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**KNOWLEDGE LEADERS' CRITICAL ISSUES:
AN INTERNATIONAL DELPHI STUDY**

Marc Dfouni

**A Thesis
in
The John Molson School of Business**

**Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Administration at
Concordia University
Montreal, Quebec, Canada**

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ABSTRACT

Knowledge Leaders' Critical Issues: An International Delphi Study

Marc Dfouni

Nowadays, an increasing number of organizations hire knowledge leaders to create and maintain a knowledge management environment. However, the critical issues these individuals face are very poorly defined in today's academic literature. Using a web-based Delphi method, this study is the first to reach a worldwide consensus on knowledge leaders' critical issues. These issues include knowledge leaders' roles, skills, perceived knowledge management benefits and obstacles, as well as the technologies and tools they use for implementing knowledge management initiatives.

A stable level of agreement among 100 knowledge leaders has been reached on these issues. The results indicate that their most important role is to foster a knowledge sharing culture in their organization in order to overcome the most important obstacle: organizational culture. They also suggest that the key abilities a knowledge leader should possess are those of strong interpersonal and leadership skills. In addition, portals and information retrieval engines are found to be the most widely used technologies and tools to develop and/or implement knowledge management initiatives. Finally, an increase in internal knowledge sharing was judged to be the most significant of all perceived knowledge management benefits.

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TABLE OF CONTENTS

LIST OF TABLES.....	VI
LIST OF FIGURES.....	VII
LIST OF APPENDICES	VIII
CHAPTER I - INTRODUCTION	1
CHAPTER II - LITERATURE REVIEW	3
II.1 - DEFINING A KNOWLEDGE LEADER.....	5
II.2 - KNOWLEDGE LEADERS' ROLES.....	6
II.3 - KNOWLEDGE LEADERS' SKILLS	10
II.4 - KNOWLEDGE MANAGEMENT BENEFITS	14
II.5 - KNOWLEDGE MANAGEMENT OBSTACLES.....	17
II.6 - KNOWLEDGE MANAGEMENT TECHNOLOGIES AND TOOLS.....	19
II.7 - DELPHI METHOD.....	21
CHAPTER III - RESEARCH METHODOLOGY.....	22
III.1 - RESEARCH QUESTIONS	22
III.2 - DELPHI METHOD	23
<i>III. 2. a - Justification for Using the Delphi Method.....</i>	<i>24</i>
<i>III. 2. b - Validity of the Delphi Method.....</i>	<i>27</i>
<i>III. 2. c - Standard Delphi Procedure</i>	<i>28</i>
<i>III. 2. d - Delphi Variables.....</i>	<i>32</i>
III.3 - WEB-BASED SURVEY	47
III.4 - FINDING POTENTIAL RESPONDENTS	50
<i>III. 4. a - Subject Bias</i>	<i>53</i>
III.5 - DEVELOPING THE QUESTIONNAIRES	54
III.6 - DEVELOPMENT OF THE FIRST ROUND QUESTIONNAIRE	55
<i>III. 6. a - Cover Letter</i>	<i>55</i>
<i>III. 6. b - Consent Form</i>	<i>56</i>
<i>III. 6. c - General Instructions</i>	<i>56</i>
<i>III. 6. d - Section 1 – Knowledge Leaders' Roles.....</i>	<i>57</i>
<i>III. 6. e - Section 2 – Knowledge Leaders' Skills.....</i>	<i>57</i>
<i>III. 6. f - Section 3 – KM Obstacles.....</i>	<i>57</i>
<i>III. 6. g - Section 4 – KM Technologies and Tools.....</i>	<i>58</i>
<i>III. 6. h - Section 5 –KM Benefits.....</i>	<i>58</i>
<i>III. 6. i - Section 6 – Background Information</i>	<i>58</i>
<i>III. 6. j - Pre-testing the First Round Questionnaire.....</i>	<i>59</i>
III.7 - DEVELOPMENT OF THE SECOND ROUND QUESTIONNAIRE	63
III.8 - DEVELOPMENT OF THE THIRD ROUND QUESTIONNAIRE	66
III.9 - STATISTICAL PROCEDURES.....	68

CHAPTER IV - RESULTS AND DATA ANALYSIS.....	69
IV.1 - RESPONSE RATES	69
IV.2 - DEMOGRAPHIC PROFILE OF THE ORGANIZATIONS	70
IV. 2. a - Industry.....	70
IV. 2. b - Employee Number.....	72
IV. 2. c - KM Employee Number.....	72
IV. 2. d - Revenue.....	73
IV. 2. e - Percentage of the Budget Reserved for KM.....	74
IV. 2. f - Percentage of Time Dedicated to KM Activities.....	75
IV. 2. g - Functional Areas Where KM is Being Implemented.....	76
IV.3 - DEMOGRAPHIC PROFILE OF THE RESPONDENTS.....	77
IV. 3. a - Geographic Area.....	77
IV. 3. b - Job Position.....	78
IV. 3. c - Years in Firm / in Position / of KM Experience.....	80
IV. 3. d - Reporting Structure.....	81
IV. 3. e - Education and Study Field.....	82
IV. 3. f - Age and Gender.....	84
IV. 3. g - Who Appointed the Respondents to Their Current Job Position.....	84
IV.4 - ANALYSIS OF ROUND ONE'S RESULTS	86
IV. 4. a - Knowledge Leaders' Roles.....	89
IV. 4. b - Knowledge Leaders' Skills.....	90
IV. 4. c - KM Obstacles.....	90
IV. 4. d - KM Technologies and Tools.....	91
IV. 4. e - KM Benefits.....	91
IV.5 - ANALYSIS OF ROUND TWO'S RESULTS.....	92
IV.6 - ANALYSIS OF ROUND THREE'S RESULTS.....	96
IV.7 - SUMMARY OF THE ITEMS' PATH THROUGH THE THREE ROUNDS.....	100
IV.8 - ANALYSIS OF THE LEVEL OF CONSENSUS.....	102
IV. 8. a - Mean Ratings as a Measure of Consensus.....	104
IV. 8. b - Standard Deviations as a Measure of Consensus.....	104
IV. 8. c - Medians as a Measure of Consensus.....	104
IV. 8. d - Inter-Quartile Range as a Measure of Consensus.....	105
IV. 8. e - Percent Top Issues as a Measure of Consensus.....	105
IV. 8. f - Kendall's Coefficient of Concordance (<i>W</i>) as a Measure of Consensus.....	105
IV. 8. g - Conclusion on the Level of Consensus.....	106
CHAPTER V - DISCUSSION – KNOWLEDGE LEADERS' CRITICAL ISSUES.....	107
V.1 - GENERAL DISCUSSION	107
V. 1. a - Top 10 Knowledge Leaders' Roles.....	107
V. 1. b - Top 5 Knowledge Leaders' Skills.....	115
V. 1. c - Top 10 KM Benefits.....	119
V. 1. d - Top 10 KM Obstacles.....	124
V. 1. e - Top 10 KM Technologies and Tools.....	130
V.2 - DISCUSSION ON THE DELPHI METHOD.....	136
V. 2. a - Level of Consensus.....	136
V. 2. b - Number of Rounds.....	137
CHAPTER VI - CONCLUSION.....	138
VI.1 - LIMITATIONS.....	140
VI.2 - IMPLICATIONS FOR RESEARCHERS AND PRACTITIONERS.....	141
VI.3 - FUTURE DIRECTIONS.....	143
BIBLIOGRAPHY.....	144
GENERAL BIBLIOGRAPHY.....	144
BIBLIOGRAPHY ON THE DELPHI METHOD.....	150

LIST OF TABLES

Table 1 - Organizational deficiencies that CKOs should attempt to correct (Neilson, 2000).....	7
Table 2 - CKO challenges identified by Guns (1998)	7
Table 3 - Roles cited by more than 80% of the subjects (Bonner, 2000).....	8
Table 4 - Knowledge leaders' roles by order of their occurrence in the literature (constituting section one of the first questionnaire).....	10
Table 5 - Findings grouped into four competency categories and their respective competencies presented by order of importance (Corcoran and Jones, 1997).....	11
Table 6 - CKO skills to develop the KM vision and to plan the KM program (Abell and Oxbrow, 1999).....	12
Table 7 - CKO competencies identified by Guns (1998).....	12
Table 8 - Knowledge leaders' skills by order of their occurrence in the literature (constituting section two of the first questionnaire).....	13
Table 9 - Benefits of implementing knowledge management initiatives (Waruszynski, 2000).....	15
Table 10 - Obstacles for Implementing Knowledge Management Initiatives (Chase, 1997; Waruszynski, 2000; McKeen and Staples, 2001)	17
Table 11 - Knowledge Management obstacles (constituting section three of the first questionnaire).....	18
Table 12 - Knowledge management technologies and tools (constituting section four of the first questionnaire).....	20
Table 13 - Circumstances justifying the usage of the Delphi method (Linstone and Turoff, 1975, p. 4).....	25
Table 14 - Reasons for Delphi use in the KM field	26
Table 15 - Advantages of the Delphi method (Tersine and Riggs, 1976; Murry and Hammons, 1995)	26
Table 16 - Drawbacks of the Delphi method (Tersine and Riggs, 1976; Murry and Hammons, 1995)	27
Table 17 - Literature matrix of Delphi studies (in collaboration with Marina h Marina Chambon, 2002).....	36
Table 18 - Interpretation of Kendall's <i>W</i> (Schmidt, 1997)	42
Table 19 - Summary of different alternatives to evaluate the level of agreement and stabilization of the results.....	45
Table 20 - List of potential KM associations.....	52
Table 21 - List of potential KM forums.....	53
Table 22 - Sources of potential respondents	53
Table 23 - Modifications to the questionnaire	63
Table 24 - Number of effective respondents by round and section	69
Table 25 - Number of usable questionnaires by round	70
Table 26 - Two-level industry categorization.....	71
Table 27 - Two-level geographical categorization	77
Table 28 - Two-level job position categorization	79
Table 29 - Respondent classification by job position (N=98)	80
Table 30 - Respondent classification by years in firm, years in position, and years of KM experience (N=98).....	81
Table 31 - Two-level reporting structure categorization	82
Table 32 - Two-level categorization of whom appointed the respondents to their current job position.....	85
Table 33 - Analysis of round one's results.....	88
Table 34 - Number of occurrence of added roles in round one	89
Table 35 - Number of occurrence of added skills in round one.....	90
Table 36 - Number of occurrence of added KM obstacles in round one	90
Table 37 - Number of occurrence of added KM technologies and tools in round one	91
Table 38 - Number of occurrence of added KM benefits in round one	92
Table 39 - Analysis of round two's results.....	94
Table 40 - Analysis of round three's results.....	97
Table 41 - Items' path through the three rounds.....	101
Table 42 - Analysis of the level of consensus.....	103
Table 43 - Kendall's coefficient of concordance <i>W</i> for all the sections in rounds two and three	106
Table 44 - Top ten knowledge leaders' roles (based on final round of Delphi survey).....	107
Table 45 - Top five knowledge leaders' skills (based on final round of Delphi survey).....	115
Table 46 - Top ten KM benefits perceived by knowledge leaders (based on final round of Delphi survey).....	119
Table 47 - Top ten KM obstacles perceived by knowledge leaders (based on final round of Delphi survey).....	124
Table 48 - Top ten KM technologies and tools perceived by knowledge leaders (based on final round of Delphi survey).....	130

LIST OF FIGURES

Figure 1 - Standard Delphi procedure (Fowles, 1978).....	31
Figure 2 - Classic formula of Kendall's coefficient of concordance W (Siegel, 1956, p. 231).....	44
Figure 3 - Formula of Kendall's coefficient of concordance W corrected for ties (Siegel, 1956, p. 234)	45
Figure 4 - Organizational classification by industry (N=98)	71
Figure 5 - Organizational classification by employee number (N=97).....	72
Figure 6 - Organizational classification by KM employee number (N=92)	73
Figure 7 - Organizational classification by revenue (N=56).....	74
Figure 8 - Organizational classification by percentage of budget reserved for KM (N=69)	75
Figure 9 - Organizational classification by percentage of time dedicated to KM activities (N=66).....	76
Figure 10 - Organizational classification by functional area where KM is being implemented (N=99)	76
Figure 11 - Respondent classification by geographical area (n=99).....	78
Figure 12 - Respondent classification by reporting structure (N=89).....	81
Figure 13 - Respondent classification by education (n=98)	83
Figure 14 - Respondent classification by study field (n=88)	83
Figure 15 - Respondent classification by age and gender (n=98).....	84
Figure 16 - Respondent classification by who appointed them to their current job position (n=86)	86

LIST OF APPENDICES

APPENDIX 1 – KM RELATED JOB TITLES.....	155
APPENDIX 2 – LETTER SENT TO KM ASSOCIATIONS	156
APPENDIX 3 – LETTER SENT TO KM FORUMS (FIRST ROUND)	157
APPENDIX 4 – FIRST ROUND QUESTIONNAIRE.....	158
APPENDIX 5 – MODIFICATIONS QUESTIONNAIRE.....	170
APPENDIX 6 – PRECONDITIONING SENT TO PRACTITIONERS (PRE-TEST).....	171
APPENDIX 7 – FOLLOW-UP LETTER SENT TO PRACTITIONERS (PRE-TEST)	172
APPENDIX 8 – FIRST REMINDER SENT TO PRACTITIONERS (PRE-TEST).....	173
APPENDIX 9 – SECOND REMINDER SENT TO PRACTITIONERS WHO ACCEPTED TO DO THE PRE-TEST.....	174
APPENDIX 10 – SECOND REMINDER SENT TO PRACTITIONERS WHO DID NOT REPLY TO DO THE PRE-TEST	175
APPENDIX 11 – SECOND ROUND QUESTIONNAIRE.....	176
APPENDIX 12 – SECOND ROUND LETTER SENT TO NEW POTENTIAL RESPONDENTS	186
APPENDIX 13 – SECOND ROUND LETTER SENT TO FIRST ROUND RESPONDENTS	187
APPENDIX 14 – SECOND ROUND FIRST REMINDER	188
APPENDIX 15 – THIRD ROUND QUESTIONNAIRE.....	189
APPENDIX 16 – THIRD ROUND INITIAL E-MAIL	196
APPENDIX 17 – THIRD ROUND FIRST REMINDER.....	197
APPENDIX 18 – THANK YOU LETTER	198

“The next society will be a knowledge society. Knowledge will be its key resource, and knowledge workers will be the dominant group in its workforce.”

Peter Drucker (2001)

**“All men by nature desire to know”
– Aristotle (384 B.C.)**

Chapter I - INTRODUCTION

“In 1930, information doubled every 30 years. Two thousand five hundred years worth of codified information doubled every 30 years! In 1970, that same codified base of information doubled every 7 years. By the year 2010, all the codified information base in the world will double every 11 hours!”, has said Nick Bontis¹, knowledge management (KM) guru. The need for organizations to manage and extract knowledge from this vast amount of information is increasing. However, this is easier said than done. The first step for an organization to initiate a KM activity is to appoint a knowledge leader. Hence, as the number of such organizations increases, so does the demand for knowledge leaders. In fact, Gartner Group estimates that by 2005, innovation-focused knowledge workers will represent 30 to 35 percent of the employed workforce in developed nations, up from 10 to 15 percent in 2000 (Morello and Caldwell, 2001).

Using the Delphi method, this study is the first, to our knowledge, to reach a worldwide consensus on major issues concerning today’s knowledge leaders. These issues were retrieved from existing KM literature and categorized into knowledge leaders’ roles and skills, their perceived KM benefits, the KM obstacles they encounter in their daily tasks, as well as the technologies and tools they use for implementing KM initiatives. They were then presented to KM experts in order to be validated. The experts were also asked to suggest missing issues.

The main objective of this thesis is to present the above mentioned issues in order to build a baseline allowing knowledge leaders to better understand where they need to be in the future. More specifically, the main objective is to present the above mentioned issues with the purpose of serving as guideposts and benchmarks to knowledge leaders to examine the possible transition to a fully integrated knowledge organization and assist them as they further evolve knowledge management functions. With this more substantial view, the knowledge leader community can be prepared for the years to come.

The next chapter will offer a literature review on the above-mentioned issues. Chapter III presents the research methodology used in the present study, while the fourth chapter depicts the obtained results and data analysis. Finally, results are discussed in Chapter V, and limitations, implications, and future directions of this thesis are suggested in Chapter VI.

¹ http://www.ccmd-ccg.gc.ca/events/workshops/KM/bontis/video1_e.html

Chapter II - LITERATURE REVIEW

Knowledge management's recent emergence is mainly due to the nomadic working lifestyle of today's employees. It has been asserted that, nowadays, employees change their jobs once every two years, carrying with them the knowledge they have acquired through years of experience. To alleviate this problem, KM's main objective is to maximize organizational knowledge sharing, while minimizing knowledge loss. In order to initiate KM, today's organizations need individuals to undertake the responsibility of developing and maintaining a KM environment. Accordingly, organizations need knowledge leaders. Unfortunately, the amount of academic literature that has researched and analyzed knowledge leaders at this point in time is very limited, although the frequency of KM research is increasing expeditiously.

Despres and Chauvel (1999a) presented a figure in their article showing the increasing number of new articles found using the keywords "knowledge management" in the ABI/INFORM database. However, the majority of these articles concentrate on both the technical and process aspects of KM rather than on its culture and people, contrary to Liebowitz (1999), who reveals that KM is 80% about people and cultural change and only 20% about technical development. Unfortunately, change does not occur without the intervention of people, and the main question for all organizations following this route is to appropriately define the roles and skills that knowledge leaders should have.

Knowledge leaders were first employed in the early 1990s to foster the flow of knowledge throughout increasingly complex organizations. Their function can be compared to the analogy of transmitting bits of information through different pipes to the appropriate people. They then designed better pipes, such as company-wide e-mail networks and corporate intranets, and, furthermore, re-designed work and communication processes to promote collaboration (Foote et al., 2001). In the November 2001 issue of the Economist, Peter Drucker (1998) declared: “Now we are entering a third period of change: the shift from the command-and-control organization...to the organization of knowledge specialists.” However, due to the infancy state of KM, knowledge leaders do not have stable job titles. Their job titles were retrieved from the KM literature and include Chief Knowledge Officer, Chief Learning Officer, Knowledge Manager, Knowledge Facilitator, and many more (see Appendix 1).

As mentioned earlier, this study’s main objective is to reach a worldwide consensus on major issues concerning today’s knowledge leaders. These issues include knowledge leaders’ roles and skills, their perceived KM benefits, the KM obstacles they encounter in their daily tasks, as well as the technologies and tools they use for implementing KM initiatives. Furthermore, these issues were selected after a thorough literature review on knowledge leaders. To our knowledge, these issues have not yet been combined within a same study.

The next sections present a literature review on knowledge leaders, their roles, skills, as well as on KM's obstacles, benefits, and technologies and tools. It is important to note that these issues will not be explained in the literature review since it is still uncertain, at this stage, whether they will be the most important ones yielded from the last Delphi questionnaire. The most important issues will be detailed in the Discussion presented in Chapter V.

II.1 - Defining a Knowledge Leader

Various past studies have defined the Chief Knowledge Officer (CKO) position. While two authors defined it in general terms by stating that 1) "CKOs are the leaders of their organizations' knowledge management and organizational learning initiatives" (Bonner, 2000), and 2) "CKOs are senior executives who are responsible for ensuring that an organization maximizes the value it achieves through one of its most important assets – knowledge" (Skyrme, 1997), two other authors defined it in more detail. The first stated that a CKO is "the catalyst for a knowledge-sharing culture, owner of the infrastructure specifications that facilitate knowledge transfer and storage, and maintainer of the closed-loop learning system" (Rasmus, 2000). The second defined a CKO as "one who sets strategic policy for an organization's acquisition and distribution of knowledge and learning, based on the premise that increasing people's capacity to take action will enable them to respond more effectively and efficiently to their customers" (Barclay, 1997).

In order to simplify these various definitions, this study defines a knowledge leader in more general terms:

A knowledge leader is an individual responsible for creating and/or maintaining a KM environment.

II.2 - Knowledge Leaders' Roles

Before attempting to explore the literature review on knowledge leaders' roles, it is primordial to understand the definition of what is a 'role'. Henry Mintzberg, a management professor and analyzer of managerial behavior has defined a role as "a set of systematically interrelated and observable behaviors that belong to an identifiable job or position." (1975). In the context of this study, a knowledge leaders' role is the duties that this individual is expected to perform in her/his organization in order to develop and/or implement a KM environment.

Unfortunately at this point in time, the amount of academic literature that examined knowledge leaders' roles can be counted on one hand. The most important academic paper was written by Earl and Scott in 1999 in which the authors studied twenty knowledge leaders in North America and Europe in order to understand their roles and to "gain insight on evolving knowledge management practice". They concluded that the mandates and overall mission of a knowledge leader are still not clear. To add to this unclarity, a recent study stated: "There is little consensus regarding the competencies needed by those individuals charged with leading knowledge management initiatives" (Neilson 2000). Earl and Scott's seminal article was the starting point of this study and

most of the other found articles referred to their results. The following table refers to Earl and Scott's perceived organizational deficiencies that CKOs should attempt to correct (Neilson, 2000):

<i>Organizational Deficiencies that CKOs Should Attempt to Correct</i>
<ul style="list-style-type: none"> • Inattention to the explicit or formal management of knowledge in ongoing operations. • Failure to leverage the hidden value of corporate knowledge in business development. • Inability to learn from past failures and successes in strategic decision-making. • Not creating value or "making money" from knowledge embedded on products or held by employees.

Table 1 - Organizational deficiencies that CKOs should attempt to correct (Neilson, 2000)

In 1998, 25 knowledge leaders were interviewed in order to outline their challenges (Guns, 1998). The findings are summarized in Table 2. Since the "challenges" have not been defined by the study's author, their content was studied and judged to be comparable to "roles".

<i>Challenges (Roles)</i>
<ul style="list-style-type: none"> • Setting knowledge management strategic priorities. • Getting a knowledge (best practices) database up and running. • Gaining commitment of business leaders to better support a learning environment. • Transforming a center of shared intelligence into that of intelligence provocateurs. • Putting in place a process for managing intellectual assets. • Obtaining customer satisfaction information from customers in 'near' real time. • Globalizing knowledge management.

Table 2 - CKO challenges identified by Guns (1998)

The author concluded that CKOs will "experience a clearer sense of the full scope and depth of their responsibilities" only upon the development of an architecture that will shape and frame the discipline of KM.

More recently, eighteen CKOs and Chief Learning Officers (CLOs) representing various industries from large private and public organizations were studied to define their roles (Bonner, 2000). The author found that the roles of the CKOs and CLOs are noticeably similar. Table 3 below depicts the roles cited by more than 80% of her studied sample.

Roles	Percentage of CKO CLO performing these roles
Having a customer service orientation.	100%
Identifying critical areas for improvement.	100%
Undertake knowledge-content activities (capture, share and retain knowledge)	100%
Leverage corporate-wide learning and/or knowledge.	100%
Align and integrate diverse functions or groups.	89%
Use and/or develop best practices and benchmarking studies.	89%
Be a visionary/champion for organizational learning and/or KM.	89%
Develop a culture that encourages learning and accepts KM.	83%
Develop partnerships with senior management and others.	83%
Conduct strategic planning and implementation.	83%

Table 3 - Roles cited by more than 80% of the subjects (Bonner, 2000)

The author also thoroughly discussed the evolving roles, responsibilities, and daily activities of knowledge leaders. She observed that “[Knowledge leaders] are first generation incumbents. They typically started their jobs less than three years ago and did so without clearly defined roles, responsibilities, and daily activities.” It is not surprising that knowledge leaders do not have clearly defined roles. Since KM is an emerging field, the only available resources for knowledge leaders are books, conferences, the Internet, and input from a limited number of consulting firms. Knowledge leaders do not have predecessors from whom they can seek guidance. Other authors have supported these facts by stating that: “Clearly, there are inconsistencies in [knowledge leaders’] roles, responsibilities, titles, and training” (Herschel and Nemati, 1999).

The most recent academic article on the CKO position was published in 2000 by Dr. Nick Bontis in the *Knowledge and Process Management* journal. The main objective of his paper was to “highlight the multi-disciplined perspective that CKOs must embrace to be successful”. The author defines a CKO as an “evangelist that preaches and exemplifies the important skills required to leverage the knowledge embedded in every person and system” and concludes that to be successful, a CKO must effortlessly rotate between being a “knowledge sharing icon” (where the CKO acts as an icon that other members of the organization look up to for guidance), a “trust steward”, a “total trainer” (where the CKO works closely with the HR department and the training and development staff), a “techno nerd”, as well as a “number-crunching accountant” (where the CKO should understand the world of finance and accounting). A contrast between the roles stated in the studies mentioned above is easily noticeable mainly due to the fact that the roles of knowledge leaders are evolving rapidly. The first objective of this thesis will hence be to update prior research findings on today’s knowledge leaders’ most important roles.

Other sources of knowledge leaders’ roles include web resources from the CIO magazine, many KM independent web sites, as well as academic and non-academic articles (Davenport, 1994; Skyrme, 1997; Paquette, 1998; Weinstein, 1998; Capshaw, 1999; Herschel and Nemati, 1999; Liebowitz, 1999; Lee and Yang, 2000; Rasmus, 2000; Flash, 2001; Foote, 2001; Schelin, 2001; Sears, 2001). These sources will not be discussed since they review the roles mentioned earlier.

A compilation of the five most recurrent roles was done from the literature. Table 4 contains, in order of occurrence, these roles and the studies from where they were extracted. These will constitute section one of the first-round questionnaire.

Knowledge Leaders' Roles	Source
Foster a knowledge sharing culture in my organization.	Bonner, 2000; Corcoran and Jones, 1997; Davenport, 1996; Earl and Scott, 1999; Flash, 2001; Guns, 1998; Herschel and Nemati, 1999; Sears, 2001.
Develop my organization's knowledge resources.	Bonner, 2000; Davenport, 1994; Guns, 1998; Herschel and Nemati, 1999; Lee and Yang, 2000; Liebowitz, 1999; Paquette, 1998; Skyrme, 1997.
Convince senior management of what our organization will gain through managing knowledge.	Bonner, 2000; Corcoran and Jones, 1997; Flash, 2001; Foote et al., 2001; Guns, 1998; Liebowitz, 1999.
Drive initiatives to measure KM benefits in my organization.	Davenport, 1996; Earl and Scott, 1999; Flash, 2001; Guns, 1998; Herschel and Nemati, 1999.
Select and provide support for technologies that contribute to implement KM activities in my organization.	Bonner, 2000; Earl and Scott, 1999; Guns, 1998; Lee and Yang, 2000.

Table 4 - Knowledge leaders' roles by order of their occurrence in the literature (constituting section one of the first questionnaire)

II.3 - Knowledge Leaders' Skills

Before attempting to explore the literature review on knowledge leaders' skills, it is important to understand the definition of what is a 'skill'. In the context of this study, a knowledge leaders' skill is a special ability or competency that this individual possesses to accomplish assigned roles. In this thesis, competencies are compared to skills based on two definitions. Competency is defined by Boyatzis (1982) as "an underlying characteristic of a person in that it may be motive, skill, aspect of one's self image or social role, or a body of knowledge which he or she uses". On the other hand, McLagan (1997, p.41) defines a competency as "the characteristics of the people doing the work – knowledge, skills, and attitudes".

In 1997, a study compared the competencies required by executives, knowledge executives, and librarians and concluded that librarians “not only agreed with the competencies identified for knowledge executives, but also agreed that the competency gaps facing many librarians are in the areas of information technology grounding, leadership and entrepreneurial approach that is so critical for these executives” (Corcoran and Jones, 1997). These competencies are identified in the following table.

Category	Definition	Competencies
Executive Competencies.	Competencies organizations look for in their executives.	<ul style="list-style-type: none"> • Communication. • Leadership. • Experience. • Financial management. • Customer focus.
Knowledge Executive Competencies.	Competencies organizations involved in or developing knowledge management initiatives look for in executives responsible for these areas.	<ul style="list-style-type: none"> • Entrepreneurial insight and approach. • Information technology grounding. • Leadership.
Executive Competency Development for Librarians.	Competency gaps librarians feel they must address to progress to executive positions.	<ul style="list-style-type: none"> • Communication. • Leadership. • Experience. • Financial management.
Knowledge Executive Competency Development for Librarians.	Competency gaps librarians feel they must address to progress to these knowledge executive positions.	<ul style="list-style-type: none"> • Information technology grounding. • Leadership. • Entrepreneurial insight and approach.

Table 5 - Findings grouped into four competency categories and their respective competencies presented by order of importance (Corcoran and Jones, 1997)

A review of seven KM case studies reports that “CKOs need to view organizations holistically and possess a mix of hard and soft skills characteristic of a leader of a strategic change management program.” (Abel and Oxbrow, 1999).

In addition, the authors divided the CKOs skills into two main categories: 1) skills to develop the KM vision, and 2) skills to plan the KM program. These skills are depicted in the following table:

Skills to Develop the KM Vision	Skills to Plan the KM Program
<ul style="list-style-type: none"> • Business knowledge. • Political understanding. • Risk analysis. • Influencing skills. • Leadership. • Creativity. • Presentation skills. 	<ul style="list-style-type: none"> • Organizational development. • Information and IT strategy. • Financial planning. • Communication. • Innovation. • Risk management. • Flexibility and openness to all issues. • Managing across boundaries. • Helping individuals to self-manage. • Ability to release the full potential of people.

Table 6 - CKO skills to develop the KM vision and to plan the KM program (Abell and Oxbrow, 1999)

In 1998, 25 knowledge leaders were interviewed in order to outline their competencies (Guns, 1998). The findings are summarized in Table 7.

Competencies
<ul style="list-style-type: none"> • Interpersonal communication skills. • Passionate, visionary leadership. • Business acumen. • Strategic thinking skills. • Champion of change. • Collaborative skills. • Integrative skills.

Table 7 - CKO competencies identified by Guns (1998)

Similarly to the roles, the results between the above mentioned studies show differences in defining the skills required by knowledge leaders. The only skills in common are “communication skills”, “business acumen”, and “visionary leadership”. The second objective of this thesis will hence be to update prior research findings on today’s knowledge leaders’ most important skills.

Other sources of knowledge leaders' skills include web resources from the CIO magazine, many KM independent web sites, as well as academic and non-academic articles (Davenport, 1994; Barclay, 1997; Manasco, 1997; Skyrme, 1997; Paquette, 1998; Weinstein, 1998; Capshaw, 1999; Herschel and Nemati, 1999; Liebowitz, 1999; Lee and Yang, 2000; Neilson, 2000; Rasmus, 2000; Flash, 2001; Foote, 2001; Schelin, 2001; Sears, 2001). These sources will not be discussed since they review the skills mentioned earlier.

A compilation of the five most recurrent skills was done from the literature. Table 8 below contains, in order of importance, these skills column wise and the studies from where they were extracted row wise. These will constitute section two of the first-round questionnaire.

Knowledge Leaders' Skills	Source
Project management skills.	Abell and Oxbrow, 1999; Barclay, 1997; Bonner, 2000; Brown, 1999; Corcoran and Jones, 1997; Earl and Scott, 1999; Flash, 2001; Guns, 1998; Herschel and Nemati, 1999; Lee and Yank, 2000; Manasco, 1997; Rasmus, 2000; Schelin, 2001; Weinstein, 1998.
Technological skills.	Barclay, 1997; Corcoran and Jones, 1997; Davenport, 1994; Flash, 2001; Herschel and Nemati, 1999; Liebowitz, 1999; Paquette, 1998; Rasmus, 2000; Schelin, 2001; Weinstein, 1998.
Interpersonal skills.	Abell and Oxbrow, 1999; Bonner, 2000; Corcoran and Jones, 1997; Earl and Scott, 1999; Flash, 2001; Guns, 1998; Neilson, 2000; Rasmus, 2000; Schelin, 2001; Skyrme, 1997.
Leadership skills.	Abell and Oxbrow, 1999; Bonner, 2000; Corcoran and Jones, 1997; Flash, 2001; Foote et al., 2001; Herschel and Nemati, 1999; Neilson, 2000; Rasmus, 2000; Skyrme, 1997.
Change agent skills.	Abell and Oxbrow, 1999; Bonner, 2000; Flash, 2001; Guns, 1998; Rasmus, 2000; Skyrme, 1997.

Table 8 - Knowledge leaders' skills by order of their occurrence in the literature (constituting section two of the first questionnaire)

II.4 - Knowledge Management Benefits

Before attempting to explore the literature review on KM benefits, it is important to define a 'benefit'. To our knowledge, prior studies that have researched benefits have not defined it explicitly. In the context of this study, a benefit is the positive effect or support yielded from implementing KM. The respondents could hence interpret benefits as 'advantages', 'help', 'usefulness', and/or 'gains'.

Knowledge management benefits have only been discussed in a handful of academic and non-academic articles (Chase, 1997; Charney and Jordan, 2000; KPMG, 2000; Waruszynski, 2000). Chase (1997) reported that 'better decision-making', 'increased responsiveness to customers', and 'improved efficiency of people and operations' are the most important organizational benefits gained by KM. KPMG's recent report (2000) validates Chase's findings by arguing that the above mentioned issues are the most expected benefits resulting from effective KM. In addition to these benefits, Waruszynski's report (2000) summarizes various benefits of implementing KM initiatives cited in several other articles and studies (Table 9).

