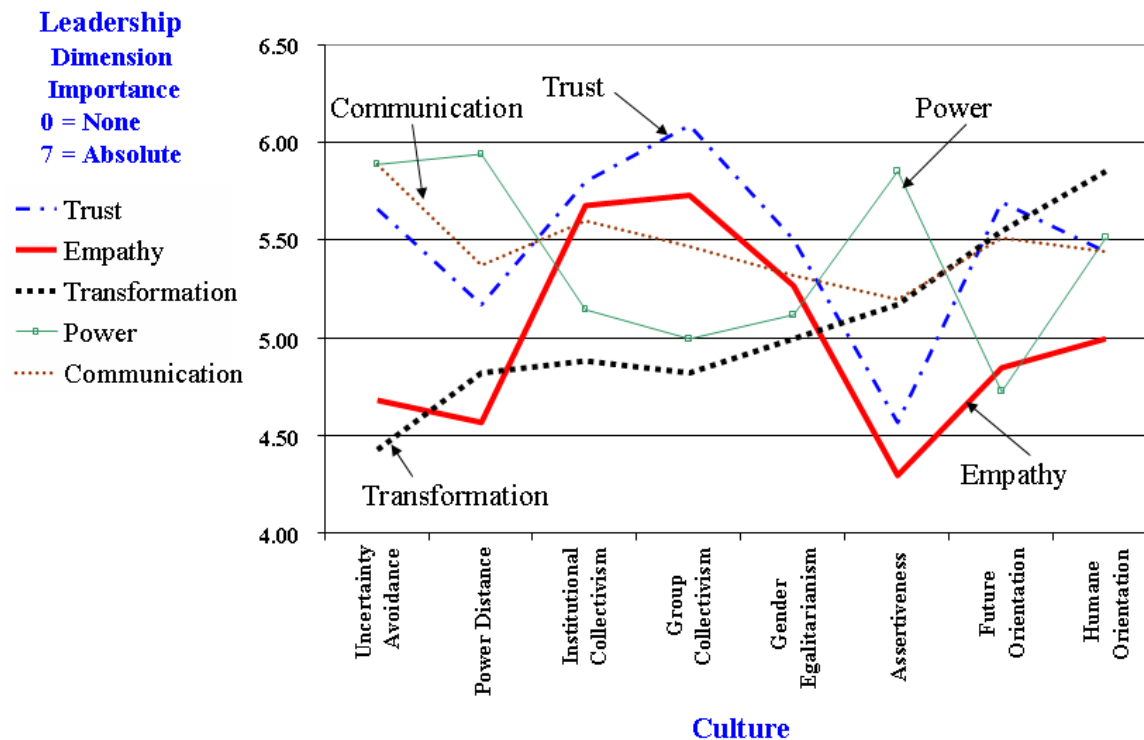
Figure 3 - Leadership/Culture Correlation

Figure 4 shows the relationship between the dimensions of leadership and those of culture. It also underscores the importance of trust and communications. The cultural dimension of assertiveness, was found to be negatively correlated with leadership. This suggests that there is little correlation with empathy. Assertiveness however shows that there is significant correlation with power, again as one would expect.

Discussion and Conclusions

The Delphi technique is a qualitative survey technique that is well suited for the research of complex issues. It does not offer the rigor of clinical testing or quantitative analysis, but it provides a scientific methodology that is well suited to issues that require the insights of subject matter experts.

The Delphi technique was a good fit when Czinkota and Ronkainen (2005) wanted to explore international business trends and how businesses were dealing with globalization and change in international markets. However, Iacoboni, Molnar-Szakacs et al. (2005) used a quantitative approach when they wanted to explore the relationship between actions and mirror neurons. The important point being made here, is that a researcher needs to select the research tool(s) best suited to the topic and the data. My research was more closely related to the approach taken by Czinkota and Ronkainen, in that it explored a complex and multifaceted topic.

A weaknesses with the technique is that it will not produce clinical testing-type accuracy that yields exact numeric results. The Delphi technique is a qualitative approach, not a

quantitative approach. It may also not yield exact repeatable results. For example if a group of people in information technology (IT) in Micronesia were asked to respond to the same questions as the Delphi panel addressed in my work, their answers would not be exactly the same. The results would not be similar to those of Iacoboni, Molnar-Szakacs et al. (2005)

The strength of the Delphi technique, especially as applied to my work, was that it offered the ability to examine a topic that had a multitude of aspects, and that was variable depending upon the cultural context. The literature alone on the issue of cross-cultural leadership is disparate, wide-ranging, and crossed over many academic boundaries. I believe the research to be well designed because it took account of a broad range of research conducted over more than 50 years on cross-cultural leadership, in more than a dozen disciplines. The research was calibrated and benchmarked back to the GLOBE study which was performed using clinical techniques other than Delphi. In addition, the research took advantage of a group of subject matter experts (SME's) from academia and business who have many years of experience with the connection between theory and practice, and between leadership and culture.

I found Delphi research reports in most every discipline. A search in Google Scholar for Delphi technique or method between 2000 and 2008 yielded 14,100 hits. According to Bell (1977, p262) "there are multiples of thousands of Delphi studies that have been carried out in both the public sector and by private corporations." This strongly suggests that regardless of the field of study to be investigated, there is a wealth of published research on how to use the Delphi technique within a given discipline. This paper has presented an overview of thinking on the technique itself, when to use it, how to use it, and how to assess the results.

The aim of this paper was to share my experience in using this technique and that my personal experience with the technique will both stimulate ideas and provide a starting point for those wrestling with complex multifaceted research issues. The process of successfully researching and submitting a doctoral thesis provides evidence that the tools and techniques used have been deemed suitable and proper by expert examiners and so this paper should provide a useful example to cite for further research being undertaken using the Delphi approach in project management.

Continued research is needed in a number of areas. The first being that metrics are needed for evaluating and training on XLQ Leadership skills. There is a wealth of information on evaluation and training in the literature, but it needs to be related back to the XLQ Model. A research paper to investigate how to connect the previous work to the XLQ Model would enable a training program to be developed and tested in multiple cultures. To be useful, the model needs metrics that can provide a way of measuring the knowledge transfer.

Another topic that would help to calibrate leaders is to research the characteristics of leadership as perceived by people from different cultures. If I ask a Project Management training group in Trinidad and Tobago who they believe a leader to be, the immediate answers are Fidel Castro and Hugo Chavez.   If I ask my Chinese friends, they say Sun Yat-Sen.   If I ask an American Project Management group, they might say George Bush or Colin Powell. If I ask my friends in Turkey, they say Ataturk. When I tell the Americans about the views of the Trinidadians, they scoff and immediately reject their views. The exploration of

who people consider leaders has been done in previous research, but usually from a Western perspective. A systematic review of leaders from different cultural perspectives, that could be evaluated using the XLQ model, would help to bridge some of the cultural gaps and improve the leadership training.

Lastly, research into virtual team trust and communications is needed. Many people work in a virtual environment, and the e-sociality dimension of leadership needs to be explored in far more detail than it has been to date. There is some interesting research on the topic, but once again, it needs to be connected to XLQ Leadership.

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