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The relevance of information systems (IS) research publications to IS practitioners' key concerns

J. S. Fall
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**THE RELEVANCE OF INFORMATION SYSTEMS (IS) RESEARCH
PUBLICATIONS TO IS PRACTITIONERS' KEY CONCERNS**

J. Steve Fall
BA (Hons), PGCE

**This thesis is presented in fulfilment of the requirements for the degree of Doctor
of Business Administration (Information Systems)**

Faculty of Business and Law (FBL)

Edith Cowan University

July, 2005

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USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

ABSTRACT

The primary aim of the research was to determine if, and if so how, the topics published in information systems (IS) journal articles were related to the key issues reported to be of concern to IS managers. The secondary aim was to determine what proportions of the journal articles were investigating closely-related and distantly-related information technology (IT) phenomena.

The research covered 1376 articles published in nine highly-rated journals for the seven-year period 1995-2001. The journals chosen for the research included five US academic journals, two European academic journals, and two practitioner journals. The primary data source for the managers' key issue data was the 'Top IS Management Issues' survey responses presented in the Computer Sciences Corporation Surveys over the period 1995 to 2001.

An IS topic classification scheme (taxonomy) was developed and each article abstract was examined and allocated between one and three topic classification codes. An analysis of the level of coverage the journal articles provided for the taxonomy topics was then produced. The three most frequently occurring topics were group decision support system (GDSS) research, MIS research methods and approaches, and systems evaluation. Over 20% of all the articles covered one of these three topics. The analysis also identified a number of specific taxonomy topics that had not been covered or only very poorly covered. These included IT Strategy Formulation & Building a Responsive IT Infrastructure, Component-based Development (CBD), Systems Security, System Maintenance & Migration Processes, and Wireless & Mobile Computing.

An 'IT-relatedness' classification scheme (the 'IS conceptual net') was then developed. The analysis of the journal articles' coverage of the components of the net revealed that only about a quarter of the articles addressed topics that were directly related to an IT artefact or its first-order antecedents/effects.

The taxonomy nodes and journal articles were then mapped to their related management issues. The subsequent analysis revealed that just over half of the journal articles were related to one or more of the (twenty-five) management issues. Some issues were very

well covered by the journal articles and some were very poorly covered. The two best covered issues were each covered by more than 10% of the articles whereas the eight worst covered issues were each covered by less than 1%. Less than half of the US academic journal articles were issue-related whereas over two-thirds of the European and three-quarters of the practitioner journal articles were issue-related.

An analysis of the relationships between the annual rank orders of the management issues and the issue-related article coverage levels was carried out. The analysis revealed that the management issue rankings could not generally be used as direct (or lead) indicators of the number of IS research articles (to be) published on related topics. Similarly, there was evidence that IS research publications were general lead indicators of management issues. However, three, out of the twenty-five issues, did appear to show some evidence of a direct relationship.

Included in the final chapter is a discussion on the significance of the research and an outline of some of the scope limitations of the research. The final chapter also identifies three groups of further research questions that arise from these scope limitations.

DECLARATION

I certify that this thesis does not, to the best of my knowledge and belief:

- (i) incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education.
- (ii) contain any material previously published or written by another person except where due reference is made in the text; or
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ACKNOWLEDGEMENTS

I would like to gratefully acknowledge the guidance and assistance provided by my supervisor Dr. Roger Sor. Without Roger's constructive criticism, guidance, and encouragement I would not have been able to undertake this thesis.

I am also indebted to my wife Sue for her patience and encouragement when it was most required. Without her encouragement I may not have had the determination required to complete the thesis.

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Chapter 1

INTRODUCTION

PURPOSE OF THE RESEARCH AND PRIMARY RESEARCH QUESTIONS

Motivation for the Research

This research was undertaken as part of a professional doctorate programme in Information Systems (IS) that focused on the intersection of IS academic research and IS practice. Toward the start of that doctorate programme there was considerable debate in the academic IS literature, particularly in MIS Quarterly (MISQ), on the relevance of mainstream academic IS research to IS practice.

The paper that started that particular relevance debate asserted that most contemporary IS academic research lacks relevance to practice (Benbasat & Zmud, 1999). One of the many rapid responses to that paper came from Allen Lee who was then the Editor-in-Chief of MISQ. Part of Lee's response to Benbasat & Zmud's assertion was:

“... my reaction is that: a survey, field study, documentary analysis, or other rigorous empirical study must be done to procure evidence for this statement (where, of course, the result of the empirical study could even be that IS research is relevant to IS practice). However, until these empirical studies are done, the extent to which IS research is relevant to IS practice remains, objectively speaking, unknown”.

(Lee, 1999b)

Lee's reaction was one of the main original motivations for this research.

The Aims of this Research

The primary aim of this research is to determine if, and if so how, the topics published in IS journal articles are related to the key issues reported to be of concern to IS managers.

A secondary aim arose, whilst the research was in progress, from the academic debate about the 'core properties' of the IS field and the role of Information Technology (IT) in IS research. One of the claims made in this debate, again by Benbasat & Zmud, was that the IS research community is:

"... under-investigating phenomena intimately associated with IT-based systems and over-investigating phenomena distantly associated with IT-based systems."

(Benbasat & Zmud, 2003, p. 184)

Because of this debate it was decided that the research would also aim to determine what proportions of the target journal articles were investigating closely and distantly IT-related phenomena.

The Primary (and Secondary) Research Questions

The primary research question arises directly from the primary aim of the research and is:

“Are the topics published in IS journal articles related to the key issues reported to be of concern to IS managers and, if so, how are they related?”

In order to answer this compound question it needed to be decomposed into a number of component questions – as explained in ‘Chapter 2: Research Justification’.

The secondary research (component) questions arise directly from the secondary aim and are:

1. “How can the ‘IT-relatedness’ of IS research be conceptualised and classified (i.e. what is the conceptual net of IS research)?”
2. “What level of coverage do the articles provide for the different components of the conceptual net?”

EXECUTIVE SUMMARY AND MAJOR FINDINGS

Executive Summary

In order to answer the primary and secondary research questions (and their various component questions) the research had to progress through a number of related stages (or groups of activities). These stages are summarised below. The research results that were derived from the execution of the research are summarised in the next section of this part of the chapter.

In order to answer the 'key issues reported to be of concern to IS managers' part of the primary research question the managers' key issues first had to be identified and analysed.

In order to identify the topics published in 'IS journal articles' the target IS journals first had to be selected and then a suitable IS topic classification scheme (taxonomy) had to be selected or developed. Each abstract of the target journal articles was then examined to determine which of the taxonomic topics it covered.

After all the target journal articles had been classified it was possible to produce an analysis of the amount of coverage the target journal articles provided for the topics (and higher-level nodes) in the taxonomy. An 'IT-relatedness' classification scheme (the 'IS conceptual net') was then developed and an analysis of how the target journal articles covered the various components of the conceptual net was produced.

In order to determine if, and how, the topics published in the IS journal articles were related to the managers' key issues the classification taxonomy nodes had first to be mapped to their related management issues. Once this had been completed it was possible to analyse the level of coverage the journal articles provided for each management issue. It was then also possible to analyse how the overall level of coverage, provided by the issue-related articles, was distributed between the different journal categories, journals, and publication years. It was also possible to determine what relationships, if any, existed between the annual rank orders of the management

issues and the annual rank orders of the issue-related article coverage levels throughout the survey period. This was done to determine if management issues and their rankings were predictors of IS research or vice versa.

Summary of Main Findings

Coverage of the management issues by the journal articles

The research found that just over half of the target journal articles were related to one or more of (the twenty-five) management issues. Some of the management issues were very well covered by the journal articles and some were very poorly covered. The two best covered issues were each covered by more than 10% of all the target articles. In contrast the eight worst covered issues were each covered by less than 1% of the articles.

Relationships between issue rankings and issue-related article coverage levels

There was no significant relationship between the managers' rankings of the issues and the rankings of the issue-related article coverage levels that related to those issues. Similarly, there was very little evidence of any general direct (or lag/lead) relationship between the yearly issue ranking trends and the yearly issue-related article coverage trends. However, three out of the twenty-five issues did appear to show some evidence of a direct (not lag or lead) relationship.

Related article contributions by journal category

When the contribution data was normalised to take account of the number of articles published by each category of journal the US academic journals came at the bottom of the 'relevance' list all having less than half of their articles issue-related. The two European journals came next having over two-thirds of their articles issue-related. The two practitioner journals were at the top with about 80% of their articles being issue-related.

Secondary Aim Findings

The first analysis of IT-relatedness was based on finding out the proportion of the articles classified under 'IT-related nodes'. This first analysis revealed that the articles classified under the IT-related nodes accounted for about 30% of all the journal article classifications.

A second analysis based on an 'Information systems conceptual net' was conducted. This showed that about a quarter of the articles analysed referred primarily to concepts and research model constructs that lay within the first order components of the IS conceptual net (i.e. they addressed topics that were directly related to the IT artefact). The remaining three-quarters of the articles addressed topics that lay within the second and third order components (i.e. they addressed topics that were only indirectly related to the IT artefact).

Other Main Findings

Topics that were poorly covered by the journal articles

The analysis identified a number of specific topics, from each of the main taxonomy Classes (MIS, Organisational, and Technology), that had either not been covered at all by the articles or just received very scant coverage. A number of 'technological' MIS and Technology topics were particularly poorly covered. These included:

- MIS: System Maintenance & Migration Processes (including Y2K), Systems Security and Availability (including virus controls), IT Strategy Formulation, Building a Responsive IT Infrastructure, and Component-based Development (CBD)
- TEC: Cellular Phones, Wireless, and Mobile Computing

Topics that were very well covered by the journal articles

A number of topics were very well covered by the journal articles. The best covered three topics were:

CSCCS¹ (GDSS) Research
MIS Research (General) Methods & Approaches
Systems Evaluation

Over 20% of all the articles covered one of these three topics.

Each Topic in the taxonomy was composed of a number of child sub-topic or 'leaf' nodes. Seven of the eight most popular leaf nodes had a research methods & approaches, or socio-psychological emphasis. These seven leaf nodes accounted for about 17% of the articles classified. Most of the articles classified under these most popular leaf nodes made either no reference, or just a brief nominal reference, to any specific type of IS/IT system or application (or IT 'artefact'). Those that did make nominal references to an IT artefact generally treated it as a 'black-box' or 'the system' and concentrated on its second or third order effects.

¹ CSCCS = Computer Supported Cooperative Communication Systems Research

INTRODUCTION TO THESIS ORGANISATION & CONTENT

Thesis Organisation and Presentation

The remainder of this thesis is contained in another nine chapters (as outlined in the next section) and forty-three appendices. The body of the thesis is presented in hard copy. The appendices, because of their length and to facilitate access, are presented in digital form on the accompanying CD. The appendices generally contain supporting detail and tables etc. that are too long to insert into the body of the chapters.

Chapter Outlines

Chapter 2: Research Justification

- Explains the aims and objectives of the research.
- States the research questions and their component questions.
- Explains the significance and contribution of the research.

Chapter 3: Literature Review

- Provides preliminary working explanations of the key basic concepts that underlie the research.
- Identifies and briefly reviews the major studies that have already been conducted in areas that are related to the area covered by this thesis.
- Provides reasonable evidence that no other doctoral dissertations, similar to this thesis, have already been published.

Chapter 4: Research Method

- Explains the ontological and epistemological perspectives of the researcher.
- Outlines the general research approach that has been adopted for this particular study.
- Outlines the specific research methods and activities that have been used in each of the main stages of this research.

Chapter 5: Analysis of Managers' Key Issues Data

- Outlines the background to the Computer Sciences Corporation (CSC) Surveys over the period 1993 to 2001 (these were the primary source of the Managers' Key Issues Data used in this thesis).
- Explains which parts of the survey results were used in this thesis and how the selected survey data was analysed.
- Provides a summary of the analysis of the survey results and observations on the results of the analysis.

Chapter 6: Journal Article Classification

- Explains how a taxonomic scheme was developed so that the 'topics' covered in the target journal articles could be classified.
- Explains the design of the database that was required to store the taxonomy and store the journal article abstract data in a form suitable for subsequent analysis.
- Describes how the taxonomy and database were used to classify the topic coverage of the target journal articles.

Chapter 7: Analysis of Journal Article Classification Data

- Presents an initial analysis of the data obtained during the journal article classification exercise that identified the topics that received little or no coverage by the journal articles.
- Analyses the degree of 'IT-relatedness' of the classified articles by reference the 'IS Conceptual Net'
- Presents an analysis of the degree of coverage the journal articles provided for the taxonomy topics.

Chapter 8: Analysis of Relationships between Journal Article & Key Issue Data

- Identifies which taxonomic nodes and journal articles relate to the particular management issues.
- Analyses the degree to which the various management issues are covered (or not covered) by the related journal articles.

- Analyses how the overall level of coverage, provided by the issue-related articles, was distributed between the different journal categories, journals, and publication years.
- Analyses the relationships between the annual rank orders of the management issues and the annual rank orders of the issue-related article coverage levels.

Chapter 9: Critical Review of Research Method Adopted

- Discusses the scope limitations of the research.
- Critically reviews the research method adopted.

Chapter 10: Summary & Discussion of Major Findings

- Presents (in Appendix 10.1) a consolidated list of research questions and answers.
- Provides a high-level summary of the research findings.
- Discusses what the research has achieved and puts forward suggestions for further related research.

Chapter 2

RESEARCH JUSTIFICATION

CHAPTER INTRODUCTION

Chapter purpose

The purpose of this chapter is four-fold:

1. to explain the aims and objectives of the research.
2. to provide a definition of its scope in terms of the specific research questions it attempts to answer.
3. to justify the research by showing that the issue of the relevance of IS research to practitioners' concerns is significant and worthy of study.
4. to demonstrate that this research will make a contribution to this field of study by determining the extent to which IS research, as evidenced by its publications, is relevant to IS practice.

Chapter contents

This chapter contains the following four main parts:

1. Aims and Objectives of the Research
2. The Research Questions
3. Significance and Contribution of the Research
4. Chapter Summary

AIMS AND OBJECTIVES OF THE RESEARCH

Primary Aim

The primary aim of this research is to determine if, and if so how, the topics published in IS journal articles are related¹ to the key issues reported to be of concern to IS managers.

In order to meet this aim two pre-requisites also need to be completed. First, the management issues need to be identified and analysed in terms of their relative importance and time-based characteristics. Second, the topics covered by each journal article need to be ascertained so that the overall level of coverage they provide for each topic can be determined.

Secondary Aim

While the research was in progress an academic debate about the ‘core properties’ of the IS field and the role of IT in IS research arose. One of the claims made in this debate was that the IS research community is:

“... under-investigating phenomena intimately associated with IT-based systems and over-investigating phenomena distantly associated with IT-based systems.”

(Benbasat & Zmud, 2003, p. 184)

Because of this debate it was decided that the research would also aim to determine what proportions of the target journal articles were investigating closely and distantly IT-related phenomena.

¹ The title of this thesis is “The Relevance of IS Research Publications to IS Practitioners' Key Concerns”. There are several dimensions of relevance. This thesis addresses the relatedness or interest dimension (i.e. does the research address the topics or issues that are of concern to IS professionals?). It also addresses the currency dimension (i.e. does IS research focus on current, at the time of publication, business issues and technologies?). The omission of the other dimensions of relevance will be discussed further in the ‘Critical Review of Methodology Adopted’ chapter.

The Main Objectives of the Research

In order to fulfil its aims the research needs to produce the following major deliverables.

1. An identification and analysis of the management issues.
2. A suitable IS topic classification scheme (hierarchical taxonomy) and an analysis of the amount of coverage the target journal articles provide for the topics (and higher-level nodes) in the taxonomy.
3. A suitable 'IT-relatedness' classification scheme (an 'IS conceptual net') and an analysis of how the target journal articles cover the various components of the conceptual net.
4. A mapping of the taxonomy topics to their related management issues and analyses of:
 - the level of coverage the articles provide for each issue.
 - the distribution of the score values of the issue-related articles between the different journal categories, journals, and publication years.
 - the relationship between the annual rank orders of the management issues and the annual rank orders of the issue-related article topic scores.

Note. In order to carry out these analyses some means of measuring the level of topic coverage provided by the journal articles is required. In this chapter we refer to these measures as 'counts' and 'scores'. More precise definitions of these terms, how their values are derived, and how they are used in the analysis are given in Chapters 4 (Research Method), 6 (Journal Article Classification), and 7 (Analysis of Journal Article Classification Data).

THE RESEARCH QUESTIONS

The Primary Research Question

The primary research question arises from the primary aim of the research and is:

“Are the topics published in IS journal articles related to the key issues reported to be of concern to IS managers and, if so, how are they related?”

This primary research question can be decomposed into a number of component questions – as explained below.

Component Research Questions and Secondary Research Questions

There are three groups of component questions and one group of secondary research questions. These groups are as follows.

1. The identification and analysis of the management issues group.
2. The IS topic taxonomy, article classification, and topic score analysis group.
3. The IS conceptual net coverage group.
4. The issue to topic mapping and relationship analysis group.

The first two groups arise from the pre-requisite of the research. The next group is concerned with the secondary research aim of determining what proportions of the target journal articles were investigating closely IT-related phenomena. The last group is concerned with the more detailed facets of the primary research question.

The specific research questions contained in each of these four groups are listed below.

1. Identification and analysis of the management issues

- 1.1. What key issues are reported to be of concern to IS managers (i.e. what are the issues)?
- 1.2. Are there any significant time-based trends in the issue rankings or any significant differences in the US and European rankings or trends.
- 1.3. What is the relative overall importance and duration of each of the issues?

2. IS topic taxonomy, article classification, and topic score analysis

- 2.1. What topics make up the IS discipline (i.e. what is a suitable taxonomy for classifying the topics covered by the journal articles)?
- 2.2. What topics are covered by each of the journal articles?
- 2.3. What level of coverage do the articles provide for each topic (i.e. what are the overall topic counts, topic scores, and rankings)?
- 2.4. Are there any significant time-based trends in the topic scores and rankings or any significant differences between the target journals' or journal categories' topic scores and rankings.

3. IS conceptual net coverage

- 3.1. How can the 'IT-relatedness' of IS research be conceptualised and classified (i.e. what is the conceptual net of IS research)?
- 3.2. What level of coverage do the articles provide for the different components of the conceptual net?

4. Issue to topic mapping and relationship analysis

- 4.1. Which of the topics are related to the specific issues (i.e. what are the issue-related topics)?
- 4.2. What level of coverage do the issue-related topics provide for each issue (i.e. what are the total scores of the issue-related articles for each issue)?
- 4.3. How are the values of the issue-related articles distributed between the different journals and publication years?
- 4.4. Is there any relationship between the rank order of the score values of the various groups of issue-related articles and the rank order of the management issues to which they relate (e.g. do the higher ranked management issues have higher issue-related article topic scores)?
- 4.5. Are there any noticeable relationships between the annual changes in the ranking of the issues and the annual changes in the values of their related articles (i.e. do the annual issue rankings provide lead, immediate, or lag indications of the number of issue-related articles published in the journals)?
- 4.6. Are there any significant differences in the degree of coverage the different categories of journal (US-published academic, European-published academic, and Practitioner) provide for each of the management issues.

SIGNIFICANCE AND CONTRIBUTION OF THE RESEARCH

Contribution to the IS Research Relevance Debate

The debate on relevance in IS research is not a new phenomenon (Keen, 1991). In the mid-1990s Galliers concluded that

“It does appear that we Information Systems researchers are pursuing somewhat different agendas than those of our colleagues in practice” and argued that “in an applied discipline, such as IS it is important that we undertake research that is seen to relevant by our colleagues in industry, government and commerce as well as sufficiently scholarly by our colleagues in academia.”

(Galliers, 1994a)

During the last few years the relevance debate appears to have received an increasing amount of attention within the academic community.

Benbasat and Zmud’s assertion, in their 1999 MISQ paper, that most contemporary IS academic research lacks relevance to practice (Benbasat & Zmud, 1999) quickly received a number of responses from leading IS researchers. One of the respondents was the then Editor-in Chief of MISQ, Allen Lee.

One of Lee’s specific criticisms of Benbasat and Zmud's paper follows.

“... consider Benbasat and Zmud's statement, ‘one tends today to observe a lack of relevance to practice in IS research’; my reaction is that:

a survey, field study, documentary analysis, or other rigorous empirical study must be done to procure evidence for this statement (where, of course, the result of the empirical study could even be that IS research is relevant to IS practice). However, until these empirical studies are done, the extent to which IS research is relevant to IS practice remains, objectively speaking, unknown”.

(Lee, 1999b)

The primary aim of the proposed research is to determine if IS journal article topics are related to IS IS practitioners’ key concerns. This should make a significant contribution to the debate on the relevance of IS research publications.

Contribution to the 'IS Field Core Properties' Debate

The second group of component research questions is concerned with 'The IS topic taxonomy, article classification, and topic score analyses'. Answering this group of questions contributes to the debate by identifying what IS phenomena actually are researched and to what level they are researched.

A secondary aim of the research is to determine what proportions of the target journal articles were investigating closely and distantly IT-related phenomena. Fulfilment of this aim contributes to the debate by analysing the level of 'IT-relatedness' of the phenomena that actually are researched.

The Wider Implications of the Relevance Debate

Implications for the funding of university research in Australia

Amaravadi summed up the wider implications of the IS relevance debate when he stated:

“The problem of relevance exists in the perceptions of the larger community and echoed in the comments of numerous participants of the debate and beyond (Benbasat and Zmud, 1999; Lee, 1999). The stakes are high regardless of the degree of the problem since public perception can eventually turn into public policy and, indirectly, affect research funding and teaching loads.”

(Amaravadi, 2001)

In Australia a significant amount of funds is spent on research conducted by universities. In 1998 the total research and experimental development expenditure by Australia's thirty-seven universities was just over \$2.6 billion (DETYA, 2000a). This was more than the total amount spent on university academic staff salaries (\$2.2 billion) in 2000 (DEST, 2002a) and more than twice the total 1999/2000 R&D expenditure (\$1.1 billion) of Australia's twenty-seven biggest R&D spending companies (Ferguson, 2000). Most of the funding for university research comes either directly or indirectly from the taxpayer (DEST, 2002a).

According to Kemp, Australia is a mid-ranked (12th. out of 24 nations surveyed) performer in terms of total expenditure on R&D but differs from other nations in that it has a relatively high level of R&D expenditure in government research organisations and universities and a comparatively low level of business expenditure on R&D. In 1999 Australia ranked 3rd. highest out of the 24 nations surveyed in terms of the ratio of public R&D expenditure to GDP. (Kemp, 1999, Ch. 1).

Kemp also points out that Australia has lagged significantly in turning the findings of its publicly funded basic research into economic advantage through business and trade. One of the recommendations, made by Kemp, to remedy this situation was to expand the current 'peer' review process that is used to determine the allocation of competitive research grants to include a 'user' assessment element. 'Users' should be involved in the assessment of potential short-term and longer-term benefits to national economic growth, as well as social and cultural development. (Kemp, 1999, Ch. 17).

As part of its ongoing higher education review process the Australian Government's Department of Education Science and Technology (DEST) has published a number of discussion papers and reports that cover the role and funding of university research. These have included the 'Higher education at the crossroads' discussion paper which put forward the idea that the Government could designate and resource just a small number of universities for research. The paper also suggested that other universities could be funded to reorganise and reorient toward meeting other needs such as providing high quality undergraduate teaching, professional development, industry partnership and so on (DEST, 2002).

Other published studies include the Australian Government's 'Productivity Commission' study which looked into international comparisons of the resourcing of universities and the management of those resources - including the distribution of funds within universities to teaching, research and other activities. (Nelson & Campbell, 2002).

The above observations, on the wider implications of the relevance of university research (and universities in general) in Australia, lend support to Amaravadi's assertion that:

“The problem of relevance exists in the perceptions of the larger community and echoed in the comments of numerous participants of the debate and beyond. The stakes are high regardless of the degree of the problem since public perception can eventually turn into public policy and, indirectly, affect research funding and teaching loads.” (Amaravadi, 2001)

In an age of economic rationalism it is maybe not surprising that the Australian Government, the major provider of university funding, should be directing its attention to how universities’ activities, including research, contribute short-term and longer-term benefits to national economic growth.

Implications for IS researchers

The Association for Information Systems (AIS) is currently conducting a major study of “The State of the IS Academic Discipline” (AIS, 2005). By the end of Q3 of 2004 more than 1200 issues had been obtained from IS researchers in response to the survey question “What are the major issues that you face as an Information Systems Researcher?”

The AIS researchers have summarised and synthesised these issues to produce a list of fifty-six issues which are being used in the second round of the survey – which asks respondents to indicate how strongly they rate the importance of each issue. Five of these issues (numbers 9, 17, 24, 38, and 39) are concerned with the relevance of IS research and its relationship with practice and three (numbers 28, 34 and 47) are concerned with the low level of recognition that those outside the IS domain place on IS research.

In summary, the initial results of the AIS survey show that IS researchers themselves continue to believe that the relevance of IS research and its relationship with practice are two major issues they face. They are also concerned about how IS research is perceived by the outside world.

CHAPTER SUMMARY

This chapter has outlined the aims and objectives of the research and defined its scope in terms of the specific research questions it attempts to answer. We have tried to justify the research by showing that the issue of the relevance of IS research to practitioners' concerns is worthy of study. In particular we pointed to Lee's statement that:

” ...until these empirical studies are done, the extent to which IS research is relevant to IS practice remains, objectively speaking, unknown”.

(Lee, 1999b)

The primary aim of this research is to determine to what extent IS journal article topics are related to IS practitioners' key concerns. This should make a significant contribution to determining the extent to which IS research is relevant to IS practice.

In the next chapter we will review the major studies that have already been conducted in related areas and point out the unique nature of the contribution to be made by this thesis.

Chapter 3

LITERATURE REVIEW

CHAPTER INTRODUCTION

Chapter purpose

The purpose of this literature review is four-fold:

1. to provide preliminary working explanations of the key basic concepts (the IS discipline, research, and relevance) that underlie the research topic.
2. to identify and briefly review the major studies that have already been conducted in areas that are related to the area covered by this thesis.
3. to review the one previous study that is similar to this research and point out the major differences between the two.
4. to provide reasonable evidence that no other doctoral dissertations, similar to this thesis, have already been published.

The main issues and concepts (and supporting literature) introduced in this chapter are given a more thorough examination in the subsequent chapters¹ of this thesis.

¹ In particular the following major issues and concepts are examined in subsequent chapters:

- IS Managers' key issue survey - particularly the Computer Sciences Corporation (CSC) surveys. (Ch. 5)
- Ontology theory and the development of ontologies and taxonomies (Ch. 6)
- The 'IS Conceptual Net' (derived from Benbasat & Zmud's 'Nomological Net') and the 'missing IT artefact' issue (Ch. 7).

Chapter contents

This chapter contains the following five main parts

1. The Information Systems (IS) Discipline
2. What is Research and what Role do Academic Publications Play?
3. The IS Research Relevance Issue
4. Prior Related Studies
5. Search for Similar Doctoral Dissertations

The first part aims to provide some support from the literature for how this thesis views the scope and focus of the IS discipline. It goes on to argue that IS is an ‘applied’ discipline and one might therefore expect the majority of IS research to be ‘applied research’ as opposed to ‘pure’ or ‘basic research’. This part also introduces the recent academic debate about the role of IT in IS research.

The next part briefly distinguishes between applied research and basic research and then goes on to discuss how refereed academic journals provide the primary means of publishing publicly verifiable research outcomes.

The ‘IS Research Relevance Issue’ part provides some evidence to justify why we assume that (at least some) IS journal article should address the concerns of IS practitioners. It then goes on to address some of the research relevance issues raised in the literature. These include ‘what is relevant research?’ and ‘to whom should IS research be relevant?’.

The next part examines the literature produced by the major studies conducted in areas that are related to the area covered by this thesis. These related areas include key IS management issue surveys and a variety of journal article analysis studies. The last section in this part presents a review of the one previous study that was quite similar to this research and points out the major differences between the two.

The last part briefly explains the steps that were taken to determine if any other doctoral dissertations, similar to this thesis, had already been published.

THE INFORMATION SYSTEMS (IS) DISCIPLINE

The Origins of the IS Discipline

Although there is still no universal consensus on the definition of terms such as; 'management information system', 'information processing system', and 'information system' most would agree that the terms generally refer to computer-based information processing systems which support the operations, management, and decision-making functions of an organisation as defined by Davies and Olson (Davies & Olson, 1984) more than twenty years ago.