Benefits of Implementing Knowledge Management Initiatives	
•	Bring together organizational expertise
•	Enhance business decisions
•	Improve productivity
•	Improve information
•	Improve customer service
•	Empower employees
•	Promote learning
•	Eliminate re-inventing the wheel
•	Enhance knowledge flow and processes
•	Promote innovation
•	Deliver high quality products
•	Enhance flexibility
•	Capture information
•	Create knowledge
•	Share and learn

Table 9 - Benefits of implementing knowledge management initiatives (Waruszynski, 2000)

Based on the analysis of their recent survey in the article “Releasing the Value of Knowledge: A Survey of UK Industry” (Breu et al. 2000), the authors argue that certain themes emerged that factored the set of KM benefits into five classes of higher level business benefits.

These relate to the following areas:

- **Innovation and growth**, which describes the business benefits that emerge from a market-facing innovative impact that leads to *new products and services, increased research and development output, new business opportunities, new markets, and innovative capability.*
- **Organizational responsiveness**, which relates to the business benefits that result from *reducing geographical barriers, achieving organizational integration and flexibility, sharing ideas and organizational learning, and improving the speed of decision making.*
- **Customer focus**, which summarizes the benefits that result in *customer retention, good customer service, meeting customer needs, and product and services quality.*
- **Supply network**, which describes the business benefits organizations can drive in their supply chain management by *increasing supply chain efficiency, integrating logistics, tightening supplier relationships, sustaining existing markets, and reducing time-to-market.*

- **Internal quality**, which relates to the inward-facing business benefits that result from *process innovation, developing and sustaining a capability for change, operational efficiency, better project management, effective product/service management, improved staff morale and quality of decision making.*

To add practicality to these benefits, Skyrme (1997) outlines six major organizations that are benefiting from the implementation of KM initiatives:

- *British Petroleum* has accelerated its solution of critical operation problems by implementing virtual team-working using videoconferencing.
- *Hoffman La Roche* reduced the cost and time in accomplishing regulatory approvals for new drugs by implementing the 'Right First Time' program.
- *Dow Chemical* has been able to generate over US\$ 125 million in revenues from licensing by exploiting their intangible assets.
- *Texas Instruments* has saved the equivalent of investing in a new plant through sharing of best practices between their semiconductor fabrication plants.
- *Skandia Assurance* has increased their revenues quicker than their industry average through the development of new measures of intellectual capital.
- *Hewlett-Packard* is able to bring new products to market quicker than in the past by sharing existing company expertise.

The third objective of this thesis will be to update the above research findings on today's knowledge leaders' most important perceived benefits of KM.

II.5 - Knowledge Management Obstacles

Before attempting to explore the literature review on KM obstacles, it is important to define an 'obstacle'. To our knowledge, prior studies that have researched obstacles have not defined it explicitly. In the context of this study, an obstacle is a tangible or intangible barrier that could prevent or impede the implementation of KM in an organization. The respondents could hence interpret an obstacle as an 'obstruction', 'impediment', 'difficulty', 'hindrance', and/or 'barrier'.

The most studied KM obstacle in the academic literature is organizational culture (Hayduk, 1998; Miles et al., 1998). However, organizational culture is clearly not the only obstacle faced by today's knowledge leaders. Although Chase (1997), Waruszynski (2000), and McKeen and Staples (2001) observe that organizational culture is the most important obstacle to KM, they add that other issues such as "lack of ownership of the problem", "lack of time", and "information/communication technology", can also create barriers to developing and implementing KM initiatives. Other KM obstacles have also been suggested by these authors (Table 10).

Obstacles for Implementing Knowledge Management Initiatives
<ul style="list-style-type: none">• Lack of teaming approaches• Rules• Lack of resources• Specialized functions and tasks• Continual change• Mission shortfall• Identifying the right team-leader for knowledge initiatives

**Table 10 - Obstacles for Implementing Knowledge Management Initiatives
(Chase, 1997; Waruszynski, 2000; McKeen and Staples, 2001)**

In the recent article ‘Practical Issues in Knowledge Management’, the author argues that “people’s self-serving interests can prove a powerful obstacle to sharing [knowledge]” (Williams, 2002). To support this claim, he provides the reader with the recent Enron case, where the company’s executives knew that the company was in dire straits but allegedly told employees that the company was fine and apparently urged them to continue investing in its stock. The fourth objective of this thesis will be to update the above research findings on today’s knowledge leaders’ most important perceived obstacles of KM.

A compilation of the ten most recurrent obstacles, and the studies where they can be found, was prepared and presented in the following table. These obstacles will constitute section three of the first-round questionnaire.

Knowledge Management Obstacles	Source
Organizational culture.	Chase, 1997, Waruszynski, 2000, McKeen and Staples, 2001
Lack of time.	Chase, 1997, Waruszynski, 2000
Information/communication technology.	Chase, 1997, McKeen and Staples, 2001
Lack of incentive (reward) system.	Chase, 1997, Waruszynski, 2000
Lack of senior management support.	Chase, 1997, Waruszynski, 2000
Organizational structure.	Chase, 1997
Staff turnover.	Chase, 1997, Waruszynski, 2000, McKeen and Staples, 2001
Physical layout of work spaces.	Chase, 1997
Non-standardized processes.	Chase, 1997, McKeen and Staples, 2001
Emphasis on individual rather than team.	Chase, 1997, Waruszynski, 2000

**Table 11 - Knowledge Management obstacles
(constituting section three of the first questionnaire)**

II.6 - Knowledge Management Technologies and Tools

Technologies and tools have been assisting knowledge leaders to develop and implement KM programs for several years now. Various articles have discussed them (Chase, 1997; Offsey, 1997; Alavi and Leidner, 1999; TechWeb, 1999; KPMG, 2000; Wensley and O'Sullivan, 2000; Duffy, 2001). Before presenting the KM technologies and tools depicted in the literature, the next paragraph attempts to define and contrast the concepts of "technology" and "tool". For the sake of simplicity, this thesis will use the term "technologies and tools", which encompasses both definitions.

It is maintained that a technology is "some human construct or artifact that potentially can enhance and enable human activities" while a tool is "one aspect of a technology that is typically used to achieve some specific purpose or related set of purposes" (Wensley and O'Sullivan, 2000). The authors add that tools, in and of themselves, are inert. It is only when they are used in certain defined ways by communities of trained individuals who are able to communicate with each other that the tools can play a part in KM.

While one study cites that the most effective technologies and tools include e-mail, Intranet, Internet, firm yellow pages, and groupware (Chase, 1997), another study surprisingly reported that Intranet and data warehousing are the most effective and Internet the least effective (KPMG, 2000). Contradictions among these articles are not uncommon. Hence, the fifth objective of this study is to shed light on the debate by

attempting to reach an acceptable degree of agreement among knowledge leaders on the technologies and tools they are using to develop and implement KM in their organization.

A compilation of the ten most recurrent technologies and tools was prepared and presented in the following table. These items will constitute section four of the first-round questionnaire.

Knowledge Management Technologies and Tools	Source
Portals (Internet/Intranet/Extranet).	(Chase, 1997), (TechWeb, 1999), (Offsey, 1997)
E-mail.	(Chase, 1997), (Duffy, 2001), (Bontis, 2000)
Information Retrieval Engines.	(Offsey, 1997), (Bair and O'Connor, 1998)
Collaborative Work Support Tools (ex.: Groupware).	(Chase, 1997), (Duffy, 2001), (TechWeb, 1999), (Offsey, 1997), (APQC, 2001), (Bair and O'Connor, 1998)
Corporate Yellow Pages of Skills and Expertise.	(Chase, 1997), (TechWeb, 1999)
Video-conference.	(Chase, 1997)
Audio-conference.	(Chase, 1997)
Document Management Systems.	(Duffy, 2001), (TechWeb, 1999), (Offsey, 1997), (Bair and O'connor, 1998)
Data Mining.	(Chase, 1997), (Duffy, 2001), (TechWeb, 1999), (Offsey, 1997)
Help-desk Applications.	(Offsey, 1997)

Table 12 - Knowledge management technologies and tools (constituting section four of the first questionnaire)

II.7 - Delphi Method

In 1984, Dickson et al. used the Delphi method (described in the next chapter) to study key information system issues for the 1980s. In 1987, Brancheau and Wetherbe used Dickson et al.'s top issues to initiate an updated study on key information system issues, also using the Delphi method. In 1991, Niederman et al. used Brancheau et al.'s study to find information system management issues for the 1990s. However, they asked their respondents to rate the issues instead of ranking them, as the previous two studies did. In 1996, Brancheau et al. followed a similar approach with minor enhancements. What is noticeable is the fact that these studies used the Delphi method to research issues pertinent to Information Managers. In order to achieve its five objectives mentioned earlier, this study will follow a similar methodology to the one described by Brancheau et al. (1996). The next chapter will detail this methodology.

Chapter III - RESEARCH METHODOLOGY

The Delphi method will be used to reach a worldwide consensus on major issues concerning today's knowledge leaders. Although various issues were retrieved from existing KM literature and presented to KM experts in order to be rated, this method also required experts to suggest missing issues. The subsequent sections provide the research questions, followed by a detailed description of the Delphi method. In addition, the web-survey methodology and sample selection methods will be portrayed. Finally, the chapter will end by three sections depicting the procedure for the development of each round's questionnaire.

III.1 - Research Questions

As stated earlier, the main objective of this research is to identify critical issues of today's knowledge leaders. These issues were selected after a thorough literature review on knowledge leaders. To our knowledge, these issues have not yet been combined within a same study. Hence, the following detailed five research questions aim to identify the major issues:

- Question 1.** What are knowledge leaders' current most important roles?
- Question 2.** What are knowledge leaders' current most important skills?
- Question 3.** What are knowledge leaders' most important perceived knowledge management benefits?
- Question 4.** What are knowledge leaders' most important obstacles in implementing knowledge management initiatives?
- Question 5.** What are knowledge leaders' most important technologies and tools for implementing knowledge management initiatives?

III.2 - Delphi Method

Dalkey and Helmer (1963, p.458) defined the Delphi method as a procedure to “obtain the most reliable consensus of opinion of a group of experts...by a series of intensive questionnaires interspersed with controlled opinion feedback.” The “Delphi” methodology was named after the Greek oracle at Delphi to whom Greeks visited to seek information about their future. This technique is still under development since its creation in 1953 by Olaf Helmer and Norman Dalkey at the RAND Corporation to solve future military issues. The rationale for this procedure is primarily the age-old adage “Two heads are better than one”. In 1959, Helmer and fellow RAND researcher Rescher published a paper on “The Epistemology of the Inexact Sciences”, which provides a philosophical base for forecasting (Fowles, 1978). The paper argues that in fields that have yet to develop any scientific laws, the testimony of experts is permissible. The problem is how to use this testimony and, specifically, how to combine the testimony of a number of experts into a single useful statement. Interestingly, the Delphi method recognizes human judgment as legitimate and useful in generating forecasts.

Single experts sometimes suffer biases; group meetings suffer from “follow the leader” tendencies and reluctance to abandon previously stated opinions (Fowles, 1978; Gatewood and Gatewood, 1983). In order to overcome these shortcomings, the basic notion of the Delphi method, its theoretical assumptions, and methodological procedures were developed. Forecasts regarding various aspects of the future are often obtained through the dissemination of judgments made by experts. Even if these collective judgments of experts are made up of subjective opinions, it is considered to be more

reliable than individual statements, thus, more objective in its outcomes (Masini, 1993; Johnson and King, 1988).

III. 2. a - Justification for Using the Delphi Method

The Delphi method has been used in fields that have not yet developed any scientific laws (Fowles, 1978). In addition, it is best suited in fields that are too new to have adequate historical data for the use of other methods (Martino, 1973). It is considered as one of the best known consensus-reaching (Jones, 1980) and qualitative methodology (Nelms and Porter, 1985), and has been used in more than 463 studies between 1975 and 1994 (Gupta and Clarke, 1996). Since articles are frequently behind actual research at the time of printing, Delphi can provide a more updated exchange of scientific or technical knowledge than a literature research by drawing upon the current knowledge of experts (Delbecq et al, 1975, p.84).

Some fields in which the Delphi method has been used include:

- Information Systems (Dickson et al., 1984; Brancheau and Wetherbe, 1987; Couger, 1988; Watson, 1989; Niederman et al., 1991; Dexter et al., 1993; Scala and McGrath, 1993; Doke and Swanson, 1995; Brancheau et al., 1996; Dekleva and Zupancic, 1996; Watson et al., 1997)
- Operations management (Malhotra et al., 1994; Pesch , 1996; Green and Price, 2000)
- Economic trends and societal change (Masser and Foley, 1987)
- Technology diffusion (Gray and Nilles, 1983)
- Technological forecasting (Chakravarti et al., 1998)
- Public administration (Preble, 1983)
- Social education (Ruskin, 1994)

- Regulatory processes (Benaire, 1988)
- Medicine (Spiby, 1988; Jenkins and Smith, 1994; Fiander and Burns, 1998; Jeffery et al., 2000)
- Nursing (Lynn et al., 1998)
- Agriculture (Waissbluth and Gortari, 1990)
- Management (Tersine and Riggs, 1976 ; Taylor and Meinhardt, 1985; Erffmeyer et al., 1986)
- Hospitality management (Birdir and Pearson, 2000)

According to Linstone and Turoff (1975, p.4), three questions should be addressed when selecting any particular research method:

1. Who is it that should communicate about the problem?
2. What alternative mechanisms are available for that communication?
3. What can we expect to obtain with these alternatives?

They add that when these three questions are considered, Delphi may be effectively employed as a valid research method in any of the circumstances outlined in Table 13.

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

Table 13 - Circumstances justifying the usage of the Delphi method (Linstone and Turoff, 1975, p. 4)

Also, as shown in the above table, all of these circumstances exist in the context of the present study, thus justifying the use of the Delphi method. More specifically, Table 14 depicts the reasons for using this methodology in the field of KM.

Reasons for Using the Delphi Method in the Knowledge Management Field	
•	Semi-structured field of research.
•	Lack of theoretical foundations.
•	Lack of empirical data.
•	Lack of historical data.
•	Ambiguity of roles and skills of knowledge leaders.
•	Need of knowledge.

Table 14 - Reasons for Delphi use in the KM field

Advantages of the Delphi Method. Although the Delphi method is not suitable for all problem-solving situations, if the circumstances described earlier warrant its use, it offers several advantages outlined in the following table:

Advantages of the Delphi Method	
•	Anonymity.
•	Multiple opinions.
•	Eliminates confrontation.
•	Eliminates group domination and pressure by individuals with more status.
•	Eliminates geographical barriers to participation.
•	Group responses can be described statistically.
•	Potential to measure agreement.

Table 15 - Advantages of the Delphi method (Tersine and Riggs, 1976; Murry and Hammons, 1995)

Drawbacks of the Delphi Method. The Delphi method consists of sending multiple questionnaires at different periods to respondents, implying a time-consuming and high cost methodology with the risk of high sample attrition between rounds. These drawbacks along with others have been depicted from various studies (Tersine and Riggs, 1976; Murry and Hammons, 1995) and are outlined in Table 16.

Drawbacks of the Delphi Method	
<ul style="list-style-type: none"> • Time consuming (multiple rounds), which may lead to a higher sample attrition rate than other methodologies. • High costs due to multiple rounds. • Anonymity can promote carelessness on the part of respondents because they are not accountable. 	

Table 16 - Drawbacks of the Delphi method (Tersine and Riggs, 1976; Murry and Hammons, 1995)

Another important drawback of this method is the inconsistency and the lack of consensus in the academic research on how to use the Delphi. Various Delphi variables vary between studies. These include the panel's number and level of expertise, the number of rounds, the evaluation methods, the feedback provided to the respondents, as well as the ways to measure the consensus. This drawback will be later discussed in more detail.

III. 2. b - Validity of the Delphi Method

The Delphi method has various similar validity issues as any survey methodology. First, since the experts are never directly confronted, some individuals criticize the method as not enabling the participants to explain or justify their evaluations (Billy, 2002). It is, therefore, important for the researcher to take a "devil's advocate" role in order to enable each participant to justify her/his opinion, to avoid pre-conceived responses, as well as to take advantage of each participant's pertinent experience.

A second important validity issue consists of the researcher's bias in writing the questions as well as the respondent's bias in answering them. In order to reduce these biases, the researcher should pre-test the questionnaires, avoid using complex vocabulary that could potentially be misinterpreted by the respondents, and make sure that the

experts are according the same importance level to the words and concepts within the questionnaires.

In general, a pertinent and efficient use of the Delphi method should include the following conditions:

- Avoid using pre-conceived ideas.
- Assure the full implication of the experts.
- Avoid ignoring disagreements to prevent reaching an artificial agreement (the researcher must be honest in order for the study to stay objective).
- Choose a representative panel of experts.

Although the Delphi method has been adapted for various needs, its core procedure remains the same and is thoroughly outlined in the following section.

III. 2. c - Standard Delphi Procedure

The Delphi method is an exercise in group communication among a panel of geographically dispersed experts (Alder and Ziglio, 1996). The method allows experts to deal systematically with a complex problem or task. The essence of the technique is fairly straightforward, comprising a series of questionnaires sent to a pre-selected group of experts either by mail or via a computerized system. These questionnaires are designed to elicit and develop individual responses to the problems posed and to enable the experts to refine their views as the group's work progresses in accordance with the assigned task. The main idea behind the Delphi method is to overcome the disadvantages of conventional committee action.

In the original Delphi method, the procedures have three features (Dalkey, 1969):

- 1- *Anonymous response.* The opinions of members of the group are obtained by formal questionnaires. Opinions, comments, and the like are not identified as to their originator but are presented to the group in such way as to hold back any identification.
- 2- *Iteration and controlled feedback.* Interaction is effected by a systematic exercise conducted in several iterations, with carefully controlled feedback between rounds.
- 3- *Statistical group responses.* The group opinion is defined as an appropriate aggregate of individual opinions on the final round. It is a device to assure that the opinion of every member of the group is represented in the final response.

These features are designed to minimize the biasing effects of dominant individuals, of irrelevant communications, and of group pressure toward conformity. The interactions among panel members are controlled by a panel director or monitor who filters out material not related to the purpose of the group (Martino, 1973). The usual problems of group dynamics are thus completely bypassed.

Although Linstone and Turoff (1975) have worked in aggregating the Delphi procedure into four major phases (exploring the subject under discussion, reaching an understanding of how the group views the issues, exploring and evaluating the disagreements, and performing a final evaluation), Fowles (1978) describes this procedure into ten more detailed steps. As shown in Figure 1, the Delphi method consists of a series of repeated interrogations (hereby called rounds), usually by means of questionnaires, of a group of experts whose opinions or judgments are of interest. After the initial round and until reaching a satisfactory and/or stable consensus, each subsequent round is accompanied by information regarding the preceding round of

replies, presented anonymously. This feedback often provides textual and statistical material to participants, usually with the group's mean response as well as their own. The expert is thus encouraged to reconsider and, where appropriate, to change her/his previous reply in light of the perceptions of other members of the group (Linstone and Turoff, 1975). A final report, including a summary of the findings, is then prepared by the research team and sent to the participants.

1. Formation of team to undertake and monitor a Delphi study on a given subject.

2. Selection of one or more panels to participate in the exercise. Customarily, the panelists are experts in the area to be investigated.

3. Development of the first round Delphi questionnaire.

4. Testing the first questionnaire for proper wording (e.g., ambiguities, vagueness).

5. Transmission of the first questionnaire to the panelists.

6. Analysis of first round responses.

7. Preparation of the second round questionnaire (and possible testing).

8. Transmission of the second round questionnaire to the panelists.

9. Analysis of the second round responses (Steps 7 to 9 are reiterated as long as desired or necessary to achieve stability in the results).

10. Preparation of a report by the research team to present the conclusions of the exercise (the report is usually sent to the participants).

Figure 1 - Standard Delphi procedure (Fowles, 1978)

III. 2. d - Delphi Variables

Although the above procedure has been commonly used by most of the Delphi studies, the panel's number and level of expertise, the number of rounds, the evaluation methods, the feedback provided to the respondents, as well as the ways to measure the consensus, vary between studies. Due to this inconsistency and the lack of consensus in the academic research on how to use the Delphi, this method is judged to be flexible by offering a certain degree of freedom to the researcher to decide upon the value of these variables. Hence, in order to facilitate and direct the researcher's decision, these variables were retrieved from 22 Delphi studies (see Table 17) and will be discussed next.

]

Response rate 2nd	14 usable	93%	12 us	17 usable	43/19 usable
Response rate 3rd		87%	12 usbl	17 usable	43/19 usable
Response rate 4th		X	12 ushl		
Send to all in all rounds			X		
Number of responses					
Number of issues					
Number of rounds					
Number of issues per round					
Number of issues per issue					
Number of issues per rank					
Number of issues per rank					
Mean	X		X		X
Mean as consensus					X
Median					X
Inter-quartile range (IQR)					X
IQR as consensus					X
SD not = consensus					X
SD = consensus	X				X
Percent top issues	X			X	X
Kendall's W					X
Significance test for W					X
Kendall's T					
Variance of ranks					
Min/Max scores					X
Median as degree of support					

Table 17 - Literature matrix of Delphi studies (in collaboration with Marina h Marina Chambon, 2002)

Selection and number of participants. The importance of the selection of the participants in a Delphi study has been widely discussed in the literature. In a recent article discussing the issues of the Delphi method, Rowe and Wright (1999) state that “there is some evidence that panels composed of relative experts tend to benefit from a Delphi procedure to a greater extent than comparative aggregates of novices.” Expertise implies that individual panelists have more knowledge about the subject matter than most people, or that they possess certain work experience, or are members in a relevant professional association (Hill and Fowles, 1975; Whitman, 1990). In addition to being experts, it is argued that in order for the Delphi to be beneficial, participants should “feel personally involved in the problem of concern, have pertinent information to share, and be motivated to include the Delphi task in their schedule” (Delbecq et al., 1975).

The selection and number of participants are organized under the same topic for a simple reason: as the homogeneity of the group decreases, a bigger number of participants is needed (Delbecq et al., 1975; Tersine and Riggs, 1976). However, the size of the respondent panel greatly varies between studies. While many had less than 30 effective respondents for their last round (Martin, 1982; Perez and Schuler, 1982; Blaylock and Rees, 1984; Couger, 1988; Dexter et al., 1993; Haan and Peters, 1993; Scala and McGrath, 1993; Doke and Swanson, 1995; Pesch, 1996; Birdir and Pearson, 2000; Green and Price, 2000), others had more than one hundred respondents (Ball and Harris, 1982; Niederman et al., 1991; Dekleva and Zupancic, 1996; Jeffery et al., 2000).

Number of rounds. Determining the number of rounds necessary to reach an acceptable and/or stable level of consensus is crucial for the success of a Delphi study. In general, the number of rounds varies between two and four. Nevertheless, it is not uncommon for studies to reach five rounds (Perez and Schuler, 1982; Taylor and Meinhardt, 1985). While on one hand, too many rounds would waste the panel members' time and the researchers' resources, on the other hand, stopping the study too soon could yield meaningless results (Schmidt, 1997). In addition to Schmidt's argument, Erffmeyer et al.'s (1986) findings indicate that limiting the number of rounds to two could hinder reaching stable results, while completing more than three rounds would usually not result in a significantly higher quality solution to the problem being solved. They add that variables such as the composition of the panel, the nature of the problem being studied, and the type of feedback provided could also affect the appropriate number of rounds. In order to reach an acceptable and/or stable degree of consensus, the majority of the studies have used three rounds (Tersine and Riggs, 1976; Blaylock and Rees, 1984; Brancheau and Wetherbe, 1987; Couger, 1988; Watson, 1989; Niederman et al., 1991; Saunders and Jones, 1992; Dexter et al., 1993; Doke and Swanson, 1995; Brancheau et al., 1996; Jeffery et al., 2000; Keller, 2001).

Evaluation methods – rankings vs. ratings. Although most of the Delphi studies have asked experts to rank the issues studied by order of importance (Dickson et al., 1984; Erffmeyer et al., 1986; Brancheau and Wetherbe, 1987; Couger, 1988; Scala and McGrath, 1993; Doke and Swanson, 1995), other studies have followed Watson's (1989) evaluation method, who was the first researcher to ask experts to rate the issues

(Niederman et al., 1991; Dexter et al., 1993; Brancheau et al., 1996; Dekleva and Zupancic, 1996; Pesch, 1996; Birdir and Pearson, 2000; Green and Price, 2000; Jeffery et al., 2000; Keller, 2001). Watson's rationale for choosing the rating evaluation method is based on Miller's research on the limited capacity of human beings to process information simultaneously (1956). Miller has argued that once the list of issues becomes larger than seven (± 2), the limited capacity makes the identification and ranking of issues a difficult task. In addition to Watson's rationale, Niederman et al. (1991) state that "rating is less taxing mentally because issues can be evaluated one at a time rather than requiring simultaneous consideration of all issues". Besides this justification, they add that "rating allows respondents to show indifference among issues (by giving them the same rating)" and also "provides valuable interval-level data for follow-up analyses". However, the rating evaluation method has its limits, the most important being the difficulty of clearly separating the mean ratings of the issues when these are close to each other.

Measurement of the level of consensus. Despite the fact that the main objective of a Delphi study is to measure the level of consensus or agreement on the most important issues, not all studies have done so (Scala and McGrath, 1993; Birdir and Pearson, 2000; Green and Price, 2000; Keller, 2001). However, studies that have measured the level of consensus have used a variety of methods:

1. *Mean and Median.* Various studies have used the mean and median ranking or rating of the items to illustrate the movement towards the consensus between rounds (Dickson et al., 1984; Brancheau and Wetherbe, 1987; Couger, 1988;

Niederman et al., 1991; Dexter et al., 1993; Doke and Swanson, 1995; Jeffery et al., 2000). Concerning the mean values, a movement towards the consensus is shown by an increase in the mean rating between rounds (decrease in the mean ranking) for the most important items, versus a decrease in the mean rating (increase in the mean ranking) for the least important items (Dexter, 1993). As for the median (a central tendency measure), it indicates the degree of support from the panel for each item; the higher the median, the greater the support (Jeffery et al., 2000). In addition, Couger (1988) and Dickson et al. (1984) rightly state that contrary to arithmetic values, medians provide the advantage of not being affected by extreme values.

2. *Inter-quartile Range (IQR)*. Movement towards consensus has been illustrated in numerous Delphi studies using the inter-quartile range (Tersine and Riggs, 1976; Dickson et al., 1984; Couger, 1988; Fiander and Burns, 1998; Dexter et al., 1993; Jenkins and Smith, 1994; Jeffery et al., 2000). An IQR is a measure of the spread of responses and is defined as the difference between the 25th and 75th percentiles. A small IQR on the final items, hence a small spread of responses, indicates that a consensus has been achieved (Dexter et al., 1993; Jeffery et al., 2000). More precisely, an IQR of zero indicates a perfect consensus (Dickson et al., 1984; Couger, 1988).

3. *Standard Deviation.* The standard deviation is a measure of dispersion of opinion that has been utilized by a vast majority of Delphi studies to explain the level of consensus reached by the panel members (Dickson et al., 1984; Brancheau and Wetherbe, 1987; Couger, 1988; Watson, 1989; Niederman et al., 1991; Doke and Swanson, 1995; Brancheau et al., 1996; Dekleva and Zupancic, 1996; Pesch, 1996). Various studies have asserted that a decreasing standard deviation between rounds indicates an increasing agreement on the importance of the issues by the respondents (Brancheau and Wetherbe, 1987; Dexter et al., 1993; Doke and Swanson, 1995; Rowe and Wright, 1999). More specifically, a perfect consensus on an item is indicated when its rating's standard deviation equals zero (Watson, 1989). Although this measure of spread of opinion has been widely used in studies that have asked their respondents to rank items (e.g. Couger, 1988; Doke and Swanson, 1995), it is not an appropriate statistic for ordinal scales (Stevens, 1981). Other measurements, including medians and inter-quartile ranges are more suitable for this type of scale (Dickson et al., 1984).
4. *Percent Top Issues.* Another measure of agreement that has been used in past Delphi studies is the percent of respondents that have rated or ranked an item in the top issues (e.g. top 10 or top 5) (Dickson et al., 1984; Brancheau and Wetherbe, 1987; Couger, 1988; Doke and Swanson, 1995; Pesch, 1996). Some studies have found that their top four items were ranked as important by more than 90% of the respondents, followed by 60% for the remaining six items

(Brancheau and Wetherbe, 1987; Doke and Swanson, 1995). Consequently, it is important to note that higher percentages indicate greater consensus.

5. *Kendall's Coefficient of Concordance (W)*. Kendall's coefficient of concordance W has been introduced by Kendall and Babington-Smith (1939), and Wallis (1939). This coefficient indicates the current degree of agreement between the panel members on the ordered list by mean ranks by taking into account the variation between the rankings (Brancheau and Wetherbe, 1987; Doke and Swanson, 1995; Schmidt et al., 2001). The value of this coefficient increases as the agreement increases. More recently, Schmidt (1997) proposed a more detailed interpretation of W (Table 18).

W	Interpretation	Confidence in Ranks
.1	Very weak agreement	None
.3	Weak agreement	Low
.5	Moderate agreement	Fair
.7	Strong agreement	High
.9	Unusually strong agreement	Very high

Table 18 - Interpretation of Kendall's W (Schmidt, 1997)

Nevertheless, as Schmidt notes, the values in the above table should only be used as guidelines and are not intended to show exact cutoffs. A high or significant value of W may be interpreted as implying that the experts are applying essentially the same standard in ranking the items under study (Siegel, 1956). Nonetheless, the author emphasizes that a high or significant value of W does not suggest that the orderings observed are correct. In fact, they may all be incorrect with respect to some external criterion. In addition, Schmidt states that "the statistical significance of W is not sufficient criterion to halt the survey".

suggesting that for panels consisting of more than ten experts, even very small values of W can be significant (Schmidt et al., 2001). A detailed explanation of the W 's calculation is presented next.

Two cases exist for calculating Kendall's W : where ties in the evaluation method are **inexistent** vs. where ties in the evaluation method do **exist**. For the first case, W 's classic formula has been developed as follows.

It begins with the sum of rankings (R_i) for each item studied. Next, the mean ranking (R_m) is calculated by dividing R_i by the number of items N . Each rank R_i can be expressed as a deviation from the mean value R_m .

The sum of squares of these deviations (S) of all the items form the numerator of W 's formula is as follow:

$$S = \sum_{i=1}^N (R_i - R_m)^2$$

The denominator corresponds to the maximum possible sum of the squared deviations, i.e.; the sum S which would occur with perfect agreement among K experts:

$$\frac{1}{12} K^2 (N^3 - N)$$

The classic formula of Kendall's coefficient of concordance W is, hence, as follows:

$$W = \frac{S}{\frac{1}{12} K^2 (N^3 - N)}$$

where S = sum of squares of the observed deviations from the mean of R_i
 N = number of items ranked
 K = number of experts

Figure 2 - Classic formula of Kendall's coefficient of concordance W (Siegel, 1956, p. 231)

Ties in the evaluation method are not considered in the classic formula of Kendall's W . Ties depress the value of W as calculated from the classic formula. Siegel (1956) states that "if the proportion of ties is small, that effect is negligible, and the [classic formula] may still be used" (p.234). However, if the proportion is large, "a correction may be introduced which will increase slightly the value of W over what it would have been if uncorrected". A correction factor

$$T = \frac{\sum t^3 - t}{12}$$

is thus introduced into the classic formula of W , where t is equal to the number of observations in a group tied for a given rank/rate and \sum is the sum over all groups of ties within any one of the K number of experts .

The corrected for ties W formula is thus:

$$W = \frac{S}{\frac{1}{12} K^2 (N^3 - N) - K \sum_T T}$$

where

- S = sum of squares of the observed deviations from the mean of R_i
- N = number of items ranked
- K = number of experts
- $\sum_T T$ = sum of values of T for all K experts

Figure 3 - Formula of Kendall's coefficient of concordance W corrected for ties (Siegel, 1956, p. 234)

The following table summarizes the different alternatives described above to determine the level of agreement and stabilization of the results, depending on the evaluation method used (ranking or rating).

Alternatives to Evaluate Consensus	Ranking Evaluation Method	Rating Evaluation Method	Movement towards a consensus if the
Mean	Yes	Yes	<ul style="list-style-type: none"> • Mean increases for most important items • Mean decreases for least important items
Median	Yes	Yes	<ul style="list-style-type: none"> • Median increases
Inter-quartile Range	Yes	Yes	<ul style="list-style-type: none"> • IQR decreases
Standard Deviation	No	Yes	<ul style="list-style-type: none"> • Standard deviation decreases
Percent Top Issues	Yes	Yes	<ul style="list-style-type: none"> • Percent top issues increases
Kendall Coefficient of Concordance W	Yes	Yes	<ul style="list-style-type: none"> • Kendall's W increases

Table 19 - Summary of different alternatives to evaluate the level of agreement and stabilization of the results

Feedback provided to respondents. As stated earlier, the Delphi method was originally defined by Dalkey and Helmer (1963, p.458) as a series of questionnaires interspersed with controlled opinion feedback. While some studies do not reveal what kind of information was fed back to the respondents after the first round (Scala and McGrath, 1993; Pesch, 1996; Birdir and Pearson, 2000; Keller, 2001), others specifically

state constructing the second round questionnaire by including the first round respondents' mean evaluation (rating/ranking), median, and/or inter-quartile range for each item (Tersine and Riggs, 1976; Dickson et al., 1984; Erffmeyer et al., 1986; Brancheau and Wetherbe, 1987; Couger, 1988; Watson, 1989; Niederman et al., 1991; Dexter et al., 1993; Doke and Swanson, 1995; Brancheau et al., 1996; Dekleva and Zupancic, 1996; Green and Price, 2000; Jeffery et al., 2000). The main rationale provided by these studies for sending feedback is to enable the experts to re-evaluate their opinions in light of the additional information provided by their peers. Some authors go even further by asking their respondents to justify their evaluation if the latter significantly deviates from the group's evaluation (Couger, 1988; Niederman et al., 1991; Dickson et al., 1984; Brancheau et al., 1996).

However, the influencing effects of sending feedback to respondents as well as the nature of this feedback have raised controversies. Along with Rowe and Right (1999), the author of this thesis believes that providing feedback to panelists simply "alters their [evaluations] in order to conform to the group without actually changing their opinions". This statement is supported by Myers's well-known research on the group polarization effect who concluded that "people avoid being markedly deviant from others" (1977). In addition, achieving consensus without the help of feedback increases the reliability of the results obtained since "exposure to the group norm, or average, is sufficient to elicit a more polarized response" (Myers, 1977), thus artificially forcing the respondents to reach a consensus.

III.3 - Web-based Survey

A web-based survey was chosen to collect the data required. To our knowledge, this is the first Delphi study to be conducted online, utilizing the best practices of web-based surveys (discussed later). This method consists of sending e-mails to potential respondents, inviting them to go to a web address in order to complete the questionnaire (Dommeyer and Moriart, 2000).

E-mail solicitations can take the following three forms (Cho and Larose, 1999):

1. *Individual e-mail solicitations*: E-mails are sent individually to potential respondents. This form of solicitation has been used by various studies including Schaefer and Dillman, 1998; Parks and Floyd, 1996; Noh, 1998; and Zelwietro, 1998.

2. *Group e-mail solicitations*: E-mails are sent to group communication channels such as listservs, discussion groups, and forums. This form of solicitation has been less widely used in the literature. The following studies are some examples: Alexander and Trissel, 1996; Borer et al., 1996; and Thomsen, 1996.

3. *Public announcements*: These include targeting potential respondents in a variety of channels. Solicitation could be done by placing banners in popular search engines and ad-supported sites, e-mail lists of interested parties, and trade press publications (Read, 1998).

A web-based survey was chosen over a regular mail survey for the following reasons:

- **Time constraints.** Web-based surveys offer the advantage of a faster response speed than other means of surveying. The average response time increase between web-based surveys and other types of surveying lies between 1.2 days and 18.5 days (Dommeyer and Moriart, 2000). Moreover, contrary to mail surveys, undeliverable e-mails can be directly depicted (Oppermann, 1995), thus giving the opportunity to the researcher to substitute returned e-mails with new potential respondents.
- **Budget constraints.** Due to the international characteristic of this study, a web-based survey avoids the costs associated with printing, postage, paper, envelopes, collating, and envelop stuffing. Studies have found that the unit cost for a mail survey exceeds that of a web-based survey by US\$0.58 to US1.56 (Mehta and Sivadas, 1995; Weible and Wallace, 1998).
- **Quality of response.** Studies that have analyzed the quality of response of web-based surveys found a high response quality. A higher response quality includes fewer item omissions (Kiesler and Sproull, 1986; Sproull, 1986; Schaefer and Dillman 1998), fewer mistakes (Kiesler and Sproull, 1986), and, particularly interesting to this study, a greater response to open-ended questions (Mehta and Sivadas, 1995; Bachmann et al., 1996; Schaefer and Dillman, 1998) since some questions in the first round will be open-ended.

In addition to the above mentioned advantages, Dommeyer and Moriart (2000) allege that “researchers who compared web-based and mail respondents on demographic and/or attitudinal data have concluded that there are no significant response biases between the two methods” (Mehta and Sivadas, 1995; Bachmann et al., 1996; Tse, 1998). Moreover, Dommeyer and Moriart, referring to Kiesler and Sproull (1986) states that a web-based survey was no more likely than a mail survey to produce “extreme responses”.

The majority of the studies that have compared multiple means of surveying indicate a lower response rate for e-mail solicited surveys (Kiesler and Sproull, 1986; Sproull, 1986; Schuldt and Totten, 1994; Bachmann et al., 1996; Tse, 1998; Weible and Wallace, 1998). In order to increase the potential response rate, this study used all three forms of e-mail solicitation. As will be discussed in the next section, sources of potential respondents include: literature, KM forums, and KM associations. The literature provides a list of individuals to whom e-mails will be sent, corresponding to the first type of e-mail solicitation: individual e-mail solicitation. KM forums correspond to the second form of e-mail solicitation (group e-mail) since a message will be posted once and will reach the entire forum’s subscribers. As for the KM associations, they correspond to the third form of e-mail solicitation: public announcements, since some of these associations agreed to place on their website an advertisement of this study’s web-based survey.

Other precaution measures that a researcher should take into consideration when conducting a web-based survey include:

- Assuring the respondent that his/her identity will not be revealed since the lack of anonymity may prevent some individuals from responding (Dommeyer and Moriart, 2000).
- Building a respondent-friendly questionnaire; one that is easy to fill out, looks appealing, and avoids confusion (Dillman et al., 1993).
- Taking into consideration that an e-mail is very easy to dispose of and/or ignore. As stated by Oppermann et al. (1995), "The increasing interactions with e-mail mean that many users find their mailbox 'full', especially after a few days absence; consequently, users just delete everything of lesser interest to them". This problem is unavoidable, however, solutions that can reduce it include writing appealing and attention-taking 'Subject' lines and e-mail core message.

III.4 - Finding Potential Respondents

Due to budget constraints and geographical dispersion of the targeted research population, three Delphi rounds, consisting of one web-based questionnaire each, will be conducted to gather responses for the five research questions depicted earlier. The targeted effective sample size consists of a minimum of 100 worldwide knowledge leaders from various branches of the industry. Nonetheless, finding the sources for the

sample has proven to be a complex task. The first source consisted of compiling a list of knowledge leaders from past literature. The results of this compilation yielded 150 potential respondents. Taking into consideration a response rate of 20%, this compilation alone does not provide a sufficient research population.

A second source consisted of contacting well-known information providers. Extensive search was done in the information industry. Mainly, Dun & Bradstreet, Kompass, and KFPL were contacted without any success. None of these companies held databases containing names and e-mails of knowledge leaders. Hence, a third source had to be found.

The third source consisted of getting in contact with international KM associations to propose to publish a short summary of the study's objectives on their website and/or in their newsletter. In this way, interested visitors could voluntarily send by e-mail their name, job position, company, and e-mail, agreeing to participate in the study (see Appendix 2). From the fourteen potential KM associations, six agreed to do so, while three rejected the proposition, and the remaining five did not answer to the request (Table 20). Unfortunately, these associations only accepted to put a short summary and a link from their website and/or newsletter, where potential participants could directly access the web survey. Thus, it was understood that from the minimum number of potential participants (7,700), many would not hold a knowledge leader position. Thereafter, more sources had to be found before starting the first round data collection.

#	KM Association Name	Response	Potential Participants
1	Association of Knowledgework (AOK)	Accepted	1200
2	Ark-interactive	Accepted	5500
3	KMTOOL	Accepted	Unknown
4	KRI	Accepted	Unknown
5	MetaKM	Accepted	Unknown
6	KMPro	Accepted	1000
7	KnowledgeBoard	Rejected	Unknown
8	Standards Australia	Rejected	Unknown
9	Institute for Knowledge Management	Rejected	Unknown
10	Knowledge Management Benchmarking Association	No answer	Unknown
11	Asian Academy of Knowledge Management	No answer	Unknown
12	Knowledge Inc.	No answer	Unknown
13	The Knowledge Management Forum (km-forum.org)	No answer	Unknown
14	BRINT	No answer	Unknown

Table 20 - List of potential KM associations

A fourth source for finding knowledge leaders consisted of posting a message on various international KM online forums found on Yahoo groups (see Appendix 3). However, this message had to be posted after the web survey was put online since it proposed to potential respondents to directly access the survey. Table 21 depicts the name of the twelve KM forums contacted, the number of members subscribed to these forums, when the message was sent, if the forum was moderated, as well as when the message was posted. Five of the twelve forums were moderated, meaning that the message had to be approved by the forum's moderator before being posted, which explains the difference between the dates when the message was sent and when it was actually posted on the forum. Only one of these forum's moderators did not approve posting the message, due to a non-survey policy. The six forums that were not moderated posted the message instantly.

#	KM Forum Name (Yahoo Groups)	# members	Message Sent on	Moderated?	Message Posted on
1	Knowledge-Management-Systems	496	17-May	no	17-May
2	knowledgemanagement2	515	17-May	no	17-May
3	act-km	451	17-May	yes	17-May
4	KMSI	425	18-May	yes	19-May
5	KM-Framework	280	20-May	no	20-May
6	ikmf_figs	267	21-May	no	21-May
7	KMinitatives	102	21-May	no	21-May
8	KM_IM_Best_Practices	322	20-May	yes	21-May
9	KM_Best_Practices	245	21-May	yes	22-May
10	km-gc-montreal	118	23-May	no	23-May
11	KMTool	575	18-May	yes	23-May
12	kmci-Virtual-Chapter	1162	17-May	yes	not approved

Table 21 - List of potential KM forums

The following table summarizes the sources described above along with their number of potential respondents:

Source	Potential Respondents
KM Literature	150
KM Associations	7,700 +
KM Forums	3,796
Total Potential Respondents	11,646 +

Table 22 - Sources of potential respondents

The total number of potential respondents was judged appropriate to start the first round data collection.

III. 4. a - Subject Bias

The above sampling technique cannot be considered as totally random. It is defined as “a convenience sampling where only motivated volunteers filled out the survey” (Gay and Diehl, 1991). That does not necessarily imply that non-probability samples are not

representative of the population but some precautions will be taken when generalizing the results (Trochim, 2001).

III.5 - Developing the Questionnaires

Best practices in questionnaire development were used to minimize questionnaire biases. The following ideal practices were identified and incorporated into the questionnaires (Erdos, 1983; Dillman et al., 1993; Czaja and Blair, 1996):

- Limit instrument to six to eight pages.
- Introduce the study with a simple and clear explanation of purpose.
- Pre-code response categories by assigning a number to each possible answer for the respondent to click on.
- Provide simple instructions.
- Use common wording and simple plain English found in everyday use, i.e.; no complex terms, undefined abbreviations, or jargon should be used.
- The questions and format should have no subjective tones which would introduce biases.
- Design the questionnaire to be easy and interesting to answer in order to avoid non-response error.
- Develop questions in ways that respondents are willing to respond to carefully and accurately.
- Group questions into sections with similar qualities and relevance.
- Questions should be relevant, easy to answer, and interesting.
- Questions should be applicable and answerable by most respondents.
- Choices must be mutually exclusive to prevent inaccuracies in responses.
- Use a closed format, i.e.; minimize open ended questions.
- The questionnaire should be pre-tested with experts taken from the actual research sample.

The next section will explain the development of the three questionnaires, taking into consideration the above best practices.

III.6 - Development of the First Round Questionnaire

The following paragraphs briefly describe how the first round questionnaire's cover letter, consent form, general instructions, and the six main survey sections were constructed.

The definitions of roles, skills, obstacles, benefits, and technologies and tools were not provided to the respondents in order to not restrict their meanings.

III. 6. a - Cover Letter

The cover letter is the first page displayed as the respondent accesses the survey link. This section of the questionnaire is highly crucial, especially in the case of the Delphi method. Delbecq et al. (1975) argue that the "most important issue in this process is the understanding of the aim of the Delphi exercise by all participants." They add that if the process is not understood, the respondents may answer inappropriately or become irritated and lose interest. The cover letter hence provided information about the time required to complete the questionnaire, the objective of the questionnaire, a summary of the study's objectives, the reward granted upon the respondent's participation (a personalized report including a summary of the results and an assessment of each respondent's position as a knowledge leader within their firm's industry as well as against other leaders in the KM community), the importance of the respondent's participation, as well as information on how to contact the researcher in case of necessity (see Appendix 4 – Figure 1). More significantly, the cover letter stressed the aim of the Delphi technique and the need for the respondents to a follow-up with two more questionnaires. In order to

enable the researcher to contact the respondent upon the preparation of forthcoming questionnaires, the cover letter finally asked the respondent to enter her/his e-mail. After having entered their e-mail, the respondents were then directed towards the consent form.

III. 6. b - Consent Form

The objective of the consent form is to let the study reflect its actual seriousness to potential participants, increase the participation rate, as well as increase the validity of the data collected. As shown in Appendix 4 – Figure 2, potential participants had the choice to withdraw by clicking on the “I do not agree” button, which redirected them to a “Thank you” web page (Appendix 4 – Figure 3). On the other hand, they had the choice to proceed with the survey by clicking on the “I agree” button.

III. 6. c - General Instructions

After the respondents agreed to take part in the study, they were redirected towards the “General Instructions” page, which is another significant component of the web questionnaire that affects the validity and the quality of the data collected. Whitley (1996, p.422) states “Instructions that are confusing or hard to follow will result in errors and lead people to abandon the task”. A copy of these instructions can be found in Appendix 4 – Figure 4. Another function of this section was to remind the respondent of the definition of a knowledge leader, as well as to ask the respondents to answer the questions by indicating their first impression and their own point of view, rather than their organization’s. The final part of the instructions included a summary of the survey’s content and technical directions on how to navigate through the survey. Throughout the writing of these instructions, academics and various friends were asked to explain what

they understood from their reading. Many of their comments were taken into consideration and helped in refining this section. After having read the instructions, the respondents were invited to begin the survey.

III. 6. d - Section 1 – Knowledge Leaders' Roles

Knowledge leaders' roles components were derived from the literature (see Chapter II). The five most cited roles were randomly ordered and constituted section one of the questionnaire (See Appendix 4 – Figure 5).

The respondent was asked to rate the provided roles using a 5-point Likert-type scale. This scale ranged from 1- Highly not important to 5- Highly important. An additional choice '6- Not applicable' was provided. The respondent was also encouraged to add and briefly explain as many as five additional important roles.

III. 6. e - Section 2 – Knowledge Leaders' Skills

Similarly to their roles, knowledge leaders' skills components were derived from the literature (see Chapter II). The five most cited skills were randomly ordered and constituted section two of the questionnaire (See Appendix 4 – Figure 6).

The respondent was asked to rate the provided skills using a 5-point Likert-type scale. This scale ranged from 1- Highly not important to 5- Highly important. An additional choice '6- Not applicable' was provided. The respondent was also encouraged to add and briefly explain as many as five additional important skills.

III. 6. f - Section 3 – KM Obstacles

This section contained the ten most current obstacles cited in the relevant related literature. The respondent was asked to rate the specific obstacles using the same scale provided in the above sections. Also, similar to the previous sections, the respondent was also encouraged to add and briefly explain as many as five additional obstacles (See Appendix 4 – Figure 7).

III. 6. g - Section 4 – KM Technologies and Tools

Technology and tools used for developing and implementing KM initiatives were also extracted from the literature. Similar to section three, the top ten technologies and tools were listed in section four. The same scale as used in previous sections was applied. In addition, the respondent had the choice to add and briefly explain as many as three additional tools and/or technologies (See Appendix 4 – Figure 8).

III. 6. h - Section 5 – KM Benefits

Due to the fast changing pace of KM benefits, section five was open-ended, encouraging participants to add as many as five important perceived KM benefits (See Appendix 4 – Figure 9).

III. 6. i - Section 6 – Background Information

This section specifically gathered background information about respondents. It included their educational and professional background, their job title, the title of the person who appointed them to their current position, their reporting structure, the number of years in current position and years in current firm, and the number of years of experience they possess in the KM field. It also looked at their gender, their age, the

number of individuals employed in their current firm, the number of individuals assigned to the development and/or implementation of KM initiatives in their organization, the functional area(s) of their firm where KM is being implemented, the percentage of their firm's budget allocated to KM activities, the percentage of their time spent on KM activities: creating knowledge, capturing knowledge, storing knowledge, organizing knowledge, transferring knowledge, deploying knowledge, and applying/using knowledge (Despres and Chauvel, 1999b; Nissen et al., 2000), their firm's annual revenue, their firm's primary industry, as well as the country they currently work in. All these questions constituted section six of the first questionnaire (See Appendix 4 – Figure 10).

It is relevant to note that this section was not included in the third round questionnaire since data was already collected after the first and second round questionnaires.

III. 6. j - Pre-testing the First Round Questionnaire

The main objective of pre-testing is to obtain proper wording (using knowledge leaders' jargon), prevent ambiguities or vagueness, and obtain the average time spent by knowledge leaders to fill the questionnaire. Two pre-tests of the first questionnaire were done: one pre-test with academics/Master students and one pre-test with practitioners.

Pre-test with Academics/Master Students. A pre-test was conducted among academics and students in the M.Sc.A. program in order to get feedback on the format of the questionnaire more than on its content, the survey's presentation being a crucial element due to it being web-based. Its content was then evaluated by pre-testing it on a

sample of KM experts chosen randomly from the research sample. A total of seven academics and four Master students have pre-tested the first questionnaire. Given the fact that the questionnaire is not paper-based and thus pre-testers could not write comments on it, special 'Comments' fields were included for each section, as well as for each item in order to provide pre-testers a space for comments and suggestions. These comment fields were removed from the real questionnaire sent to the research sample. Pre-testers were asked to evaluate the general instructions, each section's specific instructions and questions, the scales' appropriateness, the clarity and coherence of items in each section, the clarity of the provided supplementary information, the easiness of navigating through the survey, and, finally, the experience of any Internet connection problem. These comments were collected directly in a MS Access XP database.

One of the recurring comments concerned the scales used. As stated above, the questionnaire contains six sections, with a common scale for all except two of the sections. Concerning section five (KM Benefits), the original scale consisted of a 3-point scale: 1- Slightly Beneficial, 2- Moderately Beneficial, and 3- Very Beneficial (See Appendix 5 – Figure 1a). Two academic pre-testers noted that the change in scales confused them. Hence, this section's scale was re-analyzed and replaced by a more appropriate scale, consistent with the scales in all other sections (See Appendix 5 – Figure 1b).

Another major comment concerned the scale of section four (KM Technology and Tools). This section's original scale consisted of a two point scale: 1- Ineffective and 2-

Effective (See Appendix 5 – Figure 2a). All academics suggested that using a dichotomous scale (effective/ineffective) was an inappropriate idea due to the statistical restrictions that it would create. Whitley (1996, p.141) suggests that one statistical restriction of numerical scales that only have end point anchors is that the results would be ordinal level measurements, restraining the use of the statistical tests. The academics recommended using a 5-point Likert scale, similar to the other sections. After an additional review of the literature and various discussions with academics, the scale was modified as suggested (See Appendix 5 – Figure 2b).

Comments concerning the instructions, question wording, items, and survey navigation were all positive. Regarding the question wording, the importance was placed on being specific and choosing words that participants would understand and relate to. Most of the questions were also semi open-ended questions; some items were provided for the respondent to rate, while other items in the same question were blank, encouraging the respondent to offer information themselves. As mentioned earlier, the Delphi method required experts to suggest missing issues. Hence, it was extremely important to order them appropriately in order to avoid participants losing patience or interest at the onset. On account of this, the questions were ordered starting with those that would primarily interest potential respondents (Whitley, 1996, p.420). Moreover, by alternating between an open-ended question and a semi open-ended one, the effort requested by the respondent to answer a certain question was balanced with the intention of reducing the impact of order effects (Whitley, 1996, p.421).

Overall, academic and student pre-testers were satisfied with the quality of the web questionnaire.

Pre-test with Practitioners. A sample of thirteen KM experts was chosen from the research population. These experts work from various countries (Canada, USA, UK, Spain, Australia, and India) and included knowledge managers, chief knowledge officers, KM directors, as well as KM consultants. These practitioners were sent a modified version of the questionnaire, reflecting the corrections made in light of the comments received by academics and students.

A preconditioning e-mail was sent to these experts, informing them about the study's objective and asking them if they were willing to pre-test the questionnaire (Appendix 6). In addition, they were informed that a summary of the results would be sent to them in return for pre-testing. They were asked to reply with a blank e-mail if they were not interested in participating in the pre-test. From the 13 experts in the original sample, one rejected the offer, 8 agreed to participate, and 4 did not respond. A few days later, a follow-up e-mail containing the link to the questionnaire was sent to all respondents, except to the individual who declined it (Appendix 7). Moreover, two reminders were sent within the next three weeks to the experts that had not yet completed the pre-test. The first reminder was sent to eleven experts (Appendix 8). The second reminder consisted of two different e-mails: one to those who had accepted to complete the pre-test but had not done so (Appendix 9) and the other to those who had not yet replied (Appendix 10).

The pre-test results included various comments and suggestions. The ones taken in consideration are summarized (by the web-questionnaire's sections) in the following table:

Cover Page / General Instructions
<ul style="list-style-type: none"> • The benefits to potential participants were added. • The definition of a "Knowledge Leader" was refined. • A short summary of the objectives of the study was added.
Consent Form
<ul style="list-style-type: none"> • A link to Concordia University's research guidelines was added to the "Information Protection" section.
Roles and Skills of Knowledge Leaders / Background
<ul style="list-style-type: none"> • Re-wording of some items was done to reflect the experts' jargon.
KM Technologies and Tools
<ul style="list-style-type: none"> • The items were grouped together to reflect a more logical order.

Table 23 - Modifications to the questionnaire

Hence, the first questionnaire was pre-tested, the needed modifications were finalized, and it was ready to be sent to potential respondents.

III.7 - Development of the Second Round Questionnaire

After having received the first round questionnaires, each section's data (except for section six since it contained background information) were analyzed by calculating its item's average rating in order to depict their importance. Items that were added by the respondents were compiled (see Chapter IV – Results and Data Analysis). This compilation consisted of grouping similar items together under a broader topic and calculating the number of item occurrence under each broad topic. A threshold for the number of occurrences was set for each section in order to eliminate items that were

judged unimportant. Following this step, the items for each section were reworded in order to prevent ambiguities and randomly ordered to avoid influencing the respondent on the items' importance. Therefore, the questions constituting the second round questionnaire were ready to be sent to the respondents. Contrary to the first round questionnaire, all of the questions in the second round were closed; requiring the respondents to rate the items on a 5-point Likert scale ranging from 1- Highly not important to 5- Highly important.

A pre-test period of one week was undertaken in order to revise the wording of the items to prevent any vagueness, ease the navigation through the questionnaire, and establish the general time spent by knowledge leaders to complete the questionnaire. The pre-test committee consisted of one academic and three students in the Master's program. The results yielded no major changes. However, minor web design issues were raised and rectified.

Potential respondents for the second round included the ones that have answered the first questionnaire. Since the analysis will only include the respondents that filled the three questionnaires, as well as those who completed the second and third round questionnaires, the author of this study opted to follow various studies (Watson, 1989; Niederman et al., 1990; Brancheau et al., 1996; Dekleva et al., 1996; Jeffery et al., 2000; Green et al., 2000; Keller, 2001) by re-contacting online KM associations and forums. This particular approach was used with the intent of attracting new respondents to compensate for the possible attrition of the first round participants.

Due to the fact that the second round questionnaire was sent to the first round respondents, as well as to new potential participants, two versions of it had to be built. The first version of the second questionnaire which was sent to the first round respondents did not include section six – Background Information, since this data had been collected in the first round. However, this data needed to be collected for new potential respondents and was, therefore, included in the second version of the second questionnaire (see Appendix 11). Additionally, concerning the first version of the questionnaire that was sent to the first round participants, the consent form was removed and the cover letter and general instructions were grouped on one page in order to prevent redundancy between the first round and second round questionnaires due to the short period of time separating both questionnaires (See Appendix 11 – Figure 1). For both versions, a link to an example of the personalized report that would be sent to the participants was included in the e-mails, as well as on the first web page of the questionnaires (See Appendix 11 – Figure 2). In addition, two e-mails had to be written and sent, the main difference being in the e-mail sent to new potential respondents, which gave them the possibility to still participate in the second round, although they did not participate in the first (Appendix 12). The e-mail sent to the first round participants can be found in Appendix 13. A reminder was also sent a week later in order to increase participation (Appendix 14).

III.8 - Development of the Third Round Questionnaire

After the reception of the second round questionnaires, a more detailed analysis was performed on each section's data. This analysis consisted of calculating the average rating, standard deviation, median, mode, inter-quartile range, the percentage of respondents that rated a certain item as being unimportant (rating ≤ 2), as well as the percentage of respondents that rated a certain item as being important (rating ≥ 4). The results of this analysis will be discussed in the next chapter. However, at this stage, the average ratings were used in order to build the sections for the third round questionnaire. Using the average ratings, the items were ranked by importance. Each section's ten most important items (five most important for section two – Knowledge Leaders' Skills) were retrieved, randomly ordered, and placed in the appropriate section in the third round questionnaire. Similarly to the second round, all of the questions in the third round questionnaire were closed, requiring the respondents to rate the items on a 5-point Likert scale ranging from 1- Highly not important to 5- Highly important (Appendix 15).

Similarly to the previous questionnaires, a pre-test period of three days was carried out in order to revise the wording of the items, prevent ambiguities or vagueness, ease the navigation through the questionnaire, and get an estimate on the time spent by the knowledge leaders to fill the questionnaire. The pre-test committee also consisted of one academic and three students in the Master's program. The results of this pre-test yielded no major changes.

The third round questionnaire was only sent to the respondents who participated in the first and second rounds, or who only participated in the second round. Hence, the section on the background information was removed due to the previously collected data by potential third round respondents.

The third round questionnaire was ready to be sent. An initial e-mail and reminder (one week later) were sent to the respondents, thanking them for their previous participation(s), informing them about the time required to complete the questionnaire, as well as reminding them that their answers would remain strictly confidential (Appendix 16 and 17).

A thank you letter (Appendix 18) was sent to all the respondents two weeks after the end of the data collection period. The letter thanked them for their participation, reminded the respondents of confidentiality, and informed them about the current state of the thesis.

III.9 - Statistical Procedures

A Microsoft Access XP database was created in order to gather the responses from the online questionnaires. A coding system was designed and numbers were assigned to each issue. All questionnaires were reviewed for completeness in order to remove the incomplete ones from the database. The data were then exported from Microsoft Access into an Excel document format, and manipulated by Microsoft Excel XP and by Statistical Package for Social Sciences (SPSS) 10.0 for Windows to deliver combinations of statistical information. This information will be presented in the next chapter.

Chapter IV - RESULTS and DATA ANALYSIS

The following chapter presents each round's results and analysis. The next chapter will use the third round's analysis depicted in this chapter to discuss their implications in greater detail.

IV.1 - Response Rates

Contrary to previous studies that have recorded a low response rate using a web-based survey methodology (Kiesler and Sproull, 1986; Sproull, 1986; Schuldt and Totten, 1994; Bachmann et al., 1996; Tse, 1998; Weible and Wallace, 1998), this study has attracted more than 160 potential respondents. However, some of these respondents abandoned the survey after having read the 'General Instructions' section. Various e-mails were received from these respondents that explained the primary causes attributed to this attrition, the most cited ones being that they did not correspond to the definition of a knowledge leader or did not have ample time to answer the questionnaire.

A summary by section of the three rounds' effective respondents is portrayed in the following table:

Sections	First Round	Second Round	Third Round
Entered the survey	164	152	124
Section 1 – KL Roles	131	144	120
Section 2 – KL Skills	128	144	119
Section 3 – KM Obstacles	128	143	119
Section 4 – KM Technologies and Tools	127	143	119
Section 5 – KM Benefits	127	142	119
Section 6 – Background Information	117	43 (new ones)	Not used

Table 24 - Number of effective respondents by round and section

Participants that filled one of the questionnaires or only the first and third round questionnaire (19 participants) were omitted since the analysis requires the comparison of results between the second and third round questionnaires. The results and analysis depicted in this chapter are based on the responses received by 100 participants that filled the three questionnaires and to those that have completed the second and third round questionnaires (Table 25). The following sections will display the organizational and the respondents' demographic profiles, as well as each round's results.

Rounds Completed	Number of Usable Questionnaires	Percentage	Used Not Used
1-2-3	66	55%	Used
2-3	34	29%	Used
1-3	19	16%	Not Used
Total	119	100%	

Table 25 - Number of usable questionnaires by round

IV.2 - Demographic Profile of the Organizations

IV. 2. a - Industry

In order for each industry category to contain a reasonable amount of respondents for analysis purposes, a two-level industry classification was performed (Table 26). For example, industries in the 'Education', 'Governmental', and 'Training' sectors were grouped in the 'Education/Governmental' category, whereas 'Business Services', 'Communications and Media', and 'Legal' sectors were grouped under the 'Business Services' second-level category.

First Level Industry Classification	N	Second Level Industry Classification	N
Business Services	22	Business Services	29
Legal	5		
Communications and Media	2		
Governmental	17	Education/Governmental	27
Education	8		
Training	2		
IT Services	17	IT Services	17
Finance, Insurance, and Real-estate	9	Finance, Insurance, and Real-estate	9
Health	4	Health	4
Manufacturing	4	Manufacturing	
Non for profit Association	2	Non for profit Association	2
Energy	2	Other	6
Accredited Certification Body	1		
Agriculture, Forests, and Fisheries	1		
Architecture	1		
Electricity Transmission	1		

Table 26 - Two-level industry categorization

Figure 4 below shows how these industries were represented in the survey. While 'Business Services', 'Educational/Governmental', and 'IT Services' organizations employed three-quarters of the respondents, the rest of them are employed by 'Finance, Insurance, and Real-estate', 'Health', 'Manufacturing', and 'Not for profit Associations' organizations.

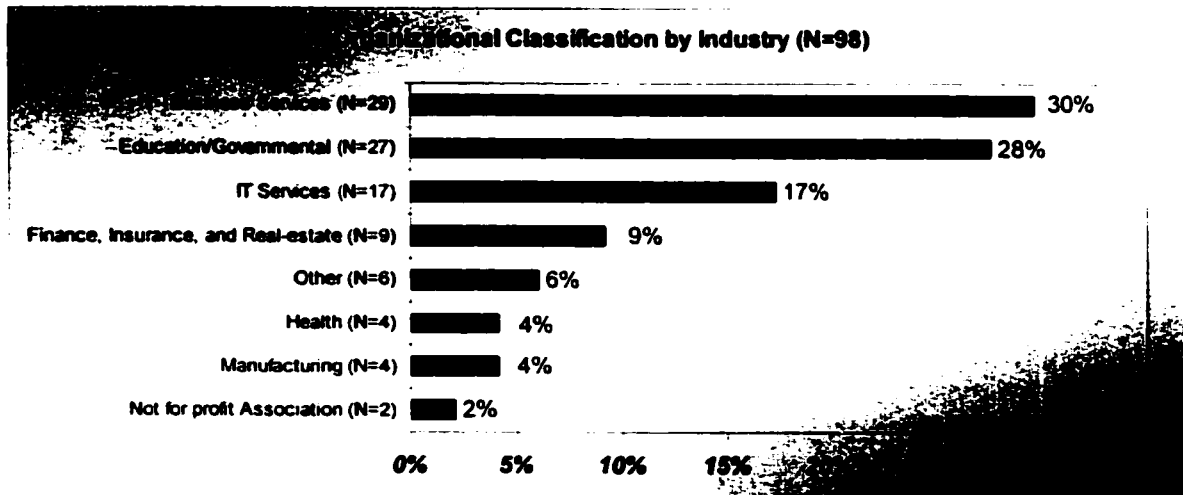


Figure 4 - Organizational classification by industry (N=98)

IV. 2. b - Employee Number

The next figure shows that the majority of the respondents (66%) work for large organizations (more than 500 employees), while 44% of them work for small to medium companies (smaller or equal to 500 employees). The average employee number of the respondents' organizations is 12,878.