One could argue that the academic discipline of IS was born in the in the early 1950's when the relatively 'new' digital computer systems started to be used for the automation of business administration processes. During the 1950's practitioners and academics started to study, and attempted to predict, the organisational impact of these emergent uses of the 'new' technology. MIS-type articles started to appear in the practitioner journals, including the HBR, in the early 1950's. Haig cites a number of these early publications (Ackoff, 1955; Blank, 1955; Haslett, 1950, 1951; Hurni, 1955; Laubach & Thompson, 1955; Ross, 1956; Wallace, 1956; Worthington, 1953) in his paper "The Chromium-Plated Tabulator: Institutionalizing an Electronic Revolution, 1954–1958" (Haig, 2001).

Arguably, the 1950's paper that had the most impact on the growth of the new MIS discipline was Leavitt and Whisler's "Management in the 1980s" article that appeared in the HBR in the late 1950's (Leavitt & Whisler, 1958). Their paper directly addressed the issue of the likely organisational impact and effects of the increasing business use of new computer technology - which they labelled 'information technology'. They argued that computer-based MIS would lead to a reduction in the proportion of middle managers in organisations because their data collection, analysis and summarisation functions would become taken over by the new computer-based systems. They also predicted that the reduced need for middle-managers combined with the increasing use of computer-based MIS by top managers would lead to organisation structures changing from their traditional triangular shape to more of an 'hourglass' shape.

Information Systems (IS) as an Applied Discipline

Leavitt and Whisler's legacy can be seen in Alan Lee's 1999 MISQ "Inaugural Editor's Comments", where he persuasively argued that the focus of the study of MIS should not just consist of a study of the technology (hardware, software, data, networks) nor should it just consist of a study of the of the organisational setting (people, business processes, politics, economics, psychology, culture, organisation, and management). Instead, he argued, the study of MIS should focus on "*the rich phenomena that emerge whenever the technological and the social come into contact with, react to, and transform each other.*" He points out that technology disciplines, such as computer science and engineering, are already making excellent contributions to our understanding of the technology whilst the social sciences are making excellent contributions to our understanding of the social setting. He explains that it is essential to focus on this area of intersection in order to make MIS research distinct and thus enable it to prosper as an academic field or discipline. (Lee, 1999)

If one agrees (as does the author of this thesis) with Lee's idea that the focus of the MIS discipline lies at the intersection of, or interaction between, ICT (information and communications technology) and its organisational impact and effects, then the discipline of MIS was born around half a century ago. Similarly, if one agrees that the focus of the MIS discipline should be on the interaction between ICT and the organisation then one could argue that the discipline should primarily be concerned with the application of ICT within the organisational (or social, economic, etc.) context. If one agrees with this argument then MIS is very much an 'applied' discipline and one might expect the majority of IS research to be 'applied' research as opposed to 'pure' or 'basic research'.

The Role of IT within IS Research

If the Information Systems (IS) discipline is primarily concerned with the application of Information Technology (IT) within the organisational context one might expect a substantial proportion of IS research to be concerned with phenomena that are closely associated with IT-based systems. One might also expect that such research would pay some attention to the IT artefacts (application systems, networks, etc.) that were the cause, or result, of the phenomena being studied. Recently, however, there has been some academic debate about the role of IT in IS research. This recent debate was

probably initiated when Orlikowski and Iacono raised the issue of the lack of IT coverage in IS research in their paper “Desperately seeking ‘IT’ in IT research - A call to theorizing the IT artefact” (Orlikowski & Iacono, 2001). Benbasat and Zmud expressed similar concerns in their “The Identity Crisis within the IS Discipline: Defining and Communicating the Discipline's Core Properties” paper when they wrote:

“... the IS research community is making the discipline’s central identity even more ambiguous by, all too frequently, under-investigating phenomena intimately associated with IT-based systems and over-investigating phenomena distantly associated with IT-based systems.”

(Benbasat & Zmud, 2003, p.184)

(We examine this issue further in the ‘Missing Topics’ and ‘Top 30 Nodes IS Conceptual Net Component Coverage’ sections of Chapter 7 ‘Analysis of Journal Article Classification Data’).

WHAT IS RESEARCH AND WHAT ROLE DO ACADEMIC PUBLICATIONS PLAY?

What is Research?

The US National Science Foundation (NSF) defines 'applied research' as:

“research directed toward gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met”

This definition can be contrasted with their definition of 'basic research' which is defined as:

“research directed toward increases in knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific application toward processes or products in mind”.

(Payson, 1999, Appendix A: Technical Notes: Definitions for Classification and Measurement)

Within the Australian higher education sector the Department of Education Training and Youth Affairs (DETYA, 2001) accepted the following definition of Research and Experimental Development (R&D):

“Research and experimental development comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.”

(DETYA attributes this definition to the OECD)

What Role do Academic Publications Play?

DETYA qualifies the above definition of research by stating that:

“The essential characteristic of research activity is that it leads to publicly verifiable outcomes which are open to peer appraisal”.

In Australia, most of a university’s research funding comes directly from Government sources in the form of block grants or indirectly via competitive bids made to Government funded research councils such as the Australian Research Council (ARC).

There are three main determinants of the amount of the block grant allocated to a particular university.

1. number of research student places and completions;
2. research related income; and
3. research outputs

The ‘research outputs’ component is determined almost completely by the number of refereed journal and conference papers published by the university. In 2000, about 90% of the ‘research outputs’ points were derived from refereed journal and conference proceeding papers (DEST, 2001, Figure 23 on page 16). In general anything that is published in a refereed academic journal or refereed conference proceedings is regarded as a ‘research output’.

The major part of most universities’ ‘research related income’ comes from Government funded bodies such as the Australian Research Council (ARC). Although, the ARC takes into account many factors when deciding whether or not to fund a particular research proposal it often places considerable weight on the previous publications track record of the applicant(s). In 1998 the Australian Academy of Technological Sciences and Engineering recommended to the ARC that when evaluating IT research proposals it:

‘should take into account other research contributions besides published papers...’.

(AATSE, 1998, Recommendation 3, page xx)

In summary, within the Australian universities context, peer reviewed academic publications are regarded as an important measure of previous research activity. They are also an important determinant of future research income.