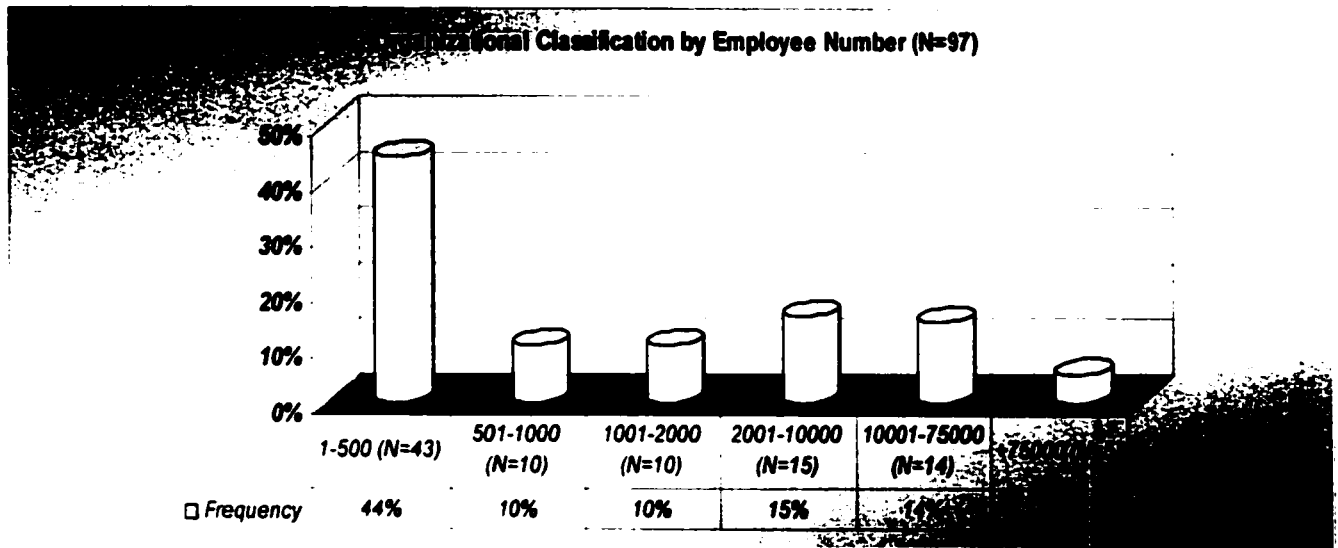


Figure 5 - Organizational classification by employee number (N=97)

IV. 2. c - KM Employee Number

The survey asked the respondents how many individuals are assigned to the development and/or implementation of KM initiatives in their organization. The answers of ninety-two out of the one hundred respondents are represented in Figure 6. Ten percent of the organizations had more than 99 KM employees, leaving the remaining 90% of the organizations with 50 or less individuals assigned to KM activities. On average, the respondents' organizations employ 22 KM employees.

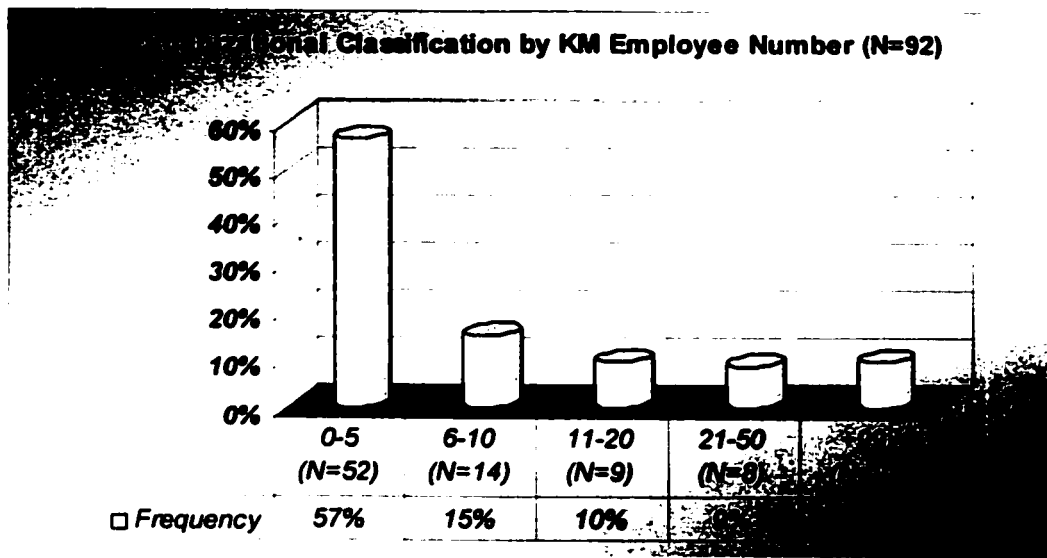


Figure 6 - Organizational classification by KM employee number (N=92)

IV. 2. d - Revenue

Concerning the fifty-six answers collected, the respondents' organizations' mean revenue is \$US 2,311,258,268. Figure 7 below suggests that revenues are evenly distributed around the central category (\$US 20 million - \$US 99,999,999), where 38% of the respondents work in companies generating less than \$US 19,999,999 in revenue and 39% work in companies generating more than \$US 100 million in revenue.

There are various reasons behind the low number of answers on the question asking respondents about their organization's revenue. One reason is that such information is not usually known by the respondents and requires additional search efforts. A second reason deals with confidentiality; some respondents have commented that they were not allowed to divulge such information.

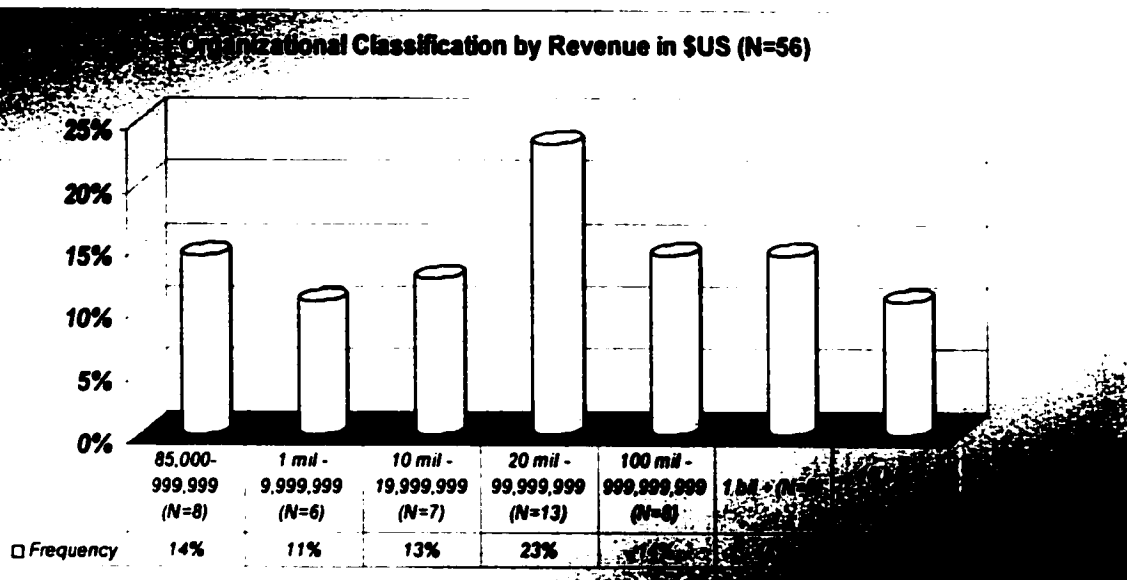


Figure 7 - Organizational classification by revenue (N=56)

IV. 2. e - Percentage of the Budget Reserved for KM

While the mean of the percentage of the organization’s budget reserved for KM is 7.25%, the majority of the respondents’ organizations (80%) reserve between zero and five percent of their budget for KM, whereas the remaining 20% allocate six percent to more than half of their budget to implement and/or develop KM activities (Figure 8). For the same reasons cited in the previous section, the results indicate a lower response rate (70%) for this question.

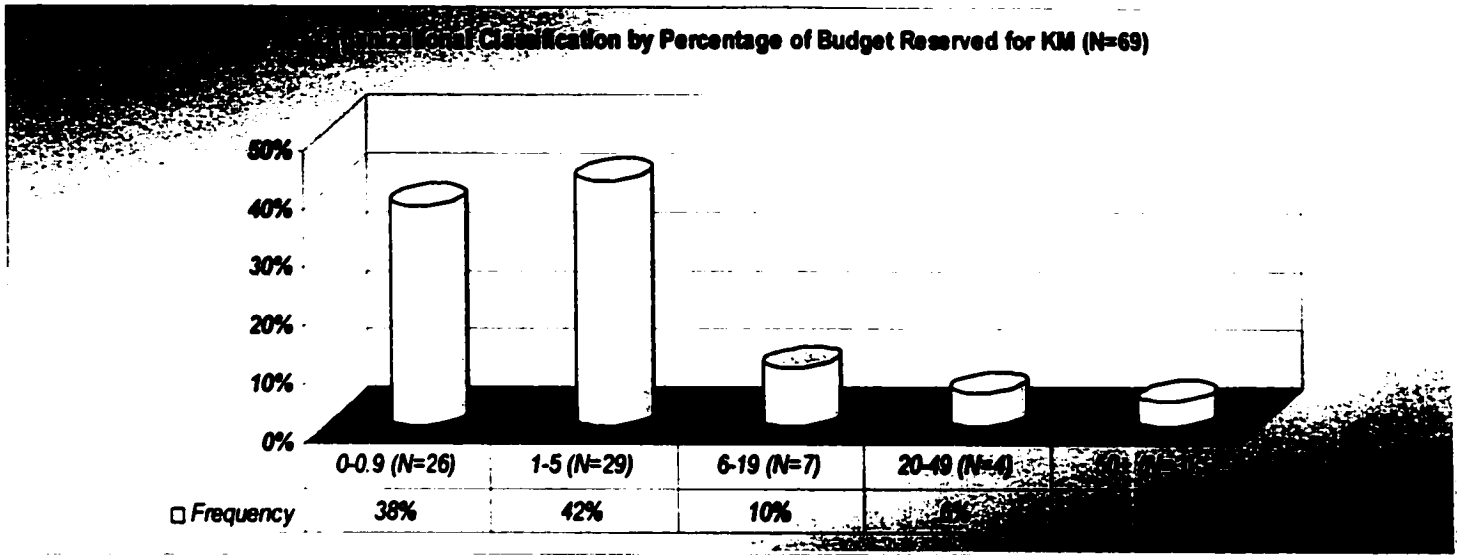


Figure 8 - Organizational classification by percentage of budget reserved for KM (N=69)

IV. 2. f - Percentage of Time Dedicated to KM Activities

Respondents were asked how much of their time is dedicated to perform KM activities. As shown in Figure 9, more time is dedicated to creating, capturing, organizing, transferring and applying knowledge than for storing and deploying knowledge. A reasonable explanation for the low response rate of 67% is that only 56% of the respondents had KM-related jobs, implying that the remaining respondents did not have KM activities in their main tasks. Hence, they were unable to provide any numbers for this question.

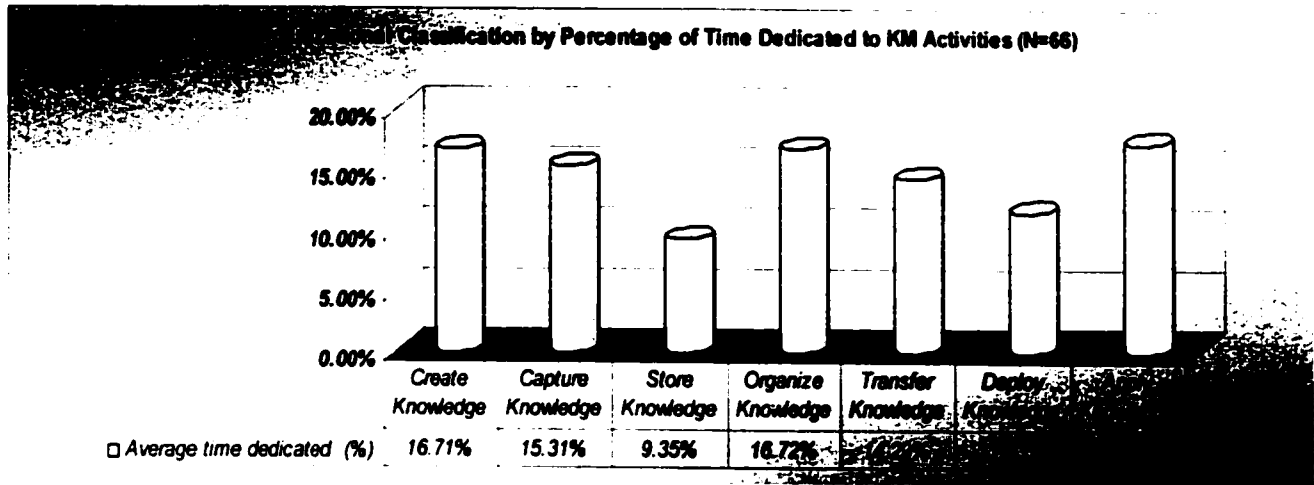


Figure 9 - Organizational classification by percentage of time dedicated to KM activities (N=66)

IV. 2. g - Functional Areas Where KM is Being Implemented

The figure below indicates that KM is mainly being implemented in the IT, Customer Service, and HR departments by more than 40% of the respondents' organizations. Only seven percent of the respondents indicated that KM is being implemented in the Manufacturing department.

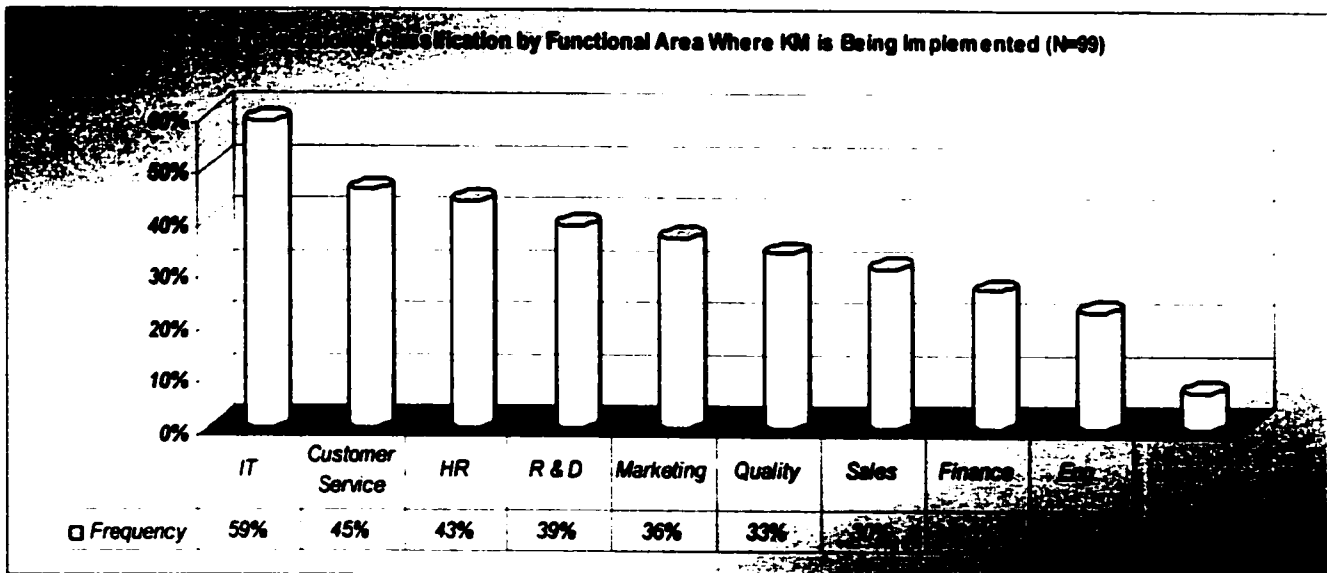


Figure 10 - Organizational classification by functional area where KM is being implemented (N=99)

IV.3 - Demographic Profile of the Respondents

IV. 3. a - Geographic Area

For the same reasons depicted in the “Industry Classification” section, a two-level geographic classification was performed. Respondents’ countries were grouped by continents as shown in Table 27 below.

Country	N	Continent	N
USA	23	North America	35
Canada	12		
Australia	21	Australia	22
New Zealand	1		
India	7	Asia	17
Malaysia	3		
Singapore	3		
Korea	1		
Pakistan	1		
Philippines	1		
Taiwan	1		
UK	11		
Netherlands	3		
Belgium	1		
France	1		
Germany	1		
Luxembourg	1		
Spain	1		
Brazil	2	South America	4
Caribbean	1		
Mexico	1		
South Africa	2	Africa	2

Table 27 - Two-level geographical categorization

When looking at the geographical distribution of the respondents in Figure 11, no particular pattern evolves. However, respondents seem to originate from the five continents, with more than 60% of the participants from North America and Australia, 36% from Europe and Asia, and the remaining 6% from South America and Africa. Specifically, the respondents are located in the U.S., Australia, and Canada.

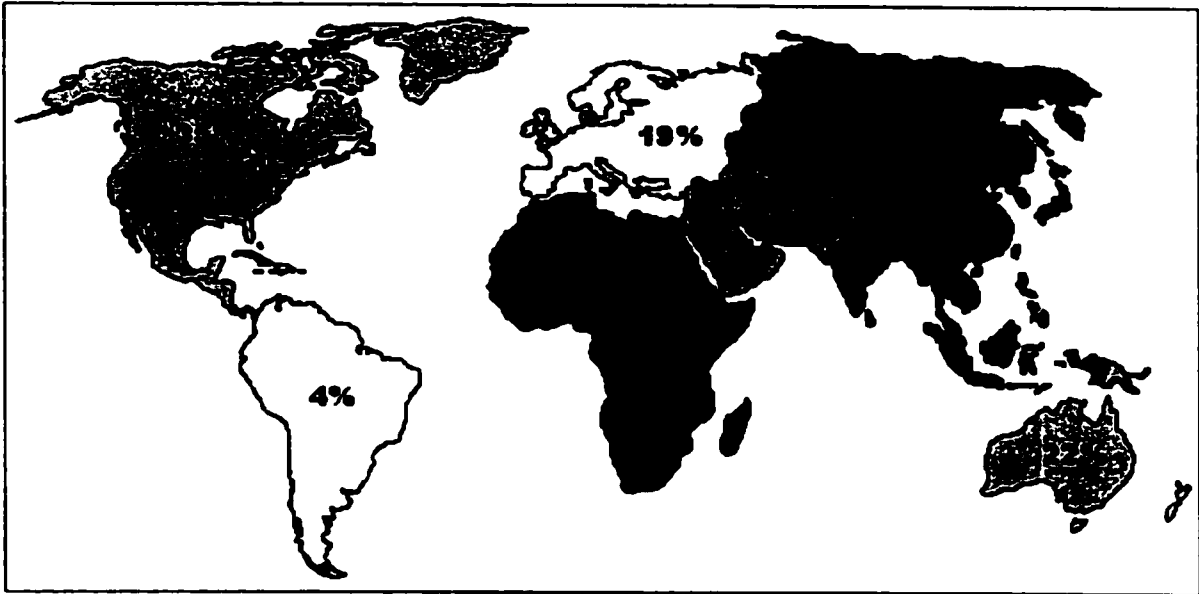


Figure 11 - Respondent classification by geographical area (n=99)

IV. 3. b - Job Position

Initially, the respondents' job titles were carefully divided into 40 different categories. As shown in Table 28 on the next page, these categories were reclassified into three broader categories pertinent to the analysis: 'KM Related' positions, 'IT/IS Related' positions, and 'Other' positions.

First Level Job Position Classification	N	Second Level Job Position Classification	N
KM Manager	21	KM Related Jobs	55
KM Director	9		
Chief Knowledge Officer (CKO)	6		
KM Consultant	5		
KM Architect	3		
KM Officer	2		
KM Vice-President	1		
KM Specialist	1		
KM Service Administrator	1		
KM Leader	1		
KM Engineer	1		
KM Coordinator	1		
KM Analyst	1		
Global Leadership and Learning Officer	1		
Document Management Specialist	1		
IT/IS Manager	3	IT/IS Related Jobs	13
Software Developer	1		
Senior Technical Advisor	1		
Manager Control Center Systems	1		
IT/IS Coordinator	1		
Information Officer	1		
Director Enterprise Architecture	1		
Communication and Information Manager	1		
CIO	1		
Applications Coordinator	1		
Applications and Architecture Director	1		
Academics	6	Other	30
Business Consultant	5		
President	3		
Project Manager	2		
Vice-President	2		
Manager	2		
Director	2		
Communication Manager	1		
Business Improvement Manager	1		
CEO	1		
Educational Developments Manager	1		
Executive Policy Director	1		
Marketing Manager	1		
Training Manager	1		
Assistant Director	1		

Table 28 - Two-level job position categorization

As shown in Table 29, the result of this two-level job position classification yielded 56% of KM related jobs, 13% of IT/IS related jobs, and the remaining job titles (31%) were classified in the 'Other' category.

Job Position	N	Frequency
KM Related Jobs	55	56%
IT/IS Related Jobs	13	13%
Other	30	31%

Table 29 - Respondent classification by job position (N=98)

IV. 3. c - Years in Firm / in Position / of KM Experience

Table 30 depicts the frequency of the respondents' number of years working in their current firm, the frequency of the respondents' number of years holding their current position, as well as the frequency of the respondents' number of years of experience in KM.

The frequency of the respondents' number of years working for their current firm is evenly distributed around the average (8.7 years), where more than 43% of the respondents have been working for their firm for more than the average, and 57% have been working for eight years or less.

The average number of years that the respondents have been holding their current job position is 3.6 years. More than 75% of the respondents have occupied their job position for less than the average, while less than 25% have occupied their job position for more than the average.

As for the number of years of KM experience, more than 60% of the respondents have less than the average of 5.9 years of such experience, while the remaining 40% of respondents have more years of KM experience than the average.

Years	In Firm	In Position	KM Experience
0-2	35%	69%	31%
3-6	14%	20%	45%
7+	51%	11%	24%
Average (Years)	8.7	3.6	5.9

Table 30 - Respondent classification by years in firm, years in position, and years of KM experience (N=98)

IV. 3. d - Reporting Structure

Dealing with job positions requires their classification into analyzable categories. A two-level classification was done (Table 31) and yielded two major categories. As shown in Figure 12, 69% of the respondents report to 'Executive level' positions while 20% report to 'Managerial level' positions. The remaining responses were classified into the 'Other' (11%).

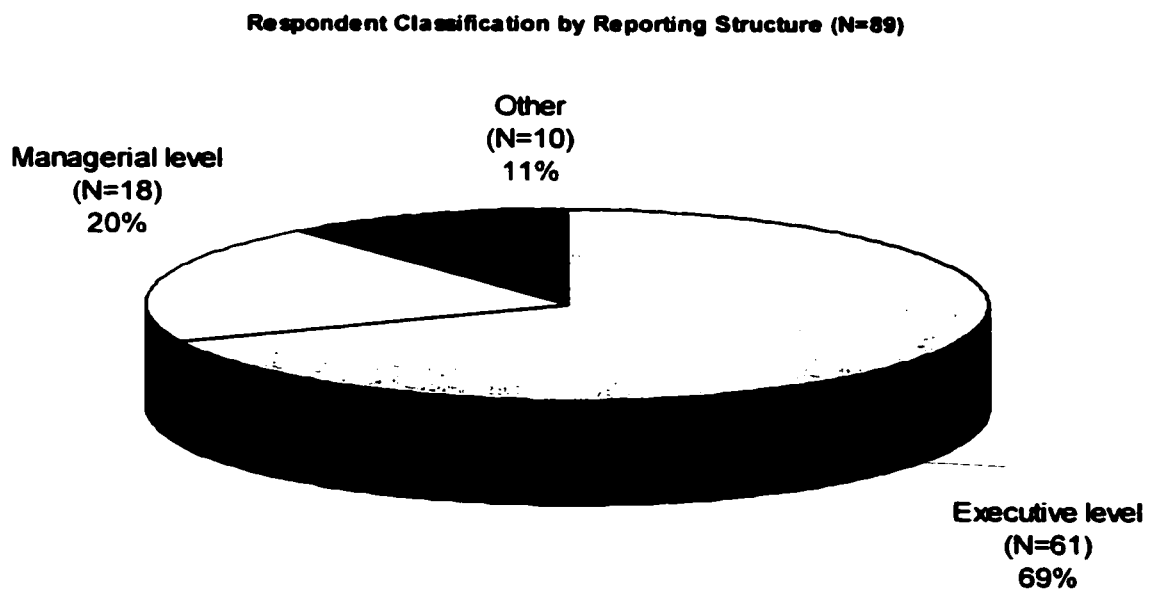


Figure 12 - Respondent classification by reporting structure (N=89)

First Level Reporting Structure Classification	N	Second Level Reporting Structure Classification	N
Director	21	Executive Level	61
CEO	9		
Vice-President	4		
COO	4		
CKO	3		
IT/IS Director	3		
President	3		
Chief Architect	2		
CIO	2		
Chief Learning Officer (CLO)	2		
Chief Technology Officer (CTO)	2		
KM Director	2		
Chief Strategy Officer	1		
Executive Director	1		
Executive Secretary	1		
Senior Partner	1	Managerial Level	18
Manager	11		
IT/IS Manager	3		
KM Manager	2		
Managing Partner	1		
Project Manager	1	Other	10
Self	4		
Associate Professor	1		
Dean	1		
Knowledge Partner	1		
Partner	1		
Secretary	1		
Team Leader	1		

Table 31 - Two-level reporting structure categorization

IV. 3. e - Education and Study Field

Figure 13 below shows that the respondents could be considered to be very well educated. The results suggest that 69% have accomplished graduate-level studies (doctorate, masters, and graduate certificate). Also, noteworthy is that only six of the respondents do not hold university degrees.

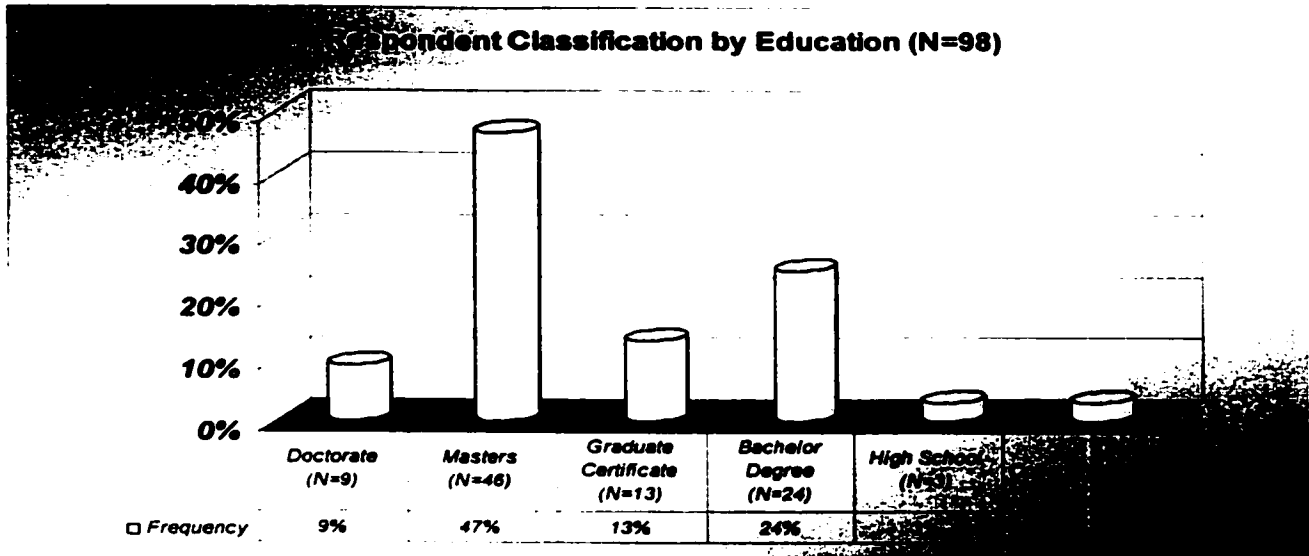


Figure 13 - Respondent classification by education (n=98)

The distribution of the respondents by study field is presented in Figure 14. A large number of respondents earned their degrees in 'Business Studies' (44%) and 'Social Sciences' (23%). However, results suggest that respondents also hold degrees in 'Pure and Applied Science', 'Engineering', 'Computer Science', 'Arts & Letters', and 'Library Science'.

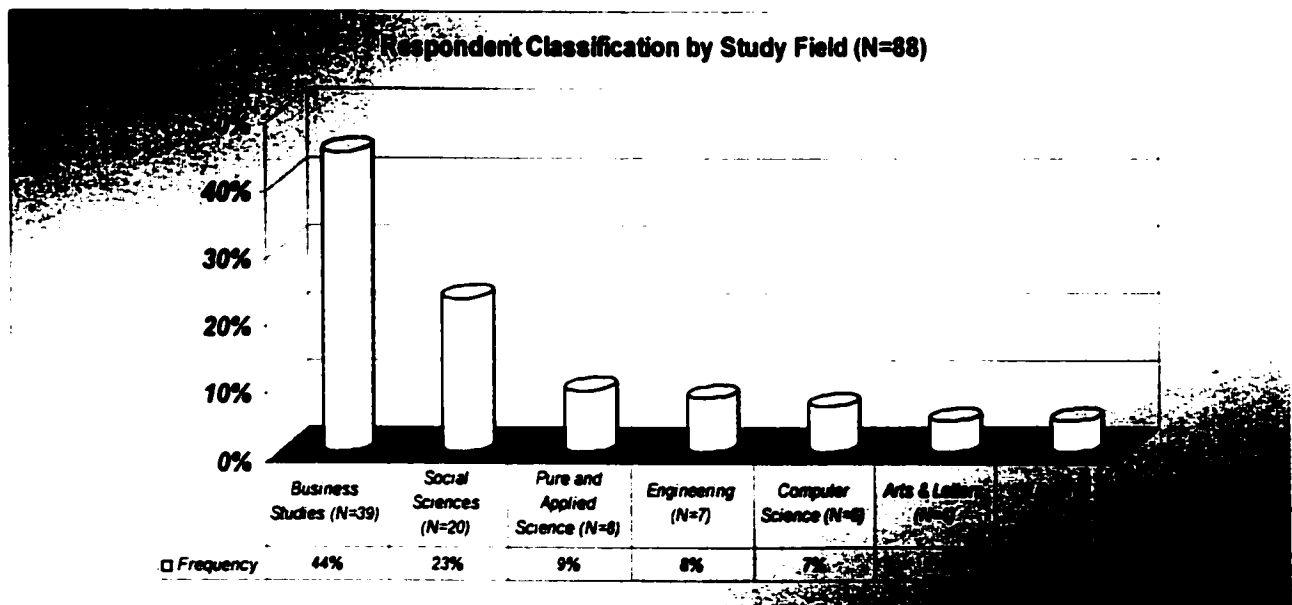


Figure 14 - Respondent classification by study field (n=88)

IV. 3. f - Age and Gender

For all the age categories representing the respondents, 62% of them are males vs. 38% females. As shown in Figure 15, twenty percent of the respondents are less than 36 years old and only seven percent are 56+ years old. This leaves 73% in the 36-55 years old category, split evenly between the 36-45 and 46-55 year old categories.

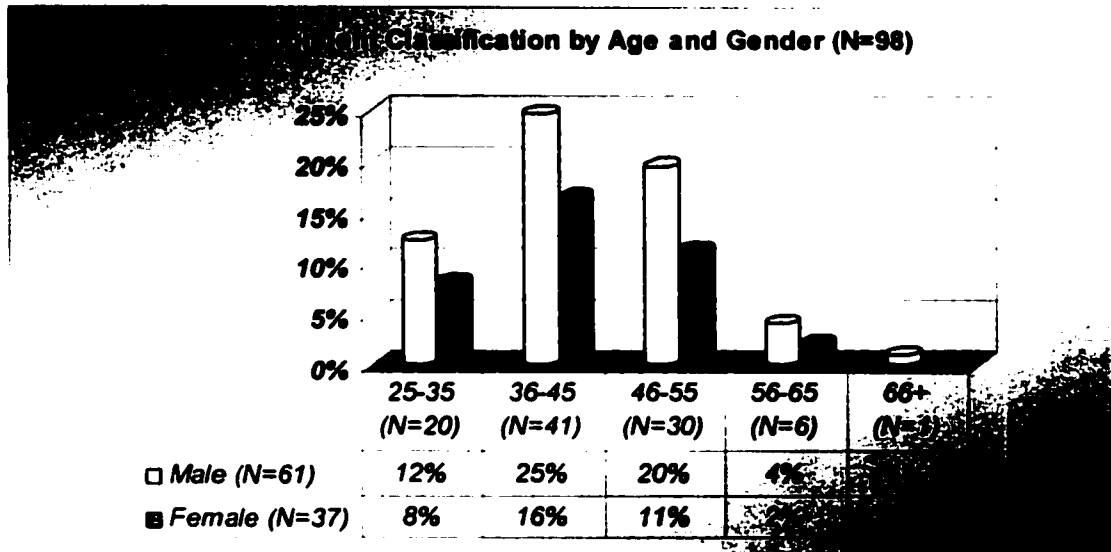


Figure 15 - Respondent classification by age and gender (n=98)

IV. 3. g - Who Appointed the Respondents to Their Current Job Position

The survey asked the respondents to state the job title of the individual who assigned them to their current job position. As shown in Table 32, the collected answers were classified into five main categories (Chief Executives, Directors, Managers, Vice-Presidents, and Other).

First Level Job Position Classification	N	Second Level Job Position Classification	N
CEO	11	Chief Executives	36
Chairman	3		
COO	3		
President	3		
CKO	3		
President	3		
Chief Architect	2		
CTO	1		
CIO	1		
CLO	1		
CSO	1		
Director	10	Directors	32
Executive Director	3		
General Director	3		
IT/IS Director	2		
Board of Directors	2		
KM Director	2		
Agency Director	1		
Global Leadership and Learning Director	1		
Laboratory Director	1		
Managing Director	1		
Planning Director	1		
Quality Director	1		
Sales and Marketing Director	1		
Research and Planning Director	1		
Scientific Director	1		
Team Director	1		
KM Manager	2	Managers	10
Manager	2		
Operations General Manager	1		
IT/IS Manager	1		
Document Manager	1		
Documentation and Processes Manager	1		
General Manager	1		
Media Services Manager	1		
Vice-President	2	Vice-Presidents	7
VP Customer Service	1		
VP Functional Unit	1		
VP Enterprise Architecture	1		
VP Professional Services	1		
VP Senior	1		
Self	4	Other	5
Team Leader	1		

Table 32 - Two-level categorization of whom appointed the respondents to their current job position

The results were graphed (Figure 16) and suggest that 82% of the respondents were assigned to their current job position by executives (Chief Executives, Directors, and Vice-Presidents) while the remaining 18% were assigned by managers, team leaders, or self-assigned.

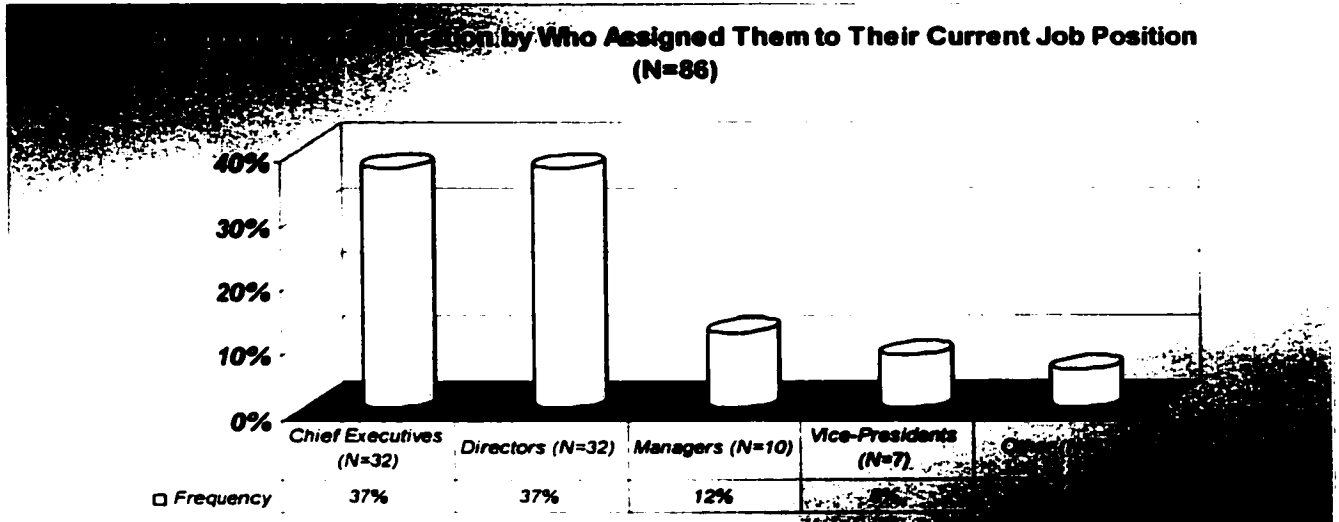


Figure 16 - Respondent classification by who appointed them to their current job position (n=86)

IV.4 - Analysis of Round One's Results

Round one's objectives included a quantitative, qualitative, and informational objective as follows:

- *Quantitative objective:* To gather the respondents' perceived importance on the items retrieved from the literature.
- *Qualitative objective:* To gather the respondents additional items, other than the ones proposed to them.
- *Informational objective:* To gather the respondents' background information.

As stated earlier, each section in the first round questionnaire proposed items derived from the literature, except for section five – KM Benefits, which was an open-ended

question. The analysis of the results of this round will enable the creation of a new list of items for the second round questionnaire. More specifically, the analysis will include:

1. The mean and median of the ratings in order to classify the items by order of importance.
2. The averages of the items' mean ratings and standard deviations for each section in order to compare it with the second and third rounds' section average. In order to be compared, this average is calculated by using only the mean ratings and standard deviations of the items that appeared in the final round.
3. The standard deviation and inter-quartile range in order to study the dispersion of the results. These measures are indicative of the degree of agreement of the items' perceived importance.
4. The percentage of participants that rated the item as being unimportant (rate ≤ 2) and the percentage of participants that rated the item as being important (rate ≥ 4) are also ways to determine the degree of agreement on the items' rankings.

The analysis of the results of round one is presented in Table 33 on the next page.

										Section Mean Rating / S.D.
Rank	R	Notes	Mean	S.D.	Median	Mode	Kurt	% rate <=2	% rate >=4	
1	R1	Foster a knowledge sharing culture in my organization.	4.88	0.37	5	5	0	0%	96%	4.54 / 0.60
2	R2	Develop my organization's knowledge resources.	4.51	0.63	5	5	1	0%	92%	
3	R3	Convince senior management of what our organization will gain through managing knowledge.	4.49	0.63	5	5	1	2%	96%	
4	R4	Drive initiatives to measure KM benefits in my organization.	4.28	0.75	4	4	1	3%	87%	
5	R5	Select and provide support for technologies that contribute to implement KM activities in my organization.	4.03	0.93	4	4	2	7%	73%	
6	R6									
Rank	S	Skills	Mean	S.D.	Median	Mode	Kurt	% rate <=2	% rate >=4	4.74 / 0.52
1	S1	Interpersonal skills.	4.84	0.37	5	5	0	0%	100%	4.74 / 0.52
2	S2	Leadership skills.	4.70	0.52	5	5	1	0%	97%	
3	S3	Change agent skills.	4.67	0.66	5	5	1	3%	96%	
4	S4	Project management skills.	4.16	0.70	4	4	1	0%	92%	
5	S5	Technological skills.	3.51	0.76	4	4	1	9%	57%	
6	S6									
Rank	O	Obstacles	Mean	S.D.	Median	Mode	Kurt	% rate <=2	% rate >=4	3.99 / 0.89
1	O1	Organizational culture.	4.63	0.62	5	5	1	2%	95%	3.99 / 0.89
2	O2	Lack of senior management support.	4.44	0.82	5	5	1	4%	88%	
3	O3	Lack of incentive (reward) system.	3.90	0.93	4	4	2	7%	66%	
4	O4	Lack of time.	3.78	0.97	4	4	1	9%	67%	
5	O5	Emphasis on individual rather than team.	3.70	1.03	4	4	1	15%	67%	
6	O6	Organizational structure.	3.41	1.03	3.5	4	1	18%	50%	
7	O7	Information/communication technology.	3.40	0.95	4	4	1	19%	55%	
8	O8	Non-standardized processes.	3.29	1.04	3	4	2	27%	49%	
9	O9	Staff turnover.	3.04	1.06	3	3	2	33%	34%	
10	O10	Physical layout of work spaces.	2.78	1.10	3	3	2	37%	27%	
11	O11									
Rank	TT	Technologies & Tools	Mean	S.D.	Median	Mode	Kurt	% rate <=2	% rate >=4	4.03 / 0.84
1	TT1	Portals (Internet/Intranet/Extranet)	4.54	0.61	5	5	1	2%	97%	4.03 / 0.84
2	TT2	Information Retrieval Engines.	4.26	0.75	4	5	1	0%	82%	
3	TT3	E-mail.	4.19	0.80	4	4	1	3%	83%	
4	TT4	Document Management Systems.	4.08	0.88	4	4	1	5%	79%	
5	TT5	Collaborative Work Support Tools (ex.. Groupware).	3.90	0.89	4	4	2	8%	71%	
6	TT6	Corporate Yellow Pages of Skills and Expertise.	3.82	0.92	4	4	1	6%	70%	
7	TT7	Data Mining	3.45	1.03	4	4	1	17%	53%	
8	TT8	Help-desk Applications.	3.36	0.93	3	3	1	17%	43%	
9	TT9	Audio-conference.	3.13	0.95	3	3	1	19%	31%	
10	TT10	Video-conference.	2.99	0.95	3	3	0	21%	18%	

Table 33 - Analysis of round one's results

In order to choose which items among the ones derived from the literature could remain in the second round questionnaire, their mean ratings needed to be higher than three, which is equal to the neutral anchor value on the 5-point Likert scale. Most of the items' mean ratings vary between 3.51 (S5 – Technological skills) and 4.88 (R1 – Foster a knowledge sharing culture). Two items had a mean rating lower than three: O10 – Physical layout of work spaces (2.78) and TT10 – Video-conference (2.99). However, since their values are very close to the neutral value (three), the decision was taken to include them in the second round questionnaire.

The percentage of respondents that rated the items as being important can also be used to measure a degree of agreement on the perceived item's importance. The items that are highly ranked are considered to be important by more than 65% of the respondents. This percentage implies that the respondents highly agree on the importance of the items.

In order to achieve the qualitative objective of this first round, the participants were invited to add items that were not proposed. The succeeding paragraphs will present the added items in each section along with the number of times they were mentioned by the respondents.

IV. 4. a - Knowledge Leaders' Roles

A total of 24 additional roles were proposed by the respondents. However, the ten most recurrent ones (Table 34) were chosen and included in the second questionnaire. For example, the role of "facilitating knowledge sharing among staff" was mentioned eleven times.

Added Roles	# Occurrence
Promote KM's benefits throughout my organization.	29
Facilitate knowledge sharing among staff.	11
Develop my organization's KM strategy.	11
Facilitate knowledge sharing events / meetings.	11
Lead by example by sharing knowledge.	9
Embed KM within internal processes.	9
Benchmark with other firms on how KM can benefit my organization.	9
Develop incentive (rewards) systems for my organization's staff.	7
Include KM tasks in job descriptions of newly recruited staff.	6
Practice change management.	4

Table 34 - Number of occurrence of added roles in round one

IV. 4. b - Knowledge Leaders' Skills

Concerning the knowledge leaders' skills, more than 28 different skills were proposed by the first round participants. The six most frequent ones presented in the table below were chosen. These skills were included in section two of the second round questionnaire.

Added Skills	# Occurrence
Business-specific skills.	20
Creativity skills.	6
Motivational skills.	6
Marketing skills.	3
Storytelling skills.	3
Negotiation skills.	2

Table 35 - Number of occurrence of added skills in round one

IV. 4. c - KM Obstacles

In addition to the ten KM obstacles derived from the literature and proposed in the first round questionnaire, participants suggested sixteen additional obstacles. Seven of the most cited obstacles are presented in the table below and will be included in section three of the second round questionnaire.

Added KM Obstacles	# Occurrence
Reluctance to change.	14
Lack of KM understanding.	12
Difficulty in measuring KM benefits in my organization.	9
Lack of capital.	9
Lack of vision.	6
Communication barriers.	4
Lack of KM methodologies.	3

Table 36 - Number of occurrence of added KM obstacles in round one

IV. 4. d - KM Technologies and Tools

Ten technologies and tools were proposed in the first round questionnaire. Nevertheless, the respondents found this list incomplete and suggested twenty additional technologies and tools. Six of these were cited more than twice and will be added to the second round questionnaire, whereas the other fourteen were disqualified due to the fact that they were only mentioned once by the respondents.

Added KM Technologies and Tools	# Occurrence
Knowledge maps.	5
Discussion boards.	4
Project management tools.	3
E-learning technologies.	2
Quality management systems.	2
Artificial intelligence.	2

Table 37 - Number of occurrence of added KM technologies and tools in round one

IV. 4. e - KM Benefits

As mentioned previously, this section's question was open-ended, asking respondents to add as many as five important perceived KM benefits. A total of 45 distinct benefits were proposed by the participants. Seventeen benefits were mentioned more than eight times and will form section five's question in the second round questionnaire. The remaining 28 benefits were removed since they occurred three times or less.

Added KM Benefits	# Occurrence
Increase the effective utilization of knowledge resources.	53
Avoid re-inventing the wheel.	38
Improve the quality of decision-making.	31
Deliver higher quality products and services.	17
Decrease learning/training time.	15
Increase internal knowledge sharing.	15
Increase external knowledge sharing.	15
Help identifying new business opportunities.	15
Increase employee satisfaction.	14
Increase innovation.	14
Retain intellectual capital when employees leave the organization.	14
Increase support for business activities.	13
Improve the work environment.	12
Increase employee productivity.	11
Build and maintain a competitive advantage.	10
Achieve a closer relationship with individual customers.	9
Increase collaboration between employees.	8

Table 38 - Number of occurrence of added KM benefits in round one

IV.5 - Analysis of Round Two's Results

The first round enabled a vast exploration of the studied subject. Contrary to the first round, round two was purely quantitative, which also required the experts to use their judgments to rate the proposed items. Round two's objectives included a quantitative and informational objective:

- *Quantitative objective:* To gather the respondents' perceived importance on the items retrieved from the literature and on the most repeated items yielded from round one.
- *Informational objective:* To gather the background information of new respondents.

The analysis of the results of this round will enable the creation of a new list of items for the third round questionnaire. More specifically, the analysis included:

1. The mean and median of the ratings in order to classify the items by order of importance.
2. The averages of the items' mean ratings and standard deviations for each section in order to compare it with the first and third rounds' section average. In order to be compared, this average is calculated by using only the mean ratings and standard deviations of the items that appeared in the final round.
3. The standard deviation and inter-quartile range in order to study the dispersion of the results. These measures are indicative of the degree of agreement of the items' perceived importance.
4. The percentage of participants that rated the item as being unimportant (rate ≤ 2) and the percentage of participants that rated the item as being important (rate ≥ 4) are also ways to determine the degree of agreement on the items' rankings.
5. Kendall's coefficient of concordance W using the corrected formula for ties (see Figure 3) is another way to determine the degree of agreement on the items' rankings. In order to compare this value with the ones in the other rounds, this coefficient was calculated by only using the rating of the items that appeared in the final round.

The analysis of the results of round two is presented in Table 39 on the next page.

										Section Mean Rating / S.D.	Kendall's Corrected W
Rank	R	Notes	Mean	S.D.	Median	Mode	KOR	% rate <=2	% rate >=4	4.34 / 0.68	0.15 (.000)
1	R1	Foster a knowledge sharing culture in my organization	4.78	0.52	5	5	0	1%	97%		
2	R2	Lead by example by sharing knowledge	4.54	0.64	5	5	1	0%	92%		
3	R3	Convince senior management of what our organization will gain through managing knowledge	4.50	0.63	5	5	1	0%	93%		
4	R4	Develop my organization's KM strategy	4.45	0.63	5	5	1	1%	95%		
5	R5	Facilitate knowledge sharing among staff	4.33	0.62	4	4	1	0%	92%		
6	R6	Promote KM's benefits throughout my organization	4.33	0.71	4	4	1	2%	90%		
7	R7	Embed KM within internal processes	4.32	0.67	4	4	1	2%	93%		
8	R8	Develop my organization's knowledge resources	4.11	0.81	4	4	1	3%	81%		
9	R9	Facilitate knowledge sharing events / meetings	4.03	0.73	4	4	1	2%	79%		
10	R10	Drive initiatives to measure KM benefits in my organization	4.02	0.82	4	4	1	4%	76%		
11	R11	Practice change management	3.92	0.89	4	4	2	4%	71%		
12	R12	Select and provide support for technologies that contribute to implement KM activities in my organization	3.89	0.74	4	4	1	3%	73%		
13	R13	Benchmark with other firms on how KM can benefit my organization	3.62	0.88	4	4	1	10%	64%		
14	R14	Develop incentive (rewards) systems for my organization's staff	3.62	0.96	4	4	1	12%	60%		
15	R15	Include KM tasks in job descriptions of newly recruited staff	3.56	0.92	4	4	1	12%	57%		
Rank	S	Skills	Mean	S.D.	Median	Mode	KOR	% rate <=2	% rate >=4	4.44 / 0.64	0.11 (.000)
1	S1	Interpersonal skills	4.64	0.56	5	5	1	0%	96%		
2	S2	Leadership skills	4.55	0.56	5	5	1	0%	97%		
3	S3	Motivational skills	4.49	0.63	5	5	1	0%	93%		
4	S4	Change agent skills	4.37	0.77	5	5	1	1%	88%		
5	S5	Creativity skills	4.16	0.70	4	4	1	3%	80%		
6	S6	Project management skills	4.00	0.81	4	4	1	3%	77%		
7	S7	Negotiation skills	3.98	0.85	4	4	2	4%	74%		
8	S8	Business-specific skills	3.92	0.75	4	4	0	5%	81%		
9	S9	Marketing skills	3.82	0.85	4	4	1	5%	70%		
10	S10	Storytelling skills	3.60	0.87	4	4	1	7%	55%		
11	S11	Technological skills	3.48	0.77	4	4	1	11%	57%		
Rank	O	Obstacles	Mean	S.D.	Median	Mode	KOR	% rate <=2	% rate >=4	4.04 / 0.81	0.20 (.000)
1	O1	Organizational culture	4.64	0.60	5	5	1	0%	94%		
2	O2	Lack of senior management support	4.48	0.73	5	5	1	3%	92%		
3	O3	Reluctance to change	4.24	0.79	4	4	1	4%	86%		
4	O4	Lack of vision	4.24	0.73	4	4	1	1%	85%		
5	O5	Communication barriers	4.00	0.80	4	4	1	4%	77%		
6	O6	Lack of KM understanding	3.88	0.91	4	4	0	9%	77%		
7	O7	Lack of time	3.85	0.88	4	4	1	6%	68%		
8	O8	Difficulty in measuring KM benefits in my organization	3.83	0.83	4	4	1	7%	70%		
9	O9	Emphasis on individual rather than team	3.72	0.97	4	4	1	12%	66%		
10	O10	Organizational structure	3.71	0.81	4	4	1	8%	65%		
11	O11	Lack of incentive (reward) system	3.68	0.90	4	4	1	8%	58%		
12	O12	Lack of KM methodologies	3.57	0.90	4	4	1	11%	61%		
13	O13	Information/communication technology	3.51	0.95	4	4	1	13%	57%		
14	O14	Non-standardized processes	3.49	0.92	4	4	1	15%	59%		
15	O15	Lack of capital	3.37	0.92	3	3	1	17%	46%		
16	O16	Staff turnover	3.14	0.96	3	3	1	24%	34%		
17	O17	Physical layout of work spaces	2.89	0.99	3	3	2	35%	28%		
Rank	B	Benefits	Mean	S.D.	Median	Mode	KOR	% rate <=2	% rate >=4	4.45 / 0.68	0.03 (.000)
1	B1	Avoid re-inventing the wheel	4.61	0.67	5	5	1	1%	95%		
2	B2	Increase internal knowledge sharing	4.56	0.56	5	5	1	1%	99%		
3	B3	Improve the quality of decision-making	4.52	0.60	5	5	1	0%	95%		
4	B4	Build and maintain a competitive advantage	4.46	0.60	5	5	1	0%	95%		
5	B5	Increase collaboration between employees	4.45	0.63	5	5	1	1%	95%		
6	B6	Increase the effective utilization of knowledge resources	4.43	0.64	5	5	1	0%	92%		
7	B7	Retain intellectual capital when employees leave the organization	4.42	0.69	5	5	1	1%	91%		
8	B8	Increase innovation	4.37	0.77	4.5	5	1	3%	91%		
9	B9	Deliver higher quality products and services	4.36	0.79	4	5	1	3%	92%		
10	B10	Increase employee productivity	4.30	0.67	4	4	1	2%	92%		
11	B11	Increase support for business activities	4.29	0.63	4	4	1	0%	91%		
12	B12	Increase employee satisfaction	4.26	0.61	4	4	1	0%	91%		
13	B13	Decrease learning/training time	4.12	0.61	4	4	0.75	0%	87%		
14	B14	Help identifying new business opportunities	4.10	0.88	4	4	1	3%	79%		
15	B15	Increase external knowledge sharing	4.06	0.78	4	4	1	3%	79%		
16	B16	Achieve a closer relationship with individual customers	3.99	0.86	4	4	1	5%	76%		
17	B17	Improve the work environment	3.92	0.75	4	4	0	4%	76%		
Rank	TT	Technologies & Tools	Mean	S.D.	Median	Mode	KOR	% rate <=2	% rate >=4	4.00 / 0.78	0.15 (.000)
1	TT1	Portals (Internet/Intranet/Extranet)	4.44	0.66	5	5	1	1%	93%		
2	TT2	E-mail	4.34	0.72	4	5	1	2%	89%		
3	TT3	Information Retrieval Engines	4.20	0.75	4	4	1	1%	86%		
4	TT4	Document Management Systems	4.08	0.74	4	4	1	3%	83%		
5	TT5	Collaborative Work Support Tools (ex Groupware)	4.06	0.77	4	4	1	3%	81%		
6	TT6	Knowledge Maps	3.97	0.73	4	4	0	3%	81%		
7	TT7	Corporate Yellow Pages of Skills and Expertise	3.80	0.90	4	4	1	8%	67%		
8	TT8	Discussion Boards	3.79	0.81	4	4	1	6%	73%		
9	TT9	E-learning Technologies	3.69	0.76	4	4	1	4%	61%		
10	TT10	Data Mining	3.57	0.97	4	4	1	15%	61%		
11	TT11	Project Management Tools	3.48	1.01	4	4	1	15%	52%		
12	TT12	Help-desk Applications	3.36	0.92	3	4	1	17%	47%		
13	TT13	Quality Management Systems	3.33	1.01	3	3	1	18%	42%		
14	TT14	Audio-conference	3.21	0.82	3	3	1	16%	36%		
15	TT15	Video-conference	3.08	0.81	3	3	0.5	17%	25%		
16	TT16	Artificial Intelligence	2.86	0.98	3	3	1	22%	31%		

Table 39 - Analysis of round two's results

Four out of the five roles proposed in round one were still among the top 10 roles in round two. The fifth role, R12 – ‘Select and provide support for technologies that contribute to implement KM activities’, was eliminated since it ranked 12 in this second round.

Concerning the skills, three out of the five, initially proposed in the first round, ranked among the top 5 skills in round two. The remaining skills, S6 – ‘Project management skills’ and S11 – ‘Technological skills’, were eliminated since they ranked respectively 6th and 11th in this second round.

As for the obstacles, half of the ones proposed in round one ranked among the top 10 obstacles in round two. The ones that were removed from round three included O11 – ‘Lack of incentive (reward) system’, O13 – ‘Information/communication technology’, O14 – ‘Non-standardized processes’, O16 – ‘Staff turnover’, and O17 – ‘Physical layout of work spaces’.

Finally, seven out of the ten technologies and tools proposed in round one ranked among the top 10 in round two. The remaining three technologies and tools, TT12 – ‘Help-desk applications’, TT14 – ‘Audio-conference’, and TT15 – ‘Video-conference’, ranked among the five least important technologies and tools and were removed from the third round questionnaire.

The ten most (rank 1 to 10) important knowledge leaders' roles, KM obstacles, KM technologies and tools, and KM benefits, as well as the five most (rank 1 to 5) important knowledge leaders' skills constituted the items for the third questionnaire. Although there was a small difference between the mean ratings in rank 10 and 11 for the KM benefits section, a cutoff after the tenth position was used as not to counter the "well-established custom of dealing with ranked items in multiples of ten" (Watson, 1989).

IV.6 - Analysis of Round Three's Results

The third round was the last round of the Delphi study. Its main objective was to yield the top ranked items by enabling the participants to rate the items that resulted from the second round.

In order to discover the most important items, as well as the level of consensus on their importance, the following analysis was performed on the results:

1. The mean and median of the ratings in order to classify the items by order of importance.
2. The averages of the items' mean ratings and standard deviations for each section in order to compare it with the first and second rounds' section average.
3. The standard deviation and inter-quartile range of each item in order to study the dispersion of the results. These measures are also indicative of the degree of agreement of the items' perceived importance.

4. The percentage of participants that rated the item as being unimportant (rate ≤ 2) and the percentage of participants that rated the item as being important (rate ≥ 4) are one ways to determine the degree of agreement on the items' rankings.
5. Kendall's coefficient of concordance W using the corrected formula for ties (see Figure 3) is another way to determine the degree of agreement on the items' rankings.

The analysis of the results of round three is presented in Table 40 below.

Rank	R	Notes	Mean	S.D.	Median	Mode	KM	% rate one	% rate two	Section Mean Rating / S.D.	Kendall's Corrected W
1	R1	Foster a knowledge sharing culture in my organization	4.59	0.64	5	5	1	1%	94%	4.32 / 0.73	0.12 (.000)
2	R2	Facilitate knowledge sharing among staff	4.56	0.61	5	5	1	1%	96%		
3	R3	Convince senior management of what our organization will gain through managing knowledge	4.49	0.67	5	5	1	0%	90%		
4	R4	Lead by example by sharing knowledge	4.48	0.72	5	5	1	2%	91%		
5	R5	Embed KM within internal processes	4.37	0.66	4	5	1	0%	90%		
6	R6	Develop my organization's KM strategy	4.32	0.71	4	4	1	2%	90%		
7	R7	Promote KM's benefits throughout my organization	4.28	0.71	4	4	1	3%	91%		
8	R8	Develop my organization's knowledge resources	4.16	0.86	4	4	1	6%	85%		
9	R9	Facilitate knowledge sharing events / meetings	3.99	0.75	4	4	0.75	2%	78%		
10	R10	Drive initiatives to measure KM benefits in my organization	3.95	0.67	4	4	2	5%	74%		
Skills											
1	S1	Interpersonal skills	4.54	0.61	5	5	1	0%	94%	4.40 / 0.63	0.07 (.000)
2	S2	Leadership skills	4.53	0.54	5	5	1	0%	96%		
3	S3	Change agent skills	4.43	0.73	5	5	1	2%	90%		
4	S4	Motivational skills	4.40	0.65	4	5	1	1%	93%		
5	S5	Creativity skills	4.12	0.77	4	4	1	3%	82%		
Obstacles											
1	O1	Organizational culture	4.58	0.66	5	5	1	1%	93%	4.63 / 0.62	0.14 (.000)
2	O2	Lack of senior management support	4.43	0.75	5	5	1	3%	90%		
3	O3	Reluctance to change	4.16	0.7	4	4	1	2%	87%		
4	O4	Lack of vision	4.09	0.69	4	4	1	6%	77%		
5	O5	Communication barriers	4.00	0.77	4	4	1	3%	77%		
6	O6	Lack of KM understanding	3.84	0.81	4	4	1	7%	72%		
7	O7	Organizational structure	3.84	0.87	4	4	1	6%	68%		
8	O8	Lack of time	3.82	0.93	4	4	2	8%	65%		
9	O9	Emphasis on individual rather than team	3.82	0.95	4	4	1	8%	70%		
10	O10	Difficulty in measuring KM benefits in my organization	3.69	0.88	4	4	1	11%	63%		
Benefits											
1	B1	Increase internal knowledge sharing	4.57	0.57	5	5	1	0%	96%	4.36 / 0.64	0.04 (.000)
2	B2	Deliver higher quality products and services	4.48	0.64	5	5	1	1%	94%		
3	B3	Avoid re-inventing the wheel	4.47	0.75	5	5	1	2%	95%		
4	B4	Improve the quality of decision-making	4.42	0.69	5	5	1	1%	91%		
5	B5	Increase collaboration between employees	4.39	0.59	4	4	1	1%	97%		
6	B6	Build and maintain a competitive advantage	4.35	0.69	4	5	1	1%	89%		
7	B7	Increase the effective utilization of knowledge resources	4.32	0.62	4	4	1	0%	92%		
8	B8	Increase employee productivity	4.29	0.67	4	4	1	1%	89%		
9	B9	Retain intellectual capital when employees leave the organization	4.27	0.71	4	4	1	2%	88%		
10	B10	Increase innovation	4.26	0.68	4	4	1	1%	89%		
Technologies & Tools											
1	TT1	Portals (Intranet/Intranet/Extranet)	4.49	0.70	5	5	1	2%	96%	3.98 / 0.62	0.17 (.000)
2	TT2	Information Retrieval Engines	4.28	0.66	4	4	1	0%	89%		
3	TT3	E-mail	4.24	0.90	5	5	1	4%	78%		
4	TT4	Collaborative Work Support Tools (ex Groupware)	4.04	0.82	4	4	1	4%	77%		
5	TT5	Document Management Systems	4.03	0.73	4	4	0	4%	84%		
6	TT6	Corporate Yellow Pages of Skills and Expertise	4.00	0.92	4	4	2	6%	74%		
7	TT7	Knowledge Maps	3.88	0.84	4	4	1	5%	73%		
8	TT8	Discussion Boards	3.74	0.84	4	4	1	6%	68%		
9	TT9	E-learning Technologies	3.57	0.86	4	4	1	11%	56%		
10	TT10	Data Mining	3.49	0.97	4	4	1	14%	55%		

Table 40 - Analysis of round three's results

The mean ratings between the second (Table 39) and third (Table 40) rounds' items did not fluctuate much (the largest variation being 0.23 and the smallest being null), implying that the consensus on the results reached a degree of stability. However, the rankings of some items varied, these include:

- R2 – 'Facilitate knowledge sharing among staff', which jumped from the fifth position in round two to the second position in round three.
- R4 – 'Lead by example by sharing knowledge' lost importance by downgrading from rank two in the second round to rank four in the third round.
- R5 – 'Embed KM within internal processes' gained importance by ranking fifth in the third round compared to ranking seventh on the second round.
- R6 – 'Develop the organization's KM strategy' lost two ranks, falling into the sixth position in round three.
- R7 – 'Promote KM's benefits throughout the organization' also lost two ranks, positioning itself in the seventh place in round three compared to the fifth place in round two.
- A permutation between the rankings of S3 – 'Change agent skills' and S4 – 'Motivational skills' was noted between rounds two and three. S3 gained importance by shifting from rank four to rank three whereas S4 did the opposite and lost importance by shifting from rank three in the second round to rank four in the third round.

- The rankings between rounds two and three were modified for four obstacles. While O7 – ‘Organizational structure’ and O8 – ‘Lack of time’ respectively gained four and one positions, O9 – ‘Emphasis on individual rather than team’ and O10 – ‘Difficulty in measuring KM benefits’ both lost importance by respectively one and two positions.
- Two slight permutations were observed in the rankings of the technologies and tools between the second and third rounds. TT2 – ‘Information retrieval engines’ and TT3 – ‘E-mail’ respectively gained and lost one position. The same was observed between TT6 – ‘Corporate Yellow Pages of skills and expertise’ and TT7 – ‘Knowledge maps’. Also, TT5 – ‘Document management systems’ lost one position, ranking fifth on the third round.
- Although the mean ratings of the KM benefits between rounds two and three did not fluctuate much (0.01 – 0.15), some of their rankings have changed. The most significant change can be noted in B2 – ‘Deliver higher quality products and services’, which moved from rank nine in the second round to rank two in the third round. One of the benefits (B5 – ‘Increase collaboration between employees’) remained in the fifth position while the remaining benefits lost or gained one or two positions.

The analysis of the third round’s results will be discussed in more detail in the next chapter.

IV.7 - Summary of the Items' Path through the Three Rounds

Table 41 was constructed in order to recapitulate the path of each section's items throughout the three rounds. As stated earlier, the items that were chosen for each section were randomly ordered in the questionnaire. The numbers in the table correspond to the placement order of the items for each round's questionnaire. For example, the role that was placed second in round one was placed seventh in round two and first in round three. Another example: "practice change management" was suggested by the participant in the first round, placed in the 13th position in the second questionnaire, and, due to a low mean rating, was removed from round three's questionnaire.