THE IS RESEARCH RELEVANCE ISSUE

Why 'Assume' that IS Journal Articles Should Address the Concerns of IS Practitioners?

If one agrees that IS is an applied discipline and that the majority of IS research should be applied research then one might expect that the research would be directed toward *“gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met”* (Payson, 1999). One might also assume that the specific needs being addressed would include those of the people primarily concerned with applying ICT in an organisational context - IS managers and practitioners. One would not expect that IS research should solely be concerned with the needs of other academics, the needs of students, or even society as a whole.

The content of the mission statements and/or instructions to authors of all the journals used in this study support the assumptions made in the previous paragraph. All the journals state clearly that the articles they publish should address the concerns of managers and/or practitioners. None of the journals state that the articles they publish are to be only read by, or only contributed to, by 'academics'. Appendix 3.1 'Extracts of Journal Mission Statements, Instructions to Authors, Etc.' contains the extracts from the journals and/or their web sites in which those statements are made.

However, it is interesting to note that only seven, out of the more than 280, editorial board members shown on the academic¹ journals' web sites (in March 2005) were listed without current affiliations to academic institutions. Only three of these seven appeared to have affiliations to specific non-academic enterprises.

The IS Research Relevance Debate

Although the debate on relevance in IS research is not a new phenomenon it has received an increasing amount of attention, within the academic community, during the last few years.

In 1999 Benbasat and Zmud, both former Editors-in-Chief of MISQ published an article in MISQ titled “Empirical research in information systems: The practice of relevance” (Benbasat & Zmud, 1999). Their article, which asserted that most contemporary IS academic research lacks relevance to practice, quickly received responses from leading IS researchers (Davenport & Markus, 1999; Lyytinen, 1999) and the Editor-in-Chief of MISQ (Lee, 1999b).

At the start of 2001 more than 30 people posted messages to an ISWorld discussion group as a result of Deepak Khazanchi posting seven responses he received to a November 2000 ISWorld inquiry on the relevance of IS research to industry. As a result of the intensity of the debate the CAIS (Communications of the Association for Information Systems) published a special volume on ‘Relevance’ in March 2001 (Gray, 2001).

Because the topic of IS research relevance was receiving increasing attention from the IS research community a panel discussion was held on the issue at the 2001 ICIS - International Conference on Information Systems - (Kock et al., 2002).

Benbasat & Zmud’s article asserted that, and explained why, most published contemporary IS academic research lacks relevance to practice. They went on to provide a number of guidelines that the IS academic community might follow in their research efforts and articles to introduce relevance to practitioners. They made it clear that their views regarding the need for increased relevancy did not imply that research should be carried out in a less rigorous (i.e. correctly using appropriate research and analysis methods) manner. They did not appear to suggest or imply (to the author of this proposal) that all IS research should be relevant solely to the IS practitioner.

¹ The two practitioner journals (HBR and SMR) did not list their editorial board members on their web sites.

Davenport and Markus's response (Davenport & Markus, 1999) to Benbasat and Zmud expressed strong agreement with their view that IS research must become more relevant. Davenport and Markus went on to say that they saw the goal of research relevance as critical to the long-term survival and success of the field. However, they stated that they disagreed with Benbasat and Zmud's view that IS research could be made more relevant without fundamentally challenging core academic values around research rigour, publication outlets and audiences, and "*the perils of consulting*". They stated that they believed that Benbasat and Zmud had not gone far enough with their recommendations and that "*far deeper changes in the research enterprise are required.*" They also stated that some of the types of research, such as research syntheses and critical essays, reported to be of interest to practitioners, as well as other practical research models (such as evaluation research and policy research), that are widely accepted in other fields, do not fit current definitions of acceptable IS research. Consequently they are difficult to get published in IS academic journals. They go on to suggest that:

"We would do better to emulate colleagues in medicine and law rather than those in other business school fields on the grounds that most medical school faculty also have clinical practices and that in medicine and law, practitioners actually read academic journals".

Following on from the argument that research needs to be read by practitioners they say:

"To us, the solution is clear: not only must IS academics focus on publishing readable applied theory research in academic journals, we must also support outlets that practitioners read and that publish the research they value such as SMR (..which has over four times the circulation of MISQ, ... is peer-reviewed and it publishes IT-related articles in almost every issue)".

Allen Lee's response (Lee, 1999b) to both Benbasat & Zmud and Davenport & Markus argues that IS researchers should consider conducting inquiry not only in the manner of the natural sciences (as Lee states Benbasat & Zmud were recommending on the grounds of their "*self-avowed positivist orientation*"), but also in other ways, such as the manner of the professions (as recommended by Davenport & Markus). Lee goes on to

point out that there are often circumstances in which one of the responsibilities of academics is to be the conscience for practitioner colleagues, and indeed, for society in general, and explains how research in the area of critical social theory can be relevant in this wider context. Lee asserts that Benbasat and Zmud's prescribed guidelines represent only one way, restricted to the instrumental model of practice context, by which relevance can be achieved.

What is 'Relevant' Research and to Whom Should it be Relevant?

Benbasat and Zmud argued that research that is relevant to practice is what managers find to be interesting and important – such as “*articles that address enduring (or current) organizational problems, challenges, and dilemmas as well as articles that address timely business issues*”. They also argued that practitioners are unlikely to view an article as being of interest unless the article’s implications are “*prescribed in a manner that could be put to use (to some extent) in practice to exploit an opportunity or to resolve a problem*”.

Lee’s response (Lee, 1999b) argued that relevance to other stakeholder groups, such as society in general, in addition to relevance to practitioners, was also valuable. This is a fairly common theme in the relevance debate (Bhattacharjee, 2001; Cresswell, 2001; Dalal, 2001; Dennis, 2001; Khazanchi & Munkvold, 2001; Mathieson & Ryan, 2001).

When discussing the relevance of research from this broader perspective clearly the following questions arise:

- To whom (which stakeholder group(s)) should research be relevant?
- In what time frame should the research be relevant?
- For how long should the research be relevant?