ROLES	Round 1	Round 2	Round 3
Foster a knowledge sharing culture in my organization.	R1	R1	R5
Develop my organization's knowledge resources.	R2	R7	R1
Convince senior management of what our organization will gain through managing knowledge	R3	R8	R8
Drive initiatives to measure KM benefits in my organization.	R4	R4	R3
Select and provide support for technologies that contribute to implement KM activities in my organization.	R5	R14	
Embed KM within internal processes		R15	R10
Facilitate knowledge sharing among staff		R11	R2
Lead by example by sharing knowledge		R9	R4
Promote KM's benefits throughout my organization.		R6	R6
Develop my organization's KM strategy.		R2	R7
Facilitate knowledge sharing events / meetings.		R3	R9
Include KM tasks in job descriptions of newly recruited staff.		R5	
Benchmark with other firms on how KM can benefit my organization.		R10	
Develop incentive (rewards) systems for my organization's staff.		R12	
Practice change management.		R13	
SKILLS	Round 1	Round 2	Round 3
Project management skills	S1	S5	
Technological skills	S2	S3	
Interpersonal skills	S3	S7	S3
Change agent skills	S4	S9	S5
Leadership skills	S5	S1	S1
Creativity skills		S6	S2
Motivational skills		S8	S4
Business-specific skills		S2	
Storytelling skills		S4	
Marketing skills		S10	
Negotiation skills		S11	
OBSTACLES	Round 1	Round 2	Round 3
Organizational culture	O1	O1	O4
Lack of time.	O2	O2	O2
Information/communication technology	O3	O3	
Lack of incentive (reward) system.	O4	O4	
Lack of senior management support.	O5	O5	O5
Organizational structure	O6	O6	O3
Staff turnover	O7	O7	
Physical layout of work spaces	O8	O8	
Non-standardized processes	O9	O9	
Emphasis on individual rather than team	O10	O10	O6
Communication barriers.		O16	O1
Lack of KM understanding		O11	O10
Difficulty in measuring KM benefits in my organization.		O12	O7
Reluctance to change.		O14	O8
Lack of vision		O15	O9
Lack of capital		O13	
Lack of KM methodologies		O17	
T&T	Round 1	Round 2	Round 3
Portals (Internet/Intranet/Extranet)	T1	T1	T9
E-mail	T2	T2	T6
Information Retrieval Engines	T3	T3	T3
Collaborative Work Support Tools (ex. Groupware)	T4	T4	T4
Corporate Yellow Pages of Skills and Expertise	T5	T5	T10
Video-conference	T6	T6	
Audio-conference	T7	T7	
Document Management Systems	T8	T8	T1
Data Mining	T9	T9	T8
Help-desk Applications	T10	T10	
Quality Management Systems		T11	
Discussion Boards		T12	T5
Knowledge Maps		T13	T2
E-learning Technologies		T14	T7
Project Management Tools.		T15	
Artificial Intelligence		T16	
BENEFITS	Round 1	Round 2	Round 3
Increase support for business activities.		B1	
Increase employee satisfaction.		B2	
Decrease learning/training time		B3	
Increase internal knowledge sharing		B4	B3
Increase external knowledge sharing.		B5	
Increase innovation.		B6	B2
Retain intellectual capital when employees leave the organization.		B7	B5
Increase employee productivity.		B8	B4
Build and maintain a competitive advantage.		B9	B6
Achieve a closer relationship with individual customers.		B10	
Improve the work environment.		B11	
Help identifying new business opportunities.		B12	
Deliver higher quality products and services.		B13	B8
Avoid re-inventing the wheel.		B14	B7
Increase the effective utilization of knowledge resources.		B15	B9
Improve the quality of decision-making		B16	B10
Increase collaboration between employees		B17	B1

Table 41 - Items' path through the three rounds

IV.8 - Analysis of the Level of Consensus

In order to measure the level of consensus on the perceived importance of the items rated in round three, this study used the six different methods discussed in chapter III (mean, standard deviation, median, IQR, percent top issues, and Kendall's coefficient of concordance W). A comparison between round two and round three's results using each method will determine the level of consensus for each item. The judgments made on the level of consensus are based on each method's criteria depicted in chapter III.

The results are shown in Table 42 on the next page and will be presented in the ensuing paragraphs.

		Round 3 - Round 2									
R	Roles	DW.	DW.	Mean	Mean	ICR	ICR	DW.	%	DW.	DW.
		Mean	S.D.	3	2	3	2	rate<=2	% rate >=4	Rank	
R1	Foster a knowledge sharing culture in my organization.	-0.19	0.12	5	5	1	0	0%	-3%	0	
R2	Facilitate knowledge sharing among staff.	0.23	-0.01	5	4	1	1	1%	4%	-3	
R3	Convince senior management of what our organization will gain through managing knowledge.	-0.01	0.04	5	5	1	1	0%	-3%	0	
R4	Lead by example by sharing knowledge.	-0.06	0.08	5	5	1	1	2%	-1%	2	
R5	Embed KM within internal processes.	0.05	-0.01	4	4	1	1	-2%	-3%	-2	
R6	Develop my organization's KM strategy.	-0.13	0.08	4	5	1	1	1%	-5%	2	
R7	Promote KM's benefits throughout my organization.	-0.05	0	4	4	1	1	1%	1%	2	
R8	Develop my organization's knowledge resources.	0.05	0.05	4	4	1	1	3%	4%	0	
R9	Facilitate knowledge sharing events / meetings.	-0.04	0.02	4	4	0.75	1	0%	-3%	0	
R10	Drive initiatives to measure KM benefits in my organization.	-0.07	0.05	4	4	2	1	1%	-2%	0	
		Round 3 - Round 2									
S	Skills	DW.	DW.	Mean	Mean	ICR	ICR	DW.	%	DW.	DW.
		Mean	S.D.	3	2	3	2	rate<=2	% rate >=4	Rank	
S1	Interpersonal skills.	-0.1	0.05	5	5	1	1	0%	-2%	0	
S2	Leadership skills.	-0.02	-0.02	5	5	1	1	0%	1%	0	
S3	Change agent skills.	0.06	-0.04	5	5	1	1	1%	2%	-1	
S4	Motivational skills.	-0.09	0.02	4	5	1	1	1%	0%	1	
S5	Creativity skills.	-0.04	0.07	4	4	1	1	0%	-7%	0	
		Round 3 - Round 2									
O	Obstacles	DW.	DW.	Mean	Mean	ICR	ICR	DW.	%	DW.	DW.
		Mean	S.D.	3	2	3	2	rate<=2	% rate >=4	Rank	
O1	Organizational culture.	-0.06	0.06	5	5	1	1	1%	-1%	0	
O2	Lack of senior management support.	-0.05	0.02	5	5	1	1	0%	-2%	0	
O3	Reluctance to change.	-0.08	-0.09	4	4	1	1	-2%	1%	0	
O4	Lack of vision.	-0.15	0.16	4	4	1	1	5%	-8%	0	
O5	Communication barriers.	0	-0.03	4	4	1	1	-1%	0%	0	
O6	Lack of KM understanding.	-0.04	-0.1	4	4	1	0	-2%	-5%	0	
O7	Organizational structure.	0.13	0.06	4	4	1	1	-2%	3%	-4	
O8	Lack of time.	-0.03	0.05	4	4	2	1	2%	-3%	1	
O9	Emphasis on individual rather than team.	0.1	-0.02	4	4	1	1	-4%	4%	-1	
O10	Difficulty in measuring KM benefits in my organization.	-0.14	0.05	4	4	1	1	4%	-7%	2	
		Round 3 - Round 2									
TT	Technologies & Tools	DW.	DW.	Mean	Mean	ICR	ICR	DW.	%	DW.	DW.
		Mean	S.D.	3	2	3	2	rate<=2	% rate >=4	Rank	
TT1	Portals (Internet/Intranet/Extranet).	0.05	0.04	5	5	1	1	1%	3%	0	
TT2	Information Retrieval Engines.	0.08	-0.09	4	4	1	1	-1%	2%	-1	
TT3	E-mail.	-0.10	0.18	5	4	1	1	2%	-11%	1	
TT4	Collaborative Work Support Tools (ex. Groupware).	-0.04	0.05	4	4	1	1	1%	-4%	0	
TT5	Document Management Systems.	-0.05	-0.01	4	4	0	1	1%	1%	1	
TT6	Corporate Yellow Pages of Skills and Expertise.	0.2	0.02	4	4	2	1	-2%	7%	-1	
TT7	Knowledge Maps.	-0.09	0.11	4	4	1	0	2%	-8%	1	
TT8	Discussion Boards.	-0.05	0.03	4	4	1	1	0%	-5%	0	
TT9	E-learning Technologies.	-0.12	0.1	4	4	1	1	7%	-5%	0	
TT10	Data Mining.	-0.08	0	4	4	1	1	-1%	-6%	0	
		Round 3 - Round 2									
B	Benefits	DW.	DW.	Mean	Mean	ICR	ICR	DW.	%	DW.	DW.
		Mean	S.D.	3	2	3	2	rate<=2	% rate >=4	Rank	
B1	Increase internal knowledge sharing.	0.01	0.01	5	5	1	1	-1%	-3%	-1	
B2	Deliver higher quality products and services.	0.12	-0.15	5	4	1	1	-2%	2%	-7	
B3	Avoid re-inventing the wheel.	-0.14	0.08	5	5	1	1	1%	0%	2	
B4	Improve the quality of decision-making.	-0.1	0.09	5	5	1	1	1%	-4%	1	
B5	Increase collaboration between employees.	-0.06	-0.04	4	5	1	1	0%	2%	0	
B6	Build and maintain a competitive advantage.	-0.11	0.09	4	5	1	1	1%	-6%	2	
B7	Increase the effective utilization of knowledge resources.	-0.11	-0.02	4	5	1	1	0%	0%	1	
B8	Increase employee productivity.	-0.01	0	4	4	1	1	-1%	-3%	-2	
B9	Retain intellectual capital when employees leave the organization.	-0.15	0.02	4	5	1	1	1%	-3%	2	
B10	Increase innovation.	-0.11	-0.09	4	4.5	1	1	-2%	-2%	2	

Table 42 - Analysis of the level of consensus

IV. 8. a - Mean Ratings as a Measure of Consensus

The insignificant differences (0 – 0.23) between the mean ratings of round three and round two for all the sections indicate a stable consensus, more specifically, that the respondents rated the importance of the items in round three in the same way they did for round two.

IV. 8. b - Standard Deviations as a Measure of Consensus

A negative difference between the standard deviations indicates a decreasing spread in responses, implying an increasing level of consensus. A positive difference is a sign of an increasing spread in responses. However, these positive differences are insignificant (ranging from 0 to 0.18), and were judged to indicate a movement toward a stable consensus.

IV. 8. c - Medians as a Measure of Consensus

The median of a sample is the value for which one-half of the observations (when ranked) will lie above that value and one-half will lie below that value. When the number of values in the sample is even, the median is computed as the average of the two middle values. In a Delphi study, the median values indicate the degree of support from the panel for each issue. As the median increases, the support increases. The medians for round two and three are identical or increase for each issue, respectively implying a stable or increasing support. However, the median of R6, S4, B5, B6, B7, and B9 decreased from 5 to 4 and the median of B10 decreased from 4.5 to 4 between rounds two and three, indicating a lesser support for these issues.

IV. 8. d - Inter-Quartile Range as a Measure of Consensus

The IQR is a measure of the spread of responses. As previously stated, a small IQR, hence, a small spread of responses, indicates that a consensus has been achieved. All of the issues did so by scoring an IQR less or equal to one, except R10, O8, and TT6 which scored an IQR of two in round three, indicating a smaller consensus for these issues.

IV. 8. e - Percent Top Issues as a Measure of Consensus

The percentage of respondents that rated the issues as being important and not important was stable between rounds two and three. The difference between these percentages in round three and two are insignificant (between 0% and 11%), indicating a movement towards a stable consensus. For example, R1 was rated as being important by three percent less respondents (equal to three respondents) in round three than in round two, whereas the same percentage of respondents (0% difference) rated this role as being not important in rounds three and two.

IV. 8. f - Kendall's Coefficient of Concordance (W) as a Measure of Consensus

Kendall's Coefficients of Concordance W for rounds three and two, as well as the difference between these two values are presented in Table 43. Due to the high number of respondents, it was more difficult to obtain a strong agreement on the rated importance of the roles. For panels consisting of more than ten experts, even very small values of W can be significant (Schmidt, 1997). An exact interpretation of W for large size panels could not be found in the literature. However, by using the differences of W between rounds

three and two, which are negligible, it can be asserted that the experts are essentially applying the same standards in rating the items for each section.

SECTION	Round Two Kendall's Coefficient of Concordance (W_{ij})	Round Three Kendall's Coefficient of Concordance (W_{ij})	$B - B_{ij}$
Knowledge Leaders' Roles	0.15	0.12	- 0.03
Knowledge Leaders' Skills	0.11	0.07	- 0.04
KM Obstacles	0.20	0.14	- 0.06
KM Technologies and Tools	0.15	0.17	0.02
KM Benefits	0.03	0.04	0.01

Table 43 - Kendall's coefficient of concordance W for all the sections in rounds two and three

IV. 8. g - Conclusion on the Level of Consensus

The results of the mean ratings, standard deviations, medians, IQRs, and Kendall's coefficient of concordance methods used above tend to conclude that the level of agreement on the importance of the items stabilized between rounds two and three, implying that the respondents rated the items' importance in round two in the same way they did in round three. On one hand, the percentage of respondents that gave the items a rating of four or higher (important) (depicted in Appendices 20 and 21), decreased from the most important items to the least important ones in all sections, implying a high degree of agreement on the most important items. On the other hand, the percentage of respondents that gave the items a rating of two or less (not important) decreased from the most important items to the least important ones in all sections, implying a high level of agreement on the least important items. In conclusion, a stable level of agreement was reached.

Chapter V - DISCUSSION – KNOWLEDGE LEADERS’ CRITICAL ISSUES

V.1 - General Discussion

V. 1. a - Top 10 Knowledge Leaders’ Roles

The most critical knowledge leaders’ roles are listed in Table 44. Each role will be briefly discussed below.

Rank	Roles	Mean Rating	S D
1	Foster a knowledge sharing culture in my organization.	4.59	0.64
2	Facilitate knowledge sharing among staff.	4.56	0.61
3	Convince senior management of what our organization will gain through managing knowledge.	4.49	0.67
4	Lead by example by sharing knowledge.	4.48	0.72
5	Embed KM within internal processes.	4.37	0.66
6	Develop my organization's KM strategy.	4.32	0.71
7	Promote KM's benefits throughout my organization.	4.28	0.71
8	Develop my organization's knowledge resources.	4.16	0.86
9	Facilitate knowledge sharing events / meetings.	3.99	0.75
10	Drive initiatives to measure KM benefits in my organization.	3.95	0.87

Table 44 - Top ten knowledge leaders’ roles (based on final round of Delphi survey)

Foster a Knowledge Sharing Culture. The role of fostering a knowledge sharing culture ranked first in importance with a mean rating of 4.59. An organizational culture is best defined by Schein (1985, p.9) as “a pattern of basic assumptions – invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration – that has worked well enough to be considered valid and therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems”. In shorter terms, it is a pattern of basic assumptions that has worked well enough to be trusted by the organization’s staff. One respondent rightly commented that ‘trust’ is essential to create a knowledge sharing culture. The confusion around creating the right culture for KM assumes that the knowledge leader knows what the current culture is and how that relates to KM. This

implies understanding how knowledge contributes to value within the organization, how the culture around knowledge operates in the organization, how it arose and is maintained in its current state, and what might be done in order to encourage it to move in the desired direction. In order to foster a knowledge sharing culture, knowledge leaders should “change the corporate culture to one that embraces and rewards knowledge sharing” (Flash, 2001). Establishing such a culture that is constantly learning and growing could be done by encouraging the organizational staff committed to learning, as well as creating mechanisms for the development and maintenance of knowledge resources in different functions and departments (Herschel and Nemati, 1999).

In summary, the knowledge leader will not single-handedly change a culture, but s/he should be the driver for cultural change as it relates to knowledge sharing. Breaking down barriers is an ongoing task that closely aligns with cultural transformation. Hence, the knowledge leader helps shape the human factors toward a knowledge-sharing culture while simultaneously designing the systems and spaces that will support knowledge transfer among people.

Facilitate Knowledge Sharing Among Staff. Although the role of facilitating knowledge sharing among staff ranked second in importance (4.56), its mean rating difference with the previous role is very small (0.03), suggesting that the level of importance of both roles is very similar. A valid explanation for this observation is that accomplishing this role poses an enormous challenge if a knowledge sharing culture is non-existent. In order to facilitate knowledge sharing in their organization, various

researchers suggest that knowledge leaders should identify the obstacles of effective knowledge sharing (Sears, 2001), encourage informal social interactions and build communities of practice (Earl and Scott, 1999), as well as develop corporate or in-house universities and labs (Bonner, 2000). In addition, it has been also suggested that knowledge leaders should use knowledge exchange protocols to help improve the knowledge exchange process (Herschel and Nemati, 1999). The authors define such protocols as the “‘how to’ for promoting and facilitating learning and sharing in a way that very much reinforces the [knowledge leader’s] goal of fostering and enabling an effective knowledge-sharing culture”.

One of the quickest and most effective methods of developing a knowledge-sharing culture is to promote and reward the creative and innovative employees who are willing to share their expertise. Unfortunately, an effective sharing of knowledge will not happen unless an appropriate incentive (reward) system is developed. Otherwise, the employees will have no motivation to contribute knowledge that could help, for example, other employees with whom they are competing. Hence, the reward attributed to employees that share knowledge should outweigh the potential loss of sharing their knowledge. When to reward and when to punish is well documented in (Liebowitz and Beckman, 1998). They suggest that organizations should reward:

- Customer satisfaction
- High performance
- Personal knowledge and expertise
- Teamwork and sharing of expertise and knowledge
- Creating new and extending existing knowledge and expertise
- Using and applying the knowledge and expertise in the knowledge repository
- Proactive problem solving and problem prevention.

And not reward (and could consider punishing):

- Buck passing
- Loyalty to the boss
- Conformance and compliance behavior
- Internal competition
- Bureaucratic, controlling behaviors
- Power grabbing and turf battles.

Convince Senior Management of KM Benefits. Convincing senior management of what the organization will gain through managing knowledge ranked third in importance (4.49). The importance of this role is not surprising since it is related to the second most important KM obstacle found in this study: the lack of senior management support. Knowledge leaders should communicate and sell this new KM concept to executives, especially that it is intangible and still requires definition (Corcoran and Jones, 1997). Foote et al. (2001) state that “the more a company wishes to alter the basis of competition by using knowledge, the more that knowledge merits the attention of top managers”. Hence, as with any other major organizational projects (CRM, TQM, etc.), senior management should agree on what it hopes to gain from managing knowledge explicitly in order to better support a learning environment (Guns, 1998; Liebowitz, 1999; Bonner, 2000; Flash, 2001).

While various respondents commented that in order for the KM initiatives to be properly developed and implemented, knowledge leaders need to obtain and sustain top management’s sponsorship, other respondents specifically suggested that senior management should not only be convinced of the importance of simply managing the

codified or explicit knowledge, but rather of the importance of managing the entire firm's knowledge.

Lead by Example by Sharing Knowledge. Leading by example through sharing knowledge ranked fourth in importance (4.48). Although this role has not been advocated in the reviewed literature, it stands amongst the most important ones generated from the first questionnaire. The ability to share knowledge fosters a cooperative and collaborative environment. Respondents suggested that knowledge leaders should be role models in terms of sharing knowledge. One respondent stated that s/he "sets an example to others in sharing what [s/he] knows." Another respondent stated that knowledge leaders should be "KM crusaders", leading the way to knowledge sharing.

Embed KM within the Organization's Internal Processes. Embedding KM within the organization's internal processes ranked fifth in importance (4.37). Similarly to the previous role, the respondents in the first questionnaire have proposed this one. The respondents' comments varied from "identifying business processes that create new knowledge" to "embedding knowledge processing capabilities by leading process redesign initiatives".

A knowledge vision and culture could potentially help the company to rearrange knowledge in novel ways, as well as help the organization to understand its history in order to manage knowledge differently. However, and more importantly, in order to properly embed KM within her/his organization's internal procedures, a knowledge

leader should identify “where the company needs to change how [managing knowledge] gets done” (Venzin, 1997; Von Krogh et al., 2000, p.107).

Develop the Organization’s KM Strategy. Developing the organization’s KM strategy ranked sixth in importance (4.32). Although this role has not been included in the first questionnaire due to the lack of literature, the respondents have noticeably suggested it.

A KM strategy “identifies the ways in which a firm’s knowledge resources may be leveraged against business issues in support of the firm’s overall business strategy and objectives.” (Srikantiah and Koenig, 2000, p.362). In addition, a KM strategy is used to define a plan of action by undertaking a gap analysis, which involves establishing current and desired status of the firm’s knowledge resources and knowledge levers. Once the current and desired states of these are defined, approaches to bridge the difference between the two may be explored and defined as specific projects.

The importance of this role is emphasized in Davenport (2000), who states that “a company or business unit should select its knowledge activities primarily on the basis of how they support or enable aspects of its overall business strategy”. Moreover, Hansen et al. (1999), state that “a company’s KM strategy should reflect its competitive strategy: how it creates value for customers, how that value supports an economic model, and how the company’s people deliver on the value and the economics”. They go even further by suggesting two broad strategies for consulting firms (Codification and Personalization)

and providing criteria to be met in order to choose one of these strategies. Chuck Lucier, CKO of Booz-Allen & Hamilton (Guns, 1998) has set the overall strategic direction for his firm and the associated KM priorities by building leading-edge KM thinking, using the best available knowledge, and continuously building these skills and competencies of his organization's staff.

Promote KM's Benefits Throughout the Organization. Promoting KM's benefits throughout the organization ranked seventh in importance (4.28). Although this role has not been stated in the reviewed literature, it is apparently essential for the knowledge leader to promote the benefits of KM organization-wide, not only in specific divisions of the firm. One respondent stated that a knowledge leader should "Create KM *propaganda* within the organization". Other respondents' comments include "demystifying staff with regards to KM", as well as "educating everyone on KM's principles and benefits". Earl and Scott (1999) suggest winning potential supporters "by actively demonstrating how managing knowledge helps them in their work and by creating reference projects or good case studies that produced obvious benefits".

Develop the Organization's Knowledge Resources. Developing the organization's knowledge resources ranked eighth in importance (4.16). This role was extracted and presented to the respondents in the first questionnaire since it was the second to most recurring one in the literature. Developing the organization's knowledge resources implies designing, implementing, and overseeing their creation and development, including the use of libraries, knowledge bases, human resources, computer knowledge

networks, research centers, and academic relationships (Herschel and Nemati, 1999). In addition and as reported by one respondent, a knowledge leader should also “foster the use of knowledge resources in the organization by facilitating access to existing resources and promoting the development of new resources”. This role is also convergent with Earl and Scott’s findings (1999), who maintain that knowledge leaders are designers of knowledge directories and knowledge-based systems.

Facilitate Knowledge Sharing Events / Meetings. Facilitating knowledge sharing events/meetings ranked ninth in importance (3.99). One would tend to believe that this role is highly related to “Facilitate Knowledge Sharing among Staff”. However, the latter role ranked second in importance whereas this role ranked ninth, implying that it has a lower importance of being a knowledge leader’s role. This difference in rating could be explained by the fact that organizing knowledge sharing events and meetings such as communities of practice is only one solution for facilitating knowledge sharing among staff, implying that for the present time, more importance is being put on the concept of facilitating knowledge sharing than on the techniques used for this purpose. Earl and Scott (1999) interestingly propose that knowledge leaders could occasionally be sponsors, “promoting and contact-managing the construction of meeting, eating, and resting places to encourage informal social interaction, reflection, and chance conversations”.

Drive Initiatives to Measure KM benefits. Driving initiatives to measure KM benefits in the organization ranked tenth in importance (3.95). It is surprising to see that this role was ranked less important than the role of promoting KM benefits throughout the organization (ranked seven) since commonsense suggests that before promoting the benefits, it would be wise to drive initiatives to discover and measure them first. Academic and non-academic literature on how to measure KM benefits has already started to be published. While Davenport (1994) states that knowledge leaders should “make KM pay off economically”, Herschel and Nemati (1999), and Earl and Scott (1999) argue that a knowledge leader’s role should drive “initiatives to both measure and protect intellectual capital as well as identify, measure, and disseminate KM benefits.”

V. 1. b - Top 5 Knowledge Leaders’ Skills

The most critical knowledge leaders’ skills are listed in Table 45. Each skill will be briefly discussed below.

Rank	Skills	Mean Rating	S. D.
1	Interpersonal skills.	4.54	0.85
2	Leadership skills.	4.53	0.85
3	Change agent skills.	4.43	0.81
4	Motivational skills.	4.40	0.87
5	Creativity skills.	4.12	0.77

Table 45 - Top five knowledge leaders’ skills (based on final round of Delphi survey)

Interpersonal and Leadership Skills. Due to the very small difference (0.01) between the interpersonal and leadership skills’ mean ratings, it can be asserted that both skills are equally important.

In order to surmount the fourth most important KM obstacle (lack of vision), knowledge leaders need to possess strong visionary leadership skills. The learning organization should be used as a model for crafting their vision and how KM can benefit their organization. Guns (1998) accurately adds that they also “need a clear idea of what the corporation would look like once the vision had been realized”.

Today’s knowledge leaders actively participate in senior executive decision-making (part of the third most important role). They must provide integrative insight and analysis based on what matters to the business, and recommend ways KM can contribute to the organizational success. Often, this will involve integration of complex strategic initiatives of the various enterprise lines of business. In these executive forums, the knowledge leader must know how to treat knowledge as an asset, and KM as a corporate function and a component of the enterprise, not as a separate entity. Knowledge leaders must use these sessions to present new ways KM investments can contribute to the business strategy. In addition, knowledge leaders can help business executives determine what business success can and should look like, and how KM adds value to the organization. All the above mentioned activities require knowledge leaders to possess exceptional interpersonal and leadership skills.

Included in the interpersonal skills are people and communication skills. Since KM is a relatively new discipline, knowledge leaders are still trying to convince and create awareness on how KM can be beneficial to their organization. These skills can also assist the overall education of the executive team and organizational staff in its understanding

of the value of leveraging knowledge, along with gaining the trust and confidence of all employees. Foote et al. (2001) rightly assert that knowledge leaders “stand or fall by their power to influence”. Good people and communication skills have the power to assist in conveying proper understanding and application of KM to all levels of the organization. Guns (1998) believes that “with the passage of time, [communication skills] may be overtaken in importance by others – once the [knowledge leader] has proven himself on the job.” Arguably, this statement does not take into consideration that their most important role is to foster a knowledge sharing culture in their organization, which requires strong interpersonal skills. Thus, these skills will still be needed, long after the knowledge leader has proven her/himself on the job.

Change Agent Skills. Change agent skills ranked third in importance (4.43). Knowledge leaders should be champions of change, bringing change into their organizations’ daily business activities and how these are viewed. Consequently, knowledge leaders serve as agents of change for their organizations. They should be in the forefront of providing business process reengineering and process improvement efforts. However, as one respondent noted: “Knowledge leaders don’t lead change, they assist with it”, thus they would not lead business process reengineering efforts in the organization, but would assist those process improvement specialists with the appropriate KM support for the desired improvements. Moreover, their most important role being to foster a knowledge sharing culture in the organization, knowledge leaders require change agent skills in order to recondition corporate cultures into becoming knowledge sharing cultures.

Motivational Skills. Motivational skills ranked fourth in importance (4.40). The motivational skills that should be possessed by knowledge leaders help them to achieve various tasks. Knowledge leaders should motivate the organization's staff to understand, value, and participate in knowledge sharing. As stated earlier, one method for doing so is to develop incentive or reward programs. However, this is only a tool used to help knowledge leaders motivate their staff. They still require motivational skills to propel the use of these programs, and, even more importantly, to be effectively used.

Creativity Skills. Creative skills ranked fifth in importance (4.12). Knowledge leaders, like any business professional, tacitly rely upon basic metaphors or images. Since the methods of KM are based upon readily changing technologies, KM is a field that requires imaginative professionals to discern the significance of pertinent technological developments as well as knowledge paths. For example, knowledge leaders could take the role of cartographers, mapping the passages through which knowledge can travel. Knowledge, in order to be methodically categorized and trustworthy, should be imagined as something like the movement of traffic on roads, where there will be a perceived need for reliable roadmaps, consistent rules of the road, and traffic regulations.

V. I. c - Top 10 KM Benefits

The most critical KM benefits perceived by knowledge leaders are listed in Table 46.

Each benefit will be briefly discussed below.

Rank	Benefits	Mean Rating	S D
1	Increase internal knowledge sharing.	4.57	0.57
2	Deliver higher quality products and services.	4.48	0.64
3	Avoid re-inventing the wheel.	4.47	0.75
4	Improve the quality of decision-making.	4.42	0.69
5	Increase collaboration between employees.	4.39	0.59
6	Build and maintain a competitive advantage.	4.35	0.69
7	Increase the effective utilization of knowledge resources.	4.32	0.62
8	Increase employee productivity.	4.29	0.67
9	Retain intellectual capital when employees leave the organization.	4.27	0.71
10	Increase innovation.	4.26	0.68

Table 46 - Top ten KM benefits perceived by knowledge leaders (based on final round of Delphi survey)

Increase Internal Knowledge Sharing. The most important perceived benefit that organizations realize through KM is an internal increase in knowledge sharing (mean rating of 4.57). The high value of this benefit is not surprising since a major goal of KM is to increase knowledge sharing (Capshaw, 1999). By cultivating a knowledge sharing culture, communication barriers tend to disappear, thus allowing employees to more effectively and efficiently communicate and share knowledge.

Deliver Higher Quality Products and Services. Delivering higher quality products and services ranked second in importance (4.48). This benefit has been supported by Neilson (2000), who correctly affirms that “explicit and tacit (implicit) knowledge about a product or service are as important as the product or service itself because it serves as a basis to improve or develop new products or services”. Companies are capturing and using organization-wide knowledge to market, sell, and service customers more

efficiently and effectively (APQC, 2001). Effectively using market and customer information to guide the development of products and services can substantially reduce the risk of new product development. For example, Hewlett Packard maintains a large database of customer comments about products. When an HP employee receives a customer complaint, comment, or suggestion for improvement of any kind about an HP product or service, s/he can input it into their knowledge base. The development engineers and product managers can use that information to help plan future products.

Avoid Re-inventing the Wheel. Avoid re-inventing the wheel ranked third in importance with a mean rating of 4.47. The re-use of existing knowledge elements prevents recurring costs related to repeated research of the same topics, and repeated formulation of the same solutions.

Improve the Quality of Decision-Making. Improving the quality of decision-making ranked fourth in importance (4.42). Making an informed decision requires the availability of sound knowledge. A well-run and well-organized knowledge system is critical in making a quality decision. A useful KM initiative ensures that employees have the necessary access to required knowledge in a form that is advantageous to their decision-making process.

Increase Collaboration between Employees. Increasing collaboration between employees ranked fifth in importance (4.39). By building communities of practice and encouraging informal social interactions, collaboration between employees is believed to increase.

Build and Maintain a Competitive Advantage. Building and maintaining a competitive advantage ranked sixth in importance (4.35). Knowledge has become the key economic resource in the knowledge society, said Peter Drucker (2001). Tom Davenport additionally stated in *Some Principles of Knowledge Management*: “The latest untapped source of commercial advantage is the knowledge of people in organizations”. Land, labor, and production are no longer primary sources of competitive advantage. Neilson (2000) notes that “competitive advantage depends on the smartness with which knowledge is used throughout the enterprise”. In order to maintain a sustainable competitive advantage, critical knowledge cannot reside passively in the minds of employees.

Knowledge management can enable an innovative strategy that would not otherwise be possible. For example, a systems integration firm could reuse both methods and software, and thus achieve high productivity relative to competitors. Moreover, companies can also gain advantage by adding knowledge to their products and services. For example, both Ernst & Young and Arthur Andersen sell electronic access to their knowledge separately from traditional professional services (Davenport, 2000).

Davenport (2000) moreover argues that “organizations could also achieve competitive advantage by using knowledge and KM to perform nonstrategic processes exceptionally well.” If a firm can use supplier knowledge to improve its procurement processes, share financial knowledge across financial processes, and even circulate knowledge effectively about human resources or information systems processes, it might conceivably gain advantage over its competitors.

Increase the Effective Utilization of Knowledge Resources. Increasing the effective utilization of knowledge resources ranked seventh in importance (4.32). As a knowledge base is used over time, continuous feedback from its users helps the system improve relevance, identify new and improved solutions, and establish the applicability of known solutions to all related problems. This increases the value and usability of the knowledge in the knowledge base. In addition, since KM systems can capture and manage knowledge from just about any subject area, organizations can use their KM systems to handle problems across a broad range of topics and job functions. This permits knowledge resources to become a real repository of collective organizational wisdom.

Increase Employee Productivity. Increasing employee productivity ranked eighth in importance (4.29). Using knowledge effectively to leverage employee productivity and operational effectiveness can benefit the organization. A prime example would be sharing knowledge regarding best practices to improve operational performance. Other examples include using knowledge more effectively in knowledge-intensive areas of the business

such as using knowledge bases to rapidly identify and implement solutions, as a result decreasing operational cost and increasing the employee's productivity.

Retain Intellectual Capital when Employees Leave the Organization. Retaining intellectual capital when employees leave the organizations ranked ninth in importance (4.27). Many organizations have found that the lack of opportunities for personal growth and minimal rewards for collaborative efforts lead to employee loss. Clearly, knowledge leaders should factor discoveries in this area into KM system design and cultural transformation efforts to reduce the loss of knowledge by helping retain employees.

Increase Innovation. Increasing innovation ranked tenth in importance (4.26). It is assumed that knowledge is one of the most powerful drivers of innovation. Unfortunately, little is known about the business practices of KM that induce firms to innovate. In their study, Landry and Amada (2001) found that the "barriers to knowledge exchange were negatively and significantly related to joint creativity of product innovations". Decreasing these barriers (allowing knowledge to be exchanged) would undoubtedly increase the likelihood of product innovation, thus supporting the importance of this KM benefit.

V. 1. d - Top 10 KM Obstacles

The most critical KM obstacles perceived by knowledge leaders are listed in Table 47. Each obstacle will be briefly discussed below.

Rank	Obstacles	Mean Rating	S.D.
1	Organizational culture.	4.58	0.66
2	Lack of senior management support.	4.43	0.75
3	Reluctance to change.	4.16	0.70
4	Lack of vision.	4.09	0.89
5	Communication barriers.	4.00	0.77
6	Lack of KM understanding.	3.84	0.81
6	Organizational structure.	3.84	0.87
8	Emphasis on individual rather than team.	3.82	0.95
8	Lack of time.	3.82	0.93
10	Difficulty in measuring KM benefits in my organization.	3.69	0.88

Table 47 - Top ten KM obstacles perceived by knowledge leaders (based on final round of Delphi survey)

Organizational Culture. Organizational culture is the most important perceived KM obstacle with a mean rating of 4.58. As stated earlier, the most crucial role of a knowledge leader is to foster a knowledge sharing culture. Arguably, this role is the most challenging one in order to overcome the most important obstacle: organizational culture. In Liebowitz (2000), Beckman reports that “having a healthy corporate culture is imperative for success in KM”. Bureaucratic cultures suffer from a lack of trust and a failure to reward and promote cooperation and collaboration (Zand, 1997). The lack of a trusting and properly motivated workforce could result in rarely shared or applied knowledge, ceasing innovation and risk-taking, and nonexistent organizational cooperation and alignment.

Lack of Senior Management Support. Lack of senior management support ranked second in importance (4.43). Due to the importance of this obstacle, it can be asserted that the role of convincing senior management of what the organization will gain through managing knowledge has been justly rated as being third in importance. The difficulty encountered in trying to change years of knowledge hoarding is multiplied when employees are not fully convinced that the highest levels of the organization support the change in behavior.

Reluctance to Change. Reluctance to change ranked third in importance (4.16). To tap a company's knowledge, some substantial changes must occur, which are not just organizational or structural, but personal. Unless change occurs at the level of attitude or behavior, an organization cannot fully mine the gold of its people. Reluctance to change is directly related to human nature. Humans, by nature, resist change. The change management field has done and is still doing extensive research on how to facilitate the implementation of a change program by minimizing the individuals' resistance. In addition, managers can foster personal change by helping employees to be aware of the need to change, by inviting them to change, by requiring the change, and by following through.

Lack of Vision. Lack of vision is the fourth most important perceived KM obstacle (4.09). Knowledge leaders, along with top management, should create a knowledge vision that defines the world in which they are living and the general direction of knowledge they ought to discover and create. The knowledge vision should cultivate

personal commitment of the organization's staff by providing meaning to their daily tasks. In Srikantiah and Koenig's book (2000), Yogesh Malhotra notes that a knowledge vision should be "purposefully vague and open-ended to allow diversity of multiple personal perspectives". Without a clearly defined vision, KM will tend not to be understood, resulting into lost opportunities.

Communication Barriers. Communication barriers are the fifth most important KM obstacle (4.00). Communication barriers needed to generate and share knowledge could be caused by obstacles depicted in this study. In addition, other factors such as the physical and time distance can also hinder effective communication.

Physical and time distance renders sharing knowledge difficult. Although technology may offer a partial solution, much knowledge is generated and transferred through body language or physical demonstration of skills. Furthermore, a certain level of intimacy may be necessary to establish comfortable communication of knowledge. Internet-based friendships suggest that intimacy does not depend solely on physical co-location, but it remains to be seen whether such friendships are based enough in reality to mimic the mutual understanding born of face-to-face encounters (Leonard and Sensiper, 1998).

Lack of KM Understanding / Organizational Structure. The lack of KM understanding and the organization structure equally ranked sixth in importance (3.84). Steve Denning, the World Bank's former KM director stated "Don't explain the theory of KM – that's deadly,...., instead, you ask how good we are at innovation or at learning

from mistakes” (Foote et al., 2001). Without the understanding of KM’s objectives by all employees, KM initiatives will have the tendency to be less effective, or even fail dramatically.

The formal or organizational structures of most companies prevent KM from operating effectively. The majority of companies are organized along lines of function, region, division, or business unit, and complete with their own recruitment, induction, and reward systems, based on their own bottom line. Of course this is not the case for all companies, however, internal relationships across hierarchies must work.

Emphasis on Individual rather than Team / Lack of Time. Emphasizing on the individual rather than on the team and lack of time equally ranked eighth in importance (3.82).

It has been asserted that knowledge should be transferred from the individual level to the group, organizational, and inter-organizational levels (Herschel and Nemati, 1999). Knowledge is available to each individual. Nonetheless, in order to increase the value of this individual knowledge, it should be accessible to the whole organization. The research area of transfer mechanisms has been widely studied. Presently, three organizational theories describe different transformation strategies (Baek et al., 2000):

- **Organizational knowledge creation (Nonaka and Takeuchi, 1995)**
- **Organizational learning**
- **Absorptive capability**

Briefly concerning the organizational knowledge creation (Nonaka and Takeuchi, 1995), knowledge is created through interactions between tacit knowledge and explicit knowledge at two different levels: the individual and group levels. Once the task of a team is completed, team members incorporate tacit knowledge acquired and created in the project with explicit knowledge in the forms of documents and reports.

Concerning the organizational learning, knowledge is created through communication of individual learning among co-workers. Besides formal knowledge, informal knowledge in the form of tacit know-how, letters, memos, informal conversations should be captured, shared, and reused. A variety of mechanisms can be used for spreading knowledge quickly and efficiently throughout the organization; this includes written, oral, and visual reports; site visits and tours; personal rotation programs; education programs and seminars. Through double-loop learning, individuals continuously update the existing norms, procedures, and policies in the organization based on their experiences.

Concerning absorptive capability, knowledge is created based on prior knowledge. In other words, the process of creating knowledge can be characterized as the process of assimilating new knowledge into preexisting knowledge. When new knowledge is added, the existing linkages and associations among different knowledge sources need to be modified. Individuals who stand between subunits within the organization are able to capture, translate, and disseminate external information in order to allow other co-workers to share it. All available knowledge can be combined by establishing new linkages with preexisting knowledge.

In summary, the knowledge leader needs to convert the individual's tacit (implicit) knowledge into explicit knowledge for the community. Tacit knowledge is personal knowledge consisting of experiences, beliefs, insights, and values. In order to share this knowledge with others in the organization, it needs to be articulated or converted in such a manner that enables everyone to understand it.

Knowledge takes time to experience and acquire, whereas employees have less and less time to do this. The obstacle of lacking time can be explained by the results yielded in Earl and Scott's study (1999), which states that knowledge leaders need some organizational slack. All the knowledge leaders in their study stressed the need for time to think, dream, talk, and sell. Moreover, the authors assert: "Two or three years into their jobs, they realize that they need more time than they first thought to promote and embed knowledge management".

Difficulty in Measuring KM Benefits in the Organization. Difficulty in measuring KM benefits in the organization ranked tenth in importance (3.69). An increasing number of organizations are starting to measure the benefits of KM. This obstacle is supported by Foote et al. (2001), who rightly note that "accounting for the influence of intangible KM assets remains more theory than practice within most organizations". The Special Libraries Association (SLA) has a web page² summarizing twelve current approaches for measuring KM benefits. Interestingly, supporting this obstacle, only two of the twelve approaches utilize dollar amounts that could be easily and objectively obtained. Moreover, this approach is only appropriate for certain KM initiative.

V. 1. e - Top 10 KM Technologies and Tools

The most critical KM Technologies and Tools perceived by knowledge leaders are listed in Table 48. Each technology and tool will be briefly discussed below. As stated by APQC (2001), “to fully capitalize on the organization’s knowledge, KM must be integrated with business process and technology tools and must enable people to act more efficiently to create value.” All the tools discussed in this section could be judged as information management (IM) tools. However, what distinguishes KM tools from IM tools is that they deal with information plus semantics, not with information alone.

Rank	Technologies and Tools	Mean Rating	S.D.
1	Portals (Internet/Intranet/Extranet).	4.49	0.70
2	Information Retrieval Engines.	4.28	0.66
3	E-mail.	4.24	0.90
4	Collaborative Work Support Tools (ex.:Groupware).	4.04	0.82
5	Document Management Systems.	4.03	0.73
6	Corporate Yellow Pages of Skills and Expertise.	4.00	0.92
7	Knowledge Maps.	3.88	0.84
8	Discussion Boards.	3.74	0.84
9	E-learning Technologies.	3.57	0.86
10	Data Mining.	3.49	0.97

Table 48 - Top ten KM technologies and tools perceived by knowledge leaders (based on final round of Delphi survey)

Portals (Internet/Intranet/Extranet). Portals ranked first in importance with a mean rating of 4.49. One of the Net’s greatest assets is that it is interactive and, thus, has the potential reciprocity to foster knowledge sharing and learning. It allows those who are seeking for knowledge to access billions of Web pages. The Intranet is simply an Internet technology used within an organization, with restricted access to its content from outside.

² <http://www.sla.org/membership/irc/knowledg.html>

The Intranet is clearly a fascinating and relatively simple way to allow users access to a company-wide knowledge center. One step beyond the Intranet is the Extranet, which is an interconnection of corporate Intranets in a business that finds itself spread over a wide geographic area.

Information Retrieval Engines. Information retrieval engines ranked second in importance (4.28). Portals would consist of mazes without information retrieval engines. Information retrieval engines are considered to be the center of information businesses. It mainly includes searching printed reference sources, online sources, CD-ROM, hypermedia, and Internet databases. To maintain high-quality control in information production and services in the highly competitive information business world, the speed of retrieval, the accuracy of retrieved information, and the cost of searching an enormous scale of information field must be strategically planned and tactically coordinated.

At the minimum, retrieval engines should search across structured and unstructured data in all formats. It should perform relevance ranking as a default, but be able to re-rank by other parameters, such as date, topic, or author. It should provide both browsing and search capabilities, intertwined, and be able to explore by ideas, rather than by words. This last ability is particularly valuable because so many terms are synonymous.

E-mail. E-mail ranked third in importance (4.24). E-mail enables a community of practice to share knowledge asynchronously. With the increasing access to e-mail via Internet, a community of practice can share knowledge across the world. Although e-mail

can be very effective, it may become too impersonal if there are few occasions for the individuals of the community to get to know one another.

Collaborative Support Tools. Collaborative support tools ranked fourth in importance (4.04). These tools allow formal and *ad hoc* conversations when the participants cannot communicate in real time. This makes collaborative support tools important for enhancing the exchange of knowledge.

Document Management Systems. Document or content management systems ranked fifth in importance (4.03). In many organizations, knowledge is embedded in documents. Duffy (2001) defines a document management system as one that “represents the convergence of full-text retrieval and publishing applications. It supports the unstructured data management requirements of KM initiatives through a process that involves capture, storage, access, selection, and document publication”.

In addition, document management systems can be integrated with other technologies, such as workflow, to direct the documents to different individuals as defined by their workflow. Also, document management allows information to be organized as fully linked corporate documents for publishing to intranets and extranets, Web servers, or the electronic document repository.

Corporate Yellow Pages of Skills and Expertise. Corporate yellow pages of skills and expertise ranked sixth in importance (4.00). In many companies, it is difficult to find who knows what. Employees waste time re-researching topics or making decisions that are not based on the company's best thinking. Corporate yellow pages of skills and expertise help to store and distribute knowledge about the skills and areas of expertise of the organization's staff. Its objective is to allow people in the organization to efficiently and effectively find colleagues with adequate skills and/or expertise. It should allow queries by taxonomy of area (for example, 'who are KM experts?'), and return a list of experts ranked by experience. An important aspect of this tool is the ability to include pre-defined rules (for example, 'always make John Brisket the top expert in marketing'). This ensures and enables that particular experts can always be identified, or oppositely, unidentified.

Knowledge Maps. Knowledge maps ranked seventh in importance (3.88). Duffy (2000) defines a knowledge map as "the navigational system that enables users to find the answers they seek. It is the primary means of representing the entire collection of knowledge objects, regardless of category or location, and helps to identify the links between existing islands of information". Knowledge maps can take a wide variety of shapes and sizes, but are designed to help people in the organization know where to go to find what they need to know, whether the destination be a person, place, or thing.

Another use of knowledge maps is to chart the knowledge flows within a process, from acquisition, through development, storage, and internal and external deployment. Such maps should not try to incorporate all possible knowledge, but rather should focus on the key issues which need to be addressed to produce bottom line results. Gartner Group (Rosser, 1999) suggests that “a best practice for optimal creation of the essential knowledge map is to manually build a high-level structure, guided by enterprise usage and consistent rules or principles, and then use that framework to enable the subsequent classification task to be done through automated means”.

Discussion Boards. Discussion boards ranked eighth in importance (3.74). Discussion boards aim to support conversations among communities of interest, or often just discussion groups. These groups are often very large with multiple topics. The focus of these systems is almost exclusively on conversational interactions, though in most cases this is augmented with chat capabilities, presence awareness, and instant messaging.

Discussion boards lack good document storage and search facilities for uploaded files, but they are usually relatively inexpensive. Some companies are starting to add features to their system in order to address a broader spectrum of community needs, including reputation of members and connections to knowledge bases. When the company’s business strategy moves in such a direction, the system is increasingly able to serve communities of practice.

E-learning Technologies. E-learning technologies ranked ninth in importance (3.57). Another way to share knowledge across an organization is through structured online learning events.

By helping to create shared common language, and providing 24-7 access to information that aligns with culture and with business objectives, e-learning helps support knowledge-driven environments that enhance employee empowerment, self-directed learning at all levels, collaborative discovery, and a sense of community. E-learning is one of many ways that the culture of an organization can open itself to the benefits of knowledge that may be outside the "box" to improve its intellectual "gene pool."

"Know-how" gained through blended learning courses allows learners to integrate thinking and doing through contextual role playing, coaching, mentoring, and modeling in both the classroom and online. Pre and post-tests online allow for self-directed practice and repetition with ample trial and error that is private to the learner. Learners gradually develop and adopt new perspectives over time that result in changed behaviors, attitudes and self-concept.

Many organizations begin KM initiatives by creating and storing knowledge in repositories. E-learning can provide support through learning portals that house various types of employee data, such as training records, white papers, press releases, "lessons learned" and discussion databases, as well as web-based courses.

Data Mining. Data mining ranked tenth in importance (3.49). Data mining is defined as the “process of exploration and analysis, by automatic or semi-automatic means, of large quantities of data in order to discover meaningful patterns and rules” (Berry and Linoff, 2000, p.7). The term “knowledge discovery in databases” or KDD has been widely used as an alternative to the term “data mining”. Therefore, a second definition complementing the prior one was proposed by Han and Kamber (2001, p.5): data mining refers to “extracting or mining knowledge from large amounts of data”.

V.2 - Discussion on the Delphi Method

V. 2. a - Level of Consensus

This study has used the same principles in applying the Delphi method as applied by most of the prior Delphi studies. Nonetheless, the main difference lies in the feedback provided to respondents for the second and third rounds. As mentioned previously, the main rationale provided by studies that have fed back information is to enable the experts to re-evaluate their opinions in the light of the additional information provided by their peers.

Given the stable level of consensus reached by this study, it is believed that if feedback was provided to respondents, it would not have altered this stable consensus, but rather force a higher level of consensus to be reached. However, this potential higher level of consensus would have been biased by the feedback and thus a naturally-reached consensus would not have been possible. As stated at the beginning of this study, achieving consensus without the help of feedback increases the reliability of the results.

V. 2. b - Number of Rounds

This Delphi study used three rounds to achieve its objectives. While some studies have used more than three rounds, it is believed that a fourth round would not have an impact on the results due to the reached stability of the level of consensus. This claim is supported by Erffmeyer et al. (1986) who state that “before limiting a Delphi to less than four rounds, it would be prudent to determine if a point of stability has been reached in the previous rounds”. Hence, the results obtained after three rounds are sufficient to conclude on the level of consensus and to have confidence in the yielded results.

Chapter VI - CONCLUSION

Using a three-round Delphi procedure, this research reached an acceptable and stable level of agreement as well as a deeper understanding of the most important issues of today's knowledge leaders internationally. These issues included knowledge leaders' current roles, skills, perceived KM benefits and obstacles, as well as technologies and tools used to develop and/or implement KM initiatives in their organizations.

The findings suggest that although specific approaches to KM vary from firm to firm, key themes and common concerns emerge. The most important knowledge leaders' roles are to foster a knowledge sharing culture, facilitate knowledge sharing among staff, and convince senior management of KM's benefits. In order to accomplish these duties, knowledge leaders need a wide range of skills. More precisely, they need to possess interpersonal, leadership, change agent, motivational, and creativity skills.

Knowledge leaders should take into consideration the most important KM obstacles in order to prevent encountering them or find solutions to decrease their negative effects during the development or implementation of KM initiatives. The major obstacles found in this study suggest that KM requires a major shift in organizational culture and a commitment at all levels of the firm (especially at the senior management level) to make it work. Other important obstacles include employees' reluctance to change, lack of vision, as well as communication barriers.

Although some authors argue that information technology is an important tool for supporting a KM strategy, it does not follow that a knowledge leader must have a technology background. However, this individual should certainly understand the technologies and tools that could potentially be used to develop and implement KM initiatives and the benefits that these technologies and tools can offer. This study finds that the most important technologies and tools are portals (Internet, Intranet, and Extranet), information retrieval engines, e-mail, collaborative work support tools, as well as document management systems. Other important tools and technologies include corporate yellow pages of skills and expertise, knowledge maps, discussion boards, e-learning technologies, and data mining.

An intense pace of competition, global markets, informed customers, and technological innovations has made the marketplace an increasingly level playing field. This study found that an organization needs to develop and implement KM initiatives not just to increase internal knowledge sharing, but to deliver higher quality products and services, avoid re-inventing the wheel, improve the quality of decision-making, as well as increase employees' collaboration. Other KM benefits yielded in this study include building and maintaining a competitive advantage, increase the effective utilization of knowledge resources, increase employee productivity, retain intellectual capital, and increase innovation.

The next three sections will conclude this thesis by providing its limitations, implications for researchers and practitioners, and future directions.

VI.1 - Limitations

This study represents a first attempt to examine critical issues of knowledge leaders on a worldwide basis. Various limitations can hence be noted.

A first methodological limitation is that the collected data represent the perceptions of members of the research sample, as opposed to an objective measurement. Yet, since members of the research sample were judged to be qualified to provide expert opinions on the issues involved in this study, the downside of this limitation was expected to be minimal.

A second limitation is related to the five-point Likert scale used in the questionnaires. Although this scale proved to be efficient for the first and second questionnaires, it was realized that a larger scale would have been needed for the third questionnaire (most likely a seven-point Likert scale). The third questionnaire's items have been rated the most important in the second questionnaire. Hence, using a five-point Likert scale lead to a small variation in the ratings and a negatively skewed distribution for most items. However, a scale change was not possible since doing so would have prevented the comparison of results between rounds.

A third limitation concerns the issue of conducting an international study. Conducting such a study implies that different respondents of various cultural backgrounds will respond to the survey. In a recent article by McGorry (2000), it is stated that "scales or constructs created in one culture may not describe the experience of individuals in

another culture.” The impact of this limitation on the present results has not been assessed. Hence, the reader should keep in mind that critical issues could potentially differ from country to country.

VI.2 - Implications for Researchers and Practitioners

As stated by Whitley (1996, p.23), one of the criteria in assessing the usefulness of a research theory is that it “should be applicable to the real world, helping us understand the processes involved in people’s everyday lives”. In other words, practitioners as well as academics should be able to benefit from research. Increasing this research’s applicability to the real world is achieved firstly by providing future researchers with critical issues and perceived KM benefits and obstacles, as suggested by today’s knowledge leaders. Researchers will be able to focus their studies on the most critical issues in order to help knowledge leaders make well-informed decisions. Researchers and practitioners will additionally be able to concentrate on finding new ways to help knowledge leaders attain KM benefits, as well as to overcome existing obstacles. Furthermore, by knowing about these benefits, knowledge leaders will be able to answer questions such as: “Why should I implement KM?”, “How can KM benefit my company?”, etc.; questions that have now reached consensus among KM practitioners.

Secondly, the results of this research are aimed at academic program developers and people responsible for appointing knowledge leaders (Human Resources, CEOs, etc.). Academic KM programs are beginning to emerge. Herschel and Nemati (1999) enumerate the School of Information Management and Systems at the University of

California, Berkeley, the Fielding Institute, and the RMIT University in Melbourne, Australia as some of the few academic institutions currently offering a KM program. Hence the need to know about knowledge leaders' roles and skills is becoming increasingly important. By providing these individuals with current knowledge leaders' roles and skills, the study allows academic developers to accurately craft graduate KM programs and properly educate their students on the roles played by knowledge leaders, as well as to build their students' skills and help them become knowledge leaders. The results of this study also guides Human Resources by enabling them to hire knowledge leaders that have the required skills, educational and professional backgrounds, and assign them the critical roles already played by current knowledge leaders.

Thirdly, but nonetheless importantly, the findings are also aimed at system and software developers. Spending on KM software reached \$330 million in 1999 and will account for approximately \$1.8 billion in 2003 (PriceWaterHouseCoopers, 2000). With a list of the most important tools and technologies used for developing and implementing KM programs and initiatives, software and system developers will be able to understand and direct their efforts and resources in developing and/or enhancing the proper tools and technologies, and in turn, will help ease the work of knowledge leaders dealing with KM current critical issues and obstacles, as well as to facilitate reaching KM benefits.

Another criterion in assessing the usefulness of a research theory is that it "should stimulate research, not only basic research to test the theory, but also applied research to put the theory into use, and should inspire new discoveries." (Whitley, 1996, p.23).

Similarly to the first study conducted by Dickson et al. (1984), this study could stimulate research and be replicated after a period of time (i.e.; 4 to 5 years) in order to update the results found as this “continuity of method and issue framework facilitates longitudinal comparison of data” (Brancheau et al., 1996).

VI.3 - Future Directions

The data gathered from respondents in this study constitutes a potential source for further detailed analyses. However, due to time and requirement limitations, only a first-level analysis was performed on the data for the purpose of this dissertation. Prospective detailed analyses could include knowledge leaders’ critical issues by industry, company size, and country.

As stated earlier, to be more effective, future research should attempt to utilize a similar methodology to replicate this study in order to enable results comparison. In addition, the list of issues yielded in this study should be updated constantly to reflect new KM trends.

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APPENDIX 1 – KM RELATED JOB TITLES

- Chief Concept Officer
- Chief Experience Officer
- Chief Knowledge Officer (CKO)
- Chief Learning Officer (CLO)
- Chief Research Officer (CRO)
- Chief Thought Officer
- Corporate Director of Intellectual Capital
- Director of Competitive Learning
- Director of Human Capital
- Director of Information Strategy and Architecture
- Director of Innovation
- Director of Intangible Assets
- Director of Intellectual Capital
- Director of Intelligence Process
- Director of Organizational Learning
- Director of Organizational Learning Manager
- Head of Knowledge Management Development
- Intellectual Asset Development Leader
- Knowledge Analyst
- Knowledge Architect
- Knowledge Assistant Director
- Knowledge Editor/Reporter
- Knowledge Engineer
- Knowledge Engineer Director
- Knowledge Initiative Manager
- Knowledge Management Director
- Knowledge Management Program Manager
- Knowledge Manager
- Knowledge Networking Officer
- Knowledge Officer
- Knowledge Resources Senior Partner
- Knowledge Strategies Director
- Learning Architect
- Vice President of Learning Principal Investigator
- VP of Learning

APPENDIX 2 – LETTER SENT TO KM ASSOCIATIONS

Dear Madam/Sir,

My name is Marc Dfouni. I am a M.Sc. Student in MIS at Concordia University in Montreal. I am presently designing my thesis research in KM, which will examine knowledge management leaders' key issues. My thesis is supervised by Dr. Anne-Marie Croteau from the MIS department of Concordia University.

My thesis' main objective is to identify knowledge leaders' current key issues. I am currently at the stage of finding knowledge leaders willing to participate in my study. And believe me, this task is becoming more difficult to accomplish due to the lack of information available on knowledge management leaders!

Standards Australia's membership directory is extremely appropriate to answer my on-line questionnaire. I understand and agree that you cannot send me your membership database due to privacy concerns. However, it would be suitable for me if you could put on Standards Australia's welcome page a short summary of my thesis' objectives as well as my e-mail (I would send you both ready to be published as soon as possible). In this way, interested visitors could voluntarily send me by e-mail their name, job position, company, and e-mail, agreeing to participate in the study. I would greatly appreciate your collaboration. In addition, your audience could interact with your website and share knowledge that will be beneficial to all the KM community.

The survey will be conducted in 3 steps (Delphi type survey) between the end of April and the end of June 2002. Following the completion of the thesis, I will send you a complete report of the results, which could be published on Standards Australia.

Please contact me at (514) 577-6000 if you require more information. It would be my pleasure to answer any of your questions and discuss the details and the contributions that my research could have for the KM community.

Sincerely Yours,

Marc Dfouni, M.Sc. Student (MIS)
John Molson School of Business
Concordia University, Montreal

APPENDIX 3 – LETTER SENT TO KM FORUMS (FIRST ROUND)

[Please accept our apologies in case of multiple receptions]

Dear Member,

Is your current job title related to Knowledge Management? If so, a new study is seeking your participation in a short online survey to identify knowledge management leaders' current critical issues.

In return for participating, a personalized report will be sent to you once the study is completed. This report will include a summary of the results and an assessment of your position as a knowledge leader within your firm's industry as well as against other leaders in the knowledge management community.


Be assured that your responses will be kept strictly confidential.

For more information and to access the survey, please follow this link: <http://www.kmleaders.com/web2/cover.asp>

Thank you for your time and collaboration,

Marc Dfouni, M.Sc. Student (MIS)
Anne-Marie Croteau, Ph.D.
Decision Sciences and MIS Department,
John Molson School of Business
Concordia University, Canada

APPENDIX 4 – FIRST ROUND QUESTIONNAIRE



John Molson
School of Business
Concordia University

Knowledge Leaders Critical Issues

Dear Knowledge Leader,

Thank you for accepting to participate in this survey which will investigate knowledge leaders' critical issues. This questionnaire should take no more than 20 minutes of your time to complete.

In return for participating, a personalized report will be sent to you once the study is completed. This report will include a summary of the results and an assessment of your position as a knowledge leader within your firm's industry as well as against other leaders in the knowledge management community.

In order to increase the accuracy and validity of the results, this first questionnaire's objective is to get a general idea of knowledge leaders' issues. Upon reception of your answers, I will combine them to other knowledge leaders' answers and send you a second questionnaire in the upcoming weeks. The second questionnaire will focus on the most important issues yielded from the first questionnaire. Using these two questionnaires, I will be able to calculate a degree of agreement on the results between the respondents.

To enable me to send you the second questionnaire in the upcoming weeks, please enter your e-mail address below. Be assured that this information, as well as your responses, comments and suggestions will be kept **strictly confidential**.

If you have any concerns on how to complete this survey, please feel free to contact Marc Dfouni at m_dfouni@msb.concordia.ca or by phone at (514) 577-6000.

Sincerely,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Mane Croteau, Ph.D.
Concordia University, Montreal, Canada

Please enter your e-mail:

Figure 1. Cover letter



John Molson
School of Business
Concordia University

Knowledge Leaders Critical Issues Consent Form

Before participating in this survey, your agreement to the following terms is required. Please take some time to read over carefully.

1. INTRODUCTION

This survey study is being conducted by Marc Dfouni as part of his M.Sc. research into knowledge leaders, under the supervision of Dr. Anne-Marie Groteau at Concordia University (Montreal, Canada). This survey aims to identify the major concerns of today's knowledge management leaders.

2. RESEARCH ENQUIRY

If the participant has any enquiries pertaining to the research in general or the way in which the survey is conducted, please direct them to Marc Dfouni at m_dfouni@msb.concordia.ca or by phone at (514) 577-6000.

3. PARTICIPATION TERMINATION

Participation in this survey is completely voluntary and the participant is free at any time to withdraw consent to further participation without prejudice in any way. The participant need give no reason nor justification for such a decision.

4. INFORMATION PROVISION

Supplying personally identifiable information is entirely voluntary. However, should the participant choose to participate in subsequent research activities beyond this survey, some basic information for the purpose of maintaining contact is required.

5. INFORMATION PROTECTION

Information collected in the survey will be kept strictly confidential in accordance with Concordia University's [guidelines](#). Upon request, we will remove any personally identifiable information immediately from our database. All information collected will be for research use only and will not be disclosed to third parties.

To protect against the loss, misuse and alteration of the information under our control, this web host has in place appropriate physical, electronic and management procedures. For example, their servers are accessible only to authorized personnel.

6. SITE CONTENT

All content on the site is for research use only. Content on the site is not to be reproduced or distributed without the prior written consent of Marc Dfouni.

I (the participant) have read the information above and any questions I have asked have been answered to my satisfaction. I agree to participate in this activity, realising that I may withdraw at any time without reason and without prejudice.

I understand that all information provided is treated as strictly confidential.

I agree that research data gathered for the study may be published provided my name or other identifying information is not used.

I agree I don't agree

Figure 2. Consent form




Thank you for considering to participate in this study.

If you have changed your mind and wish to participate, click the Back button on your browser!

[Close Window](#)

Figure 3. Thank you page when the respondent does not agree to participate



**John Molson
School of Business
Concordia University**

**Knowledge Leaders Critical Issues
General Instructions**

Please indicate your first impression, there are no good or bad answers. Your answers should reflect your own point of view, not your organization's.

Please keep in mind throughout this questionnaire that a **Knowledge Leader** is defined as a person responsible for creating and/or maintaining her/his organization's knowledge management environment.

- This questionnaire is divided into six sections, some sections containing open-ended questions and others requiring you only to rate certain statements
- Please indicate your views by rating the statements using the scale provided
- To get more information on statements, position your cursor on top of the ● symbol when available
- You are also encouraged to provide a brief explanation (one or two sentences) for the items you add
- Please click on the "Submit and Go to Section # " button after having completed each section
- A progress bar located at the end of each section indicates the percentage of the questionnaire that you have completed
- If you do not understand a question, you may skip it and proceed to the next one
- If you need to contact Marc Diboun, simply click on the "Contact me" on the top right corner
- This questionnaire is better viewed with Internet Explorer

[Please Begin](#)

Figure 4. General instructions

Section 1/6 - Knowledge Leaders Roles

A. Evaluate the importance of the following knowledge leaders' roles using the scale provided

	Highly Not Important	Not Important	Neutral	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1. Foster a knowledge sharing culture in my firm.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Develop my organization's knowledge resources.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Convince senior management to agree about what our organization will gain from managing knowledge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Drive initiatives to measure knowledge management benefits in my firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Select and provide support for technologies that contribute to implement KM activities in my firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

B. You are also encouraged to add and briefly explain as many as 5 important additional roles.

Additional Role 1:

Additional Role 2:

Additional Role 3:

Additional Role 4:

Additional Role 5:

[Submit and Go to Section 2](#)

Progress Bar (18%)

Figure 5. Section one – Knowledge leaders' roles

Section 2/6 - Knowledge Leaders Skills

A. Evaluate the importance of the following knowledge leaders' skills, using the scale provided.

	Highly Not Important	Not Important	Neutral	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1. Project management skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Technological skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Interpersonal skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Change agent.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Leadership.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

B. You are also encouraged to add and briefly explain as many as 5 important additional skills.

Additional Skill 1:

Additional Skill 2:

Additional Skill 3:

Additional Skill 4:

Additional Skill 5:

[Submit and Go to Section 3](#)

Progress Bar (36%)

Figure 6. Section two – Knowledge leaders' skills

Section 3/6 - KM Obstacles

A. Evaluate the importance of the following obstacles that might prevent you from developing/implementing KM activities in your organization. Use the provided scale.

	Highly Not Important	Not Important	Neutral			
1. Organizational culture.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Lack of time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Information/communication technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Lack of Incentive (reward) system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Lack of senior management support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Organizational structure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Staff turnover.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Physical layout of work spaces.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Non-standardized processes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Emphasis on individual rather than team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

B. You are also encouraged to add and briefly explain as many as 5 important additional obstacles.

Additional Obstacle 1:

Additional Obstacle 2:

Additional Obstacle 3:

Additional Obstacle 4:

Additional Obstacle 5:

[Submit and Go to Section 4](#)

Progress Bar (0000)

Figure 7. Section three - KM obstacles

Section 4/6- KM Technologies and Tools

A. Evaluate the importance of the following technologies and tools for implementing KM activities in your organization. Use the provided scale.

	Highly Not Important	Not Important	Neutral			
1. Intranet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
2. E-mail.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
3. Information Retrieval Engines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
4. Groupware.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
5. Corporate Yellow Pages of Skills and Expertise.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
6. Video-conference.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
7. Audio-conference.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
8. Document Management Systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
9. Data Mining.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
10. Help-desk Applications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			

B. You are also encouraged to add as many as 3 additional technologies and/or tools that you consider to be effective for implementing KM activities.

1.

2.

3.

C. Evaluate the level of integration of the following information sources with your KM application(s). Use the provided scale.

	Has already been fully integrated	is presently being integrated	will be integrated in the future	
1. Enterprise Resource Planning (ERP) systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
2. Employee expertise database.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
3. Marketing databases.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

4. Inventory databases.

5. Financial databases.

D. You are also encouraged to add as many as 3 additional information sources and indicate whether you have fully integrated them, you are presently integrating them, or if you will be integrating them in the future.

	Has already been fully integrated	Is presently being integrated	Will be integrated in the future
1. <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Submit and Go to Section 5](#)

Progress Bar (00%)

Figure 8. Section four - KM tools and technologies

Section 5/6 - Knowledge Leaders Perceived Benefits of KM

What do you perceive to be the most important benefits of KM to your firm?

Please add, with a brief explanation if possible, as many as 5 KM benefits to your firm.

1.
2.
3.
4.
5.

[Submit and Go to Last Section](#)

Progress Bar (90%)

Figure 9. Section five – KM Benefits

Section 6/6- Background Information

11/1/2010

It is very important for our study that you complete this section. Please answer the following brief questions: ("Don't forget to click the "Send" button when you complete this section.")

Be assured that all your answers are anonymous and will only be used for analysis. Your responses will remain strictly confidential.

- A. What is your current job title?
- B. How many years have you occupied this position for? years
- C. How many years have you been working for your current firm? years
- D. How many years of experience do you possess in the KM field? years
- E. What is the title of the person who appointed you to your current position?
- F. What is the title of the person in your firm that you directly report to?
- G. What is your firm's primary industry? Other (please specify):
- H. How many individuals does your firm employ? individuals
- I. From which country do you mainly work from? Other (please specify):
- J. How many individuals are assigned to the development and/or implementation of KM initiatives in your organization? individuals
- K. What is your firm's annual revenue? (Please specify currency used) (Please specify currency used)
- L. What is the percentage of your firm's budget allocated to KM activities? %
- M. In which functional area(s) of your firm is KM being implemented?
- | | | | |
|------------------------|--------------------------|------------------|--------------------------|
| Finance | <input type="checkbox"/> | Engineering | <input type="checkbox"/> |
| Human Resources | <input type="checkbox"/> | Manufacturing | <input type="checkbox"/> |
| Information Technology | <input type="checkbox"/> | Sales | <input type="checkbox"/> |
| Quality | <input type="checkbox"/> | Customer Service | <input type="checkbox"/> |
| Marketing | <input type="checkbox"/> | Other 1: | <input type="text"/> |
| R & D | <input type="checkbox"/> | Other 2: | <input type="text"/> |

N. What percentage of your time do you spend on the following KM activities?

Creating Knowledge	<input type="text"/>	%	Transferring Knowledge	<input type="text"/>	%
Capturing Knowledge	<input type="text"/>	%	Deploying Knowledge	<input type="text"/>	%
Storing Knowledge	<input type="text"/>	%	Applying/Using Knowledge	<input type="text"/>	%
Organizing Knowledge	<input type="text"/>	%			

O. From most recent to least recent, what are your last three job positions? Also indicate how many years you have occupied these positions.

1.	<input type="text"/>	<input type="text"/>	years
2.	<input type="text"/>	<input type="text"/>	years
3.	<input type="text"/>	<input type="text"/>	years

P. What is your highest accomplished education level and in which field?

Q. Gender

M F

R. Age

Progress Bar (100%)

Figure 10. Section six - Background information



THANK YOU!

Thank you for your time and collaboration! Sharing your knowledge is valuable to the success of this research.

You will be notified by e-mail when the second questionnaire will be available.

Close Window



Figure 11. Thank you page

APPENDIX 5 – MODIFICATIONS QUESTIONNAIRE

LEGEND:

N/A	SB	MB	VB
Not Applicable	Slightly Beneficial	Moderately Beneficial	Very Beneficial

	Short Term (< 3 years)				Medium Term (4-5 years)							
	N/A	SB	MB	VB	N/A	SB	MB	VB				
	0	1	2	3	0	1	2	3				
1.												

Figure 1a. Benefits' section old scale

Question:

What do you perceive to be the most important benefits of KM to your firm?
 Please add (with a justification if possible) as many as 5 benefits and rate each as being a short-term, medium-term, or long-term benefit.

	Short term	
1.		

Figure 1b. Benefits' section new scale

1. How effective do you consider the following technologies & tools for implementing KM initiatives in your organization?
 Please rate the 5 technologies and tools provided.
 Also, you are encouraged to add as many as 5 additional technologies and/or tools that you consider to be effective for implementing KM initiatives.

	Not Applicable
(Record sett. Tech1)	
COMMENTS on technology tool 1:	
(Record sett. Tech2)	
COMMENTS on technology tool 2:	

Figure 2a. Technology and tools' old scale

Question 1:

How effective do you consider the following technologies & tools for implementing KM initiatives in your organization?
 Please rate the 5 provided technologies and tools using the scale provided.
 Also, you are encouraged to add as many as 5 additional technologies and/or tools that you consider to be effective for implementing KM initiatives.

		Slightly Ineffective	Neutral	Slightly Effective		
(Record sett. Tech1)						
COMMENTS on technology tool 1:						

Figure 2b. Technology and tools' new scale

APPENDIX 6 – PRECONDITIONING SENT TO PRACTITIONERS (PRE-TEST)

Dear Mr.X,

I am contacting you to see if you are interested in pre-testing a brief web-questionnaire on knowledge management leaders' critical issues. I found your e-mail by searching for knowledge management leaders on the Internet. The web-questionnaire is part of an important research project, funded by Concordia University.

Pre-testing the questionnaire is an essential step. Your comments and suggestions concerning its layout and questions will allow me to refine and enhance its contents, in order to increase the accuracy of the results. Your collaboration is essential to this study's completion and success. Be assured that your responses, comments and suggestions will be kept confidential. In return for pre-testing, I will provide you with a summary of the results once the upcoming survey will be completed.

Filling out the pre-test should not take you more than 30 minutes. If you agree to participate to this crucial phase of this project, I will send you by e-mail a link to this web-questionnaire. If you wish to receive a paper copy of the questionnaire instead, please provide me with a physical address or fax number. In the occurrence that you are not available to respond to my request, just send a blank reply of this e-mail.

If you require further information, please contact me by e-mail at m_dfoun@jmsb.concordia.ca or by phone at (514) 577-6000.

Thank you for your time and consideration.

Sincerely,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Department of Decision Sciences and MIS
John Molson School of Business
Concordia University, Montreal, Canada

APPENDIX 7 – FOLLOW-UP LETTER SENT TO PRACTITIONERS (PRE-TEST)

Hello Mr. X,

I sent you an e-mail a few days ago about pre-testing a brief web-questionnaire on knowledge management leaders' critical issues.

The link to the online questionnaire is the following:
<http://www.kmleaders.com/consent.asp?KM=90jdbq1>

Please be assured that your responses, comments and suggestions will be kept confidential. In return for pre-testing, I will provide you with a summary of the results once the upcoming survey will be completed.

Again, let me thank you for your very useful participation.

Sincerely,

Marc Dfouni, M.Sc. Student (MIS)
John Molson School of Business
Concordia University, Montreal

APPENDIX 8 – FIRST REMINDER SENT TO PRACTITIONERS (PRE-TEST)

Hello Ms. X,

About a week ago, you received an e-mail inviting you to pretest a web questionnaire for a study on critical issues faced by knowledge management leaders. I am writing to remind you that your comments and suggestions are essential in helping me refine and enhance the contents of the web questionnaire, in order to increase the results' accuracy.

I do hope that you will soon take the opportunity to pretest the questionnaire at the following address: <http://www.kmleaders.com/consent.asp?KM=92jsah1>

If for any reason you prefer not to pretest it, please let me know by sending us a blank reply to this e-mail. I would also like to remind you that in return for pre-testing, you will be provided with a summary of the results.

Let me reassure you that your responses, comments and suggestions will be kept strictly confidential.

If you require further information, please contact me by e-mail at m_dfoun@jmsb.concordia.ca or by phone at (514) 577-6000.

Thank you for your time and consideration.

Sincerely,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Department of Decision Sciences and MIS
John Molson School of Business
Concordia University, Montreal, Canada

APPENDIX 9 – SECOND REMINDER SENT TO PRACTITIONERS WHO ACCEPTED TO DO THE PRE-TEST

Dear Ms. X,

About two weeks ago, I received your acceptance to pre-test a web questionnaire for a study on critical issues faced by knowledge management leaders. Pre-testing the questionnaire should not take you more than 30 minutes. I would like to emphasize that your responses, comments and suggestions will be kept confidential.

You will find the questionnaire at the following address:
www.kmleaders.com/consent.asp?KM=98jsah1

Would you be kind enough to pre-test the questionnaire before **Monday May 13th**? If for any reason you prefer to pre-test on a later date, please let me know when I shall receive your comments. In return for pre-testing, I will provide you with a summary of the results once the upcoming survey is completed.

Comments from people who have already pre-tested the questionnaire are very encouraging. They are helping me to refine and enhance the contents of the web questionnaire, in order to increase the results' accuracy.

If you require further information, please contact me by e-mail at m_dfoun@jmsb.concordia.ca or by phone at (514) 577-6000.

Thank you for your time and consideration.

Sincerely,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Department of Decision Sciences and MIS
John Molson School of Business
Concordia University, Montreal, Canada

APPENDIX 10 – SECOND REMINDER SENT TO PRACTITIONERS WHO DID NOT REPLY TO DO THE PRE-TEST

Dear Mr. X,

About two weeks ago, I sent you an e-mail inviting you to pretest a web questionnaire for a study on critical issues faced by knowledge management leaders. Pre-testing the questionnaire should not take you more than 30 minutes. I would like to emphasize that your responses, comments and suggestions will be kept confidential.

You will find the questionnaire at the following address:
www.kmleaders.com/consent.asp?KM=90jdbg1

Would you be kind enough to pre-test the questionnaire before **Monday May 13th**? If for any reason you prefer to pre-test on a later date, please let me know when I shall receive your comments. In return for pre-testing, I will provide you with a summary of the results once the upcoming survey is completed.

Comments from people who have already pre-tested the questionnaire are very encouraging. They are helping me to refine and enhance the contents of the web questionnaire, in order to increase the results' accuracy.


If you require further information, please contact me by e-mail at m_dfoun@jmsb.concordia.ca or by phone at (514) 577-6000.

Thank you for your time and consideration.

Sincerely,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Department of Decision Sciences and MIS
John Molson School of Business
Concordia University, Montreal, Canada

APPENDIX 11 – SECOND ROUND QUESTIONNAIRE



John Molson
School of Business
Concordia University

Knowledge Leaders Critical Issues Survey Second Questionnaire

Dear Knowledge Leader,

Thank you for accepting to participate in the second questionnaire on Knowledge Leaders' critical issues. This questionnaire was compiled using the most recurrent issues gathered in the first questionnaire from more than 130 international respondents from diverse industries.

Your participation is still crucial for the success of the study. **This questionnaire contains questions requiring you to rate certain statements and will take 5-10 minutes of your time to complete.**

As promised in the first questionnaire, a personalized report will be sent to you towards the end of the summer upon completion of the full study. This report will include a summary of the results as well as an assessment of your position as a knowledge leader within your firm's industry and against other leaders within the knowledge management community ([view example](#)).

Please be assured that your responses will be kept **strictly confidential**.

If you have any concerns on how to complete this survey, please don't hesitate to contact Marc Dfouni at m_dfouni@jmsb.concordia.ca or by phone at (514) 577-6000.

Sincerely,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Concordia University, Montreal, Canada

Instructions

Please keep in mind throughout this questionnaire that a **Knowledge Leader** is defined as a person responsible for creating and/or maintaining her/his organization's knowledge management environment.

Please indicate your first impression, there are no good or bad answers. Your answers should reflect your own point of view, not your organization's.

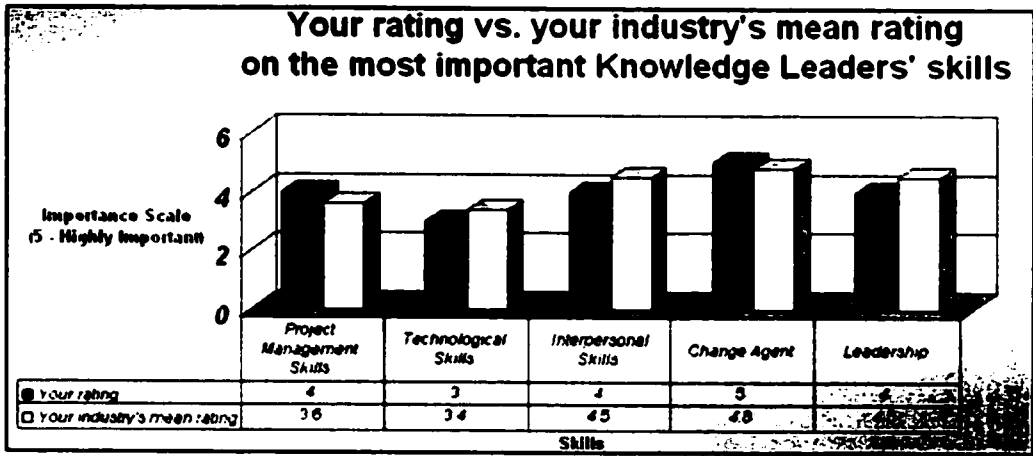
- This questionnaire is divided into five sections, all requiring you to rate certain statements.
- Indicate your views by rating the statements using the scale provided.
- If the statement does not apply to your organization check n/a for "not applicable".
- Click on the "Submit and Go to Section #" button after having completed each section.
- A progress bar located at the end of each section indicates the percentage of the questionnaire that you have completed.
- If you do not understand a question, you may skip it and proceed to the next one.
- If you need to contact Marc Dfouni, simply click on the "Contact me" on the top right corner.

Please Begin

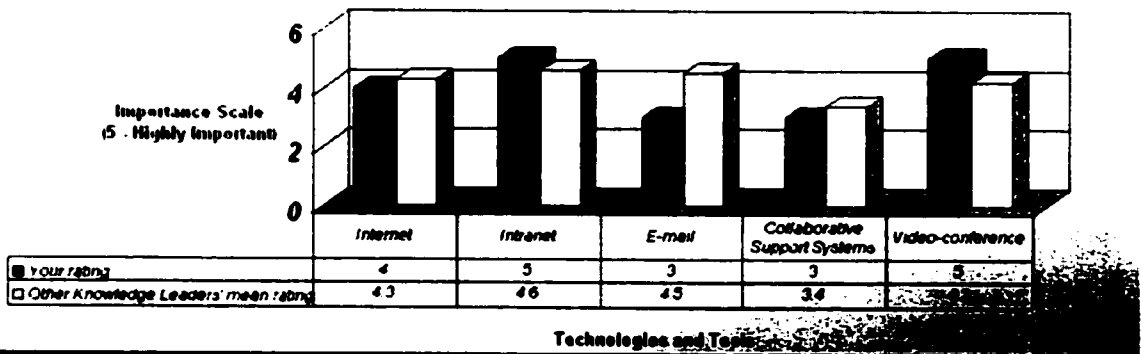
Figure 1. Cover letter and Instructions for those who answered the first round questionnaire



Example of Analysis
 Second Questionnaire



Your rating vs. other Knowledge Leaders' rating on the most important Technologies and Tools enabling KM



Close this Window

Figure 2. Example of the report that will be sent to the respondents



Knowledge Leaders Critical Issues Survey

Dear Knowledge Leader,

Thank you for accepting to participate in this survey which will investigate knowledge leaders' critical issues. This questionnaire contains questions requiring you to rate certain statements and will take no more than 10 minutes of your time to complete.

In return for participating, a personalized report will be sent to you towards the end of the summer upon completion of the full study. This report will include a summary of the results as well as an assessment of your position as a knowledge leader within your firm's industry and against other leaders within the knowledge management community ([new example](#)).

In order to increase the accuracy and validity of the results, this questionnaire's objective is to get a general idea of knowledge leaders' issues. Upon reception of your answers, I will combine them to other knowledge leaders' answers and send you a new questionnaire in the upcoming weeks. The second questionnaire will focus on the 10 most important issues yielded from this questionnaire. Using these two questionnaires, I will be able to calculate a degree of agreement on the results between the respondents.

To enable me to send you the personalized report and the second questionnaire in the upcoming weeks, please enter your e-mail address below. Be assured that this information, as well as your responses, comments and suggestions will be kept strictly confidential.

Due to a great amount of requests, please note that this questionnaire's deadline was extended and will remain online until June 10, 2002.

If you have any concerns on how to complete this survey, please feel free to contact Marc Dfoun at m_dfoun@msb.concordia.ca or by phone at (514) 577-6000.

Sincerely,

Marc Dfoun, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Concordia University, Montreal, Canada

Please enter your e-mail:

Figure 3. Cover letter for new second round respondents



John Molson
School of Business
Concordia University

Knowledge Leaders Critical Issues Second Questionnaire

Please indicate your first impression, there are no good or bad answers. Your answers should reflect your own point of view, not your organization's.

Please keep in mind throughout this questionnaire that a **Knowledge Leader** is defined as a person responsible for creating and/or maintaining her/his organization's knowledge management environment.

- This questionnaire is divided into six sections, five of them requiring you only to rate certain statements and one background section.
- Please indicate your views by rating the statements using the scale provided.
- If the statement does not apply to your organization check n/a for "not applicable".
- Click on the "Submit and Go to Section # " button after having completed each section.
- A progress bar located at the end of each section indicates the percentage of the questionnaire that you have completed.
- If you do not understand a question, you may skip it and proceed to the next one.
- If you need to contact Marc Dfouni, simply click on the "Contact me" on the top right corner.

[Please Begin](#)

Figure 4. Instructions for new second round respondents

Section 1/5 - Knowledge Leaders Roles

11/17/2007 10:12 AM

The first questionnaire yielded the following 15 most recurrent knowledge leaders roles (randomly ordered). Please evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Foster a knowledge sharing culture in my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Develop my organization's KM strategy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Facilitate knowledge sharing events / meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Drive initiatives to measure KM benefits in my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Include KM tasks in job descriptions of newly recruited staff.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Promote KM's benefits throughout my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Develop my organization's knowledge resources.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Convince senior management of what our organization will gain through managing knowledge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Lead by example by sharing knowledge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Benchmark with other firms on how KM can benefit my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Facilitate knowledge sharing among staff.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Develop incentive (rewards) systems for my organization's staff.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Practice change management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Select and provide support for technologies that contribute to implement KM activities in my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Embed KM within internal processes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Submit and Go to Section 2](#)

Progress Bar (18%)

Start: 11/17/2007, 10:12 AM

Figure 5. Section one – Knowledge leaders' roles

Section 2/5 - Knowledge Leaders Skills

The first questionnaire yielded the following 11 most recurrent knowledge leaders skills (randomly ordered). Please evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Leadership skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Business-specific skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Technological skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Storytelling skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Project management skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Creativity skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Interpersonal skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Motivational skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Change agent skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Marketing skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Negotiation skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Submit and Go to Section 3](#)

Progress Bar (30%)

Start of form, 1/1/17

Figure 6. Section two – Knowledge leaders' skills

Section 3/5 - KM Obstacles

The first questionnaire yielded the following 17 most recurrent obstacles (randomly ordered) that might prevent you from developing/implementing KM activities in your organization. Please evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Organizational culture.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Lack of time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Information/communication technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Lack of incentive (reward) system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Lack of senior management support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Organizational structure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Staff turnover.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Physical layout of work spaces.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Non-standardized processes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Emphasis on individual rather than team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Lack of KM understanding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Difficulty in measuring KM benefits in my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Lack of capital.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Reluctance to change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Lack of vision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Communication barriers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Lack of KM methodologies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Submit and Go to Section 4

Progress Bar (66%)

Mar 11, 2002

Figure 7. Section three – KM obstacles

Section 4/5- KM Technologies and Tools

The first questionnaire yielded the following 16 most recurrent technologies and tools (randomly ordered) for implementing KM activities. Please evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Portals (Internet/Intranet/Extranet).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. E-mail.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Information Retrieval Engines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Collaborative Work Support Tools (ex.:Groupware).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Corporate Yellow Pages of Skills and Expertise.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Video-conference.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Audio-conference.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Document Management Systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Data Mining.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Help-desk Applications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Quality Management Systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Discussion Boards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Knowledge Maps.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. E-learning Technologies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Project Management Tools.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Artificial Intelligence.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Submit and Go to Last Section](#)

Progress Bar (80%)

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Figure 8. Section four – KM technologies and tools

Section 5/5 - Knowledge Leaders Perceived Benefits of KM

The first questionnaire yielded the following 17 most recurrent knowledge leaders perceived KM benefits (randomly ordered). Please evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Increase support for business activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Increase employee satisfaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Decrease learning/training time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Increase internal knowledge sharing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Increase external knowledge sharing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Increase innovation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Retain intellectual capital when employees leave the organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Increase employee productivity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Build and maintain a competitive advantage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Achieve a closer relationship with individual customers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Improve the work environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Help identifying new business opportunities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Deliver higher quality products and services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Avoid re-inventing the wheel.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Increase the effective utilization of knowledge resources.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Improve the quality of decision-making.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Increase collaboration between employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Send](#)

Progress Bar (100%)

Start: Monday, 2007

Figure 9. Section five – KM benefits



Thank you for your time and collaboration!
Sharing your knowledge is valuable to the success of this research.

You will be notified by e-mail when the last questionnaire will be available.

If you wish to share any comments and/or suggestions , please do so here:

Send Comments

No Comments



Figure 10. Thank you page

APPENDIX 12 – SECOND ROUND LETTER SENT TO NEW POTENTIAL RESPONDENTS

[Please accept our apologies in case of multiple receptions]

Dear Member,

This is a follow-up to a message sent two weeks ago seeking your participation in a first questionnaire about a KM study on Knowledge Leader's critical issues. The second questionnaire is now ready! It was compiled using the most recurrent issues generated from the first questionnaire by more than 130 people worldwide from diverse industries.

If you did not participate in the first questionnaire, you could still do so in this second questionnaire. Your cooperation is still crucial for the success of this study. This questionnaire contains questions requiring you to rate certain statements and will only take 5-10 minutes of your time to complete.

In return for participating, a personalized report will be sent to you towards the end of the summer upon completion of the full study. This report will include a summary of the results as well as an assessment of your position as a knowledge leader within your firm's industry and against other leaders within the knowledge management community. The second questionnaire and an example of this report can be viewed at this address:
<http://www.kmleaders.com/round2n/cover.asp>

Be assured that your responses will be kept strictly confidential.

For more information please follow the above link.

Thank you for your time and collaboration,

Marc Dfouni, M.Sc. Student (MIS)
Anne-Marie Croteau, Ph.D.
Decision Sciences and MIS Department,
John Molson School of Business
Concordia University, Canada

APPENDIX 13 – SECOND ROUND LETTER SENT TO FIRST ROUND RESPONDENTS

Dear Knowledge Leader,

Thank you for your participation in the first questionnaire studying knowledge leaders' critical issues. The second questionnaire is now ready! It was compiled using the most recurrent issues generated from the first questionnaire by you and more than 130 people worldwide from diverse industries.

Your participation is still crucial for the success of this study. **This questionnaire contains questions requiring you to rate certain statements and will only take 5-10 minutes of your time to complete.**

As promised in the first questionnaire, a personalized report will be sent to you towards the end of the summer upon completion of the full study. This report will include a summary of the results as well as an assessment of your position as a knowledge leader within your firm's industry and against other leaders within the knowledge management community. The second questionnaire and an example of this report can be viewed at this address:

http://www.kmleaders.com/round2/gen_instructions.asp?KM=D318FBFA-33D6-4596-973B-9B1DA358F905

Please be assured that all your responses will be kept **strictly confidential**.

I would appreciate if you could fill out the questionnaire by June 14th.

After receiving your answers to this second questionnaire, I will repeat the same process and send you a last short questionnaire (I promise) containing the top 10 most important critical issues.

If you have any concerns on how to complete this survey, please don't hesitate to contact me by e-mail or by phone at (514) 577-6000.

Sincerely Yours,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Concordia University, Montreal, Canada.

APPENDIX 14 – SECOND ROUND FIRST REMINDER

Dear Knowledge Leader,

About a week ago, you received an e-mail inviting you to participate to the 2nd questionnaire of the study on critical issues faced by knowledge management leaders. I am writing to remind you that your participation is crucial to the success of this study.

I do hope that you will soon take the opportunity to participate to this second questionnaire which **contains questions requiring you to rate certain statements and will only take 5-10 minutes of your time to complete.**

As promised in the first questionnaire, a personalized report will be sent to you towards the end of the summer upon completion of the full study. This report will include a summary of the results as well as an assessment of your position as a knowledge leader within your firm's industry and against other leaders within the knowledge management community. The second questionnaire and an example of this report can be viewed following [this link](#).

I would appreciate if you could fill out the questionnaire by Friday June 14. Please inform me if for any reason you require more time.

Let me reassure you that all your responses will be kept **strictly confidential**.


If you require further information, please contact me by e-mail or by phone at (514) 577-6000.

Thank you for your time and consideration.

Sincerely Yours,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Department of Decision Sciences and MIS
John Molson School of Business
Concordia University, Montreal, Canada

APPENDIX 15 – THIRD ROUND QUESTIONNAIRE



John Molson
School of Business
Concordia University

Knowledge Leaders Critical Issues Survey Last Questionnaire's Instructions

Thank you for accepting to participate in this last questionnaire!

Please keep in mind throughout this questionnaire that a **Knowledge Leader** is defined as a person responsible for creating and/or maintaining her/his organization's knowledge management environment.

Please indicate your first impression, there are no good or bad answers. Your answers should reflect your own point of view, not your organization's.

- This questionnaire is divided into six sections, all requiring you to rate certain statements
- Indicate your views by rating the statements using the scale provided
- If the statement does not apply to your organization check n/a for "not applicable"
- Click on the "Submit and Go to Section # " button after having completed each section
- A progress bar located at the end of each section indicates the percentage of the questionnaire that you have completed
- If you need to contact Marc Dfouni, simply click on the "Contact me" located on the top right corner of each page

[Begin the Last Questionnaire](#)

Figure 1. Instructions

Section 1/6 - Knowledge Leaders Roles

The second questionnaire yielded the following 10 most recurrent knowledge leaders roles (randomly ordered). Please re-evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Develop my organization's knowledge resources.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Facilitate knowledge sharing among staff.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Drive initiatives to measure KM benefits in my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Lead by example by sharing knowledge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Foster a knowledge sharing culture in my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Promote KM's benefits throughout my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Develop my organization's KM strategy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Convince senior management of what our organization will gain through managing knowledge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Facilitate knowledge sharing events / meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Embed KM within internal processes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Submit and Go to Section 2](#)

Progress Bar (10%)

Figure 2. Section one – Knowledge leaders' roles

Section 2/6 - Knowledge Leaders Skills

11/2/2012

The second questionnaire yielded the following 5 most recurrent knowledge leaders skills (randomly ordered). Please re-evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Leadership skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Creativity skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Interpersonal skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Motivational skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Change agent skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Submit and Go to Section 3](#)

Progress Bar (36%)

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Figure 3. Section two – Knowledge leaders' skills

Section 3/6 - KM Obstacles

11/14/2007

The second questionnaire yielded the following 10 most recurrent obstacles (randomly ordered) that might prevent you from developing/implementing KM activities in your organization. Please re-evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Communication barriers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Lack of time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Organizational structure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Organizational culture.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Lack of senior management support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Emphasis on individual rather than team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Difficulty in measuring KM benefits in my organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Reluctance to change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Lack of vision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Lack of KM understanding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Submit and Go to Section 4

Progress Bar (88%)

11/14/2007 2:47

Figure 4. Section three – KM obstacles

Section 4/6- KM Technologies and Tools

10/10/2006

The second questionnaire yielded the following 10 most recurrent technologies and tools (randomly ordered) for implementing KM activities. Please to evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Document Management Systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Knowledge Maps.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Information Retrieval Engines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Collaborative Work Support Tools (ex.: Groupware).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Discussion Boards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. E-mail.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. E-learning Technologies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Data Mining.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Portals (Internet/Intranet/Extranet).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Corporate Yellow Pages of Skills and Expertise.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Submit and Go to Section 5](#)

Progress Bar (80%)

10/10/2006 10:07

Figure 5. Section four – KM technologies and tools

Section 5/6 - Knowledge Leaders Perceived Benefits of KM

The second questionnaire yielded the following 10 most recurrent knowledge leaders perceived KM benefits (randomly ordered). Please re-evaluate their importance using the provided scale.

	Highly Not Important	Not Important	Neutral		
1. Increase collaboration between employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Increase innovation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Increase internal knowledge sharing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Increase employee productivity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Retain intellectual capital when employees leave the organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Build and maintain a competitive advantage.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Avoid re-inventing the wheel.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Deliver higher quality products and services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Increase the effective utilization of knowledge resources.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Improve the quality of decision-making.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Submit and Go to Last Section](#)

Progress Bar (95%)

Time: 07:00:00

Figure 6. Section five – KM benefits

Section 6/6 - Business Performance

Business Performance refers to how your organization is performing on an overall non KM specific level.

Please indicate the extent to which you are currently satisfied with your organization's achievement in each of the following areas

	Highly Unsatisfied	Unsatisfied	Neutral	
1. Market Share.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
2. Sales Growth Rate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
3. Net Profits.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
4. Return on sales (Net Profit Margin).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
5. Return on investment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
6. Revenue growth relative to the competition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
7. Market share gains relative to the competition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
8. Net Profits relative to the competition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>
9. Return on investment relative to the competition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>

Progress Bar (100%)

Survey Complete (2002)

Figure 6. Section six – Business performance (data not used in this study)

APPENDIX 16 – THIRD ROUND INITIAL E-MAIL

Dear Knowledge Leader,

Thank you for your participation in last week's web-questionnaire studying knowledge leaders' critical issues. **The last web-questionnaire is now ready!** In order to increase the accuracy and validity of the results, this last questionnaire was compiled using the most recurrent issues gathered in the previous questionnaire from more than 140 international respondents from diverse industries.

Your participation is still crucial for the success of the study. By filling out this questionnaire, you will enable me to calculate the degree of agreement between the respondents on the most important knowledge leaders' issues. **This questionnaire contains questions requiring you to rate certain statements and will take 5-10 minutes of your time to complete.**

As promised in the first and second questionnaire, a personalized report will be sent to you towards the end of the summer upon completion of the full study. This report will include a summary of the results as well as an assessment of your position as a knowledge leader within your firm's industry and against other leaders within the knowledge management community. You can preview an example of this report [here](#).

To access the last questionnaire, please follow this link:
http://www.kmleaders.com/round3a/gen_instructions.asp?KM=94CA7270-C3B5-4D9F-A8C6-D62C8460F10F

Please be assured that your responses will be kept **strictly confidential**.

I would appreciate if you could fill out the questionnaire by **Friday June 28th**. Please inform me if for any reason you require more time.

If you need further information, please contact me by e-mail or by phone at (514) 577-6000.

Sincerely Yours,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Concordia University, Montreal, Canada.

APPENDIX 17 – THIRD ROUND FIRST REMINDER

Dear Knowledge Leader,

A week ago, you received an e-mail inviting you to participate in the last web-questionnaire of the study on critical issues faced by knowledge management leaders. I am writing to remind you that your participation is crucial to the success of this study.

I do hope that you will soon take the opportunity to participate in this last questionnaire which contains questions requiring you to rate certain statements and will only take **5-10 minutes of your time to complete**.

Your participation in this questionnaire is essential since it will enable me to prepare and send you a personalized report towards the end of the summer upon completion of the full study. This report will include a summary of the results as well as an assessment of your position as a knowledge leader within your firm's industry and against other leaders within the knowledge management community. An example of this report can be viewed on the questionnaire's web page (link below).

To access the last questionnaire, please follow this link:

http://www.kmleaders.com/round3a/gen_instructions.asp?KM=A5AEB53F-382D-47CC-AE2C-AC71281D83D3

I would appreciate if you could fill out the questionnaire by **Friday June 28**. Please inform me if for any reason you require more time. In case you don't wish to participate, please reply with a blank e-mail.

Let me reassure you that all your responses will be kept **strictly confidential**.

If you require further information, please contact me by e-mail or by phone at (514) 577-6000.

Thank you for your time and consideration.

Sincerely yours,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Department of Decision Sciences and MIS
John Molson School of Business
Concordia University, Montreal, Canada

APPENDIX 18 – THANK YOU LETTER

Dear Knowledge Leader,

Thank you for taking the time to complete my questionnaires. Please be assured that the information you have provided will be kept strictly confidential.

The data is currently being analyzed and a personalized report will be sent to you by the end of the summer.

If you have any comments or questions, please feel free to contact me.

Thank you again for your time and consideration.

Sincerely,

Marc Dfouni, M.Sc. Student
Supervised by Anne-Marie Croteau, Ph.D.
Department of Decision Sciences and MIS
John Molson School of Business
Concordia University, Montreal, Canada