Khazanchi & Munkvold suggest that a discussion of relevance also needs to take into account the “*situatedness*” of IS research findings. To them “*situatedness*” includes factors such as how the relevance may be seen differently in different industries or in

different regions of the world, as well as whether the nature of the implications of the research can be seen to be general or contextually embedded.

Stakeholder groups

Khazanchi & Munkvold provide the following list of the potential stakeholders of IS to illustrate how the potential value and character of relevance can vary considerably with the nature of the targeted audience/stakeholder group(s), and how it is possible to identify different areas of IS research that are relevant to the different groups.

- Practitioners
- Scholars
- Educators
- Users
- Politicians
- Economists
- Citizens
- Society
- Nation
- Global

(Khazanchi & Munkvold, 2001)

Clearly, the composition of any of the above stakeholder groups is not likely to be homogenous. Arguably, even the practitioner group will be comprised of different sub-groups and individuals with quite different interests.

Relevance time frame

Even the Oxford English Dictionary is rather ambiguous on this! It defines relevancy as follows:

“...pertinency to important current issues (as education to one's later career, etc.); social or vocational relevancy”.

(OED, 1989)

As mentioned earlier, research can be classified as either ‘basic’ (pure) research or ‘applied’ (technological) research (Payson, 1999). In practice, however, these terms only provide a blurred distinction between the motivations of researchers and the manner in which inquiries are conducted. The terms do not indicate the precise differences between scientific and technological research – probably because there isn’t

a precise difference. Is the exploratory research into basic technological phenomena, such as nanotechnology, that can be used in a variety of products an example of basic research or an example of applied research? If nanotechnology research is applied research today was it applied research or pure research in the 1940s and 1950s when von Neumann was publishing work on self-replicating machines?

Kock argues that even though relevance is commonly equated with direct IS applicability of research results, often the theoretical foundations on which such research builds are seen as almost irrelevant when published. He provides the example of George Boole's development of modern symbolic logic (Boolean algebra), from mathematics "*where similar debates on research relevance rage*". When developed in the mid-1800s Boole's algebra hardly qualified as contributing to anyone's practical needs. However, more than a century later it provides the foundation on which virtually all digital circuits are designed and without which computers would not exist (nor indeed would the field of IS). Kock also provides an example "*that is closer to home ...the discovery of relational databases that was at first ridiculed as a theoretical toy*".

One may argue with the relevance of Kock's example of Boole who was conducting basic research in a 'pure' discipline and not conducting applied research in an applied discipline such as IS. One may also question Kock's assertion that Codd's early ideas on relational databases (Codd, 1970) were 'ridiculed'. Initially, the top management of his company (IBM) were unenthusiastic because they were attempting to protect their established and lucrative IMS revenue stream. Some of the proponents of the CODASYL model, particularly Charles Bachman of GE, also initially expressed their reservations. However, Codd continued with his work on relational databases at IBM and developed the System R prototype. IBM released SQL/DS in 1981 and DB2 in 1983. The System R version of SQL formed the basis of the first ANSI (X3.135) SQL standard in 1986.

Kock concluded that:

"The lesson here is that contemporaries, be they practitioners or researchers, may not be in a good position to judge the relevance of research that may find great practical applications in the future".

(Kock et al., 2002)

Most would agree that this conclusion is valid for pure research. However, it is arguably less valid for applied research.

Summary of literature on “what is ‘relevant’ research and to whom should it be relevant?”

Much of the academic literature argues that there are other audiences, in addition to practitioners, to whom IS researchers could justifiably address their research. However, none of it argues that IS practitioners and managers are not a valid audience.

Regarding the issue of the time frame in which the research should be relevant and for how long it should be relevant the situation appears rather more complicated. If we agree that IS research should be applied research and also accept the NSF’s definition of applied research (“*research directed toward gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met*”) then we would probably agree with Benbasat and Zmud’s view that IS research should address “*timely*”, “*current*”, or “*enduring*” issues or needs.

If we agree that IS research should address timely and current issues as well as enduring issues it follows that relevance could be somewhat transient in nature. What is considered highly relevant in some time frame may after a while be regarded as less relevant or even of no relevance at a later time. As the speed of technological development in the IS field continues to increase the time frame for the relevance of specific technological issues continues to shrink.

PRIOR RELATED STUDIES

Prior Key IS Management Issue Surveys

Over the last two decades several IS journals have published the results of various 'key IS management issue' surveys. MIS Quarterly published SIM (Society of Information Managers in the US) key issue survey studies every three to five years during the period 1982 to 1996 (Ball, 1982; Brancheau, Janz, & Wetherbe, 1996; Brancheau & Wetherbe, 1987; Dickson, Leitheiser, Nechis, & Wetherbe, 1984).

Following on from the U.S. studies, researchers have conducted similar studies both internationally (Gottschalk, 2000b; Gottschalk, Watson, & Christensen, 2000a; Palvia, Palvia, & Whitworth, 2002; Watson & Brancheau, 1991) and in other parts of the world, for example: UK (Galliers, Merali, & Spearing, 1994b); Canada (Carey, 1992); Australia (Pervan, 1998; Watson, 1989); Hong Kong (Burn, Saxena, Ma, & Cheung, 1993; Ma, 2000; Moore, 1996); India (Palvia & Palvia, 1992); Singapore (Rao, Huff, & Davies, 1987); Taiwan (Palvia & Wang, 1995; Yang, 1996); Thailand (Pimchangthong, Plaisent, & Prosper, 2003); and Central America (Mata & Fuerst, 1997). Similar studies have also been carried out in more restricted domains. For example, Chang et al. have published a number of articles examining key ERP lifecycle issues in the Queensland government.

Some of these studies have used variants of the Delphi survey approach used in the US SIM studies. For example, Chang et al. argue strongly that the Delphi approach is particularly suitable for such studies (Chang & Gable, 2000). However, other authors have argued that most of the Delphi-based key issues surveys lacked a sound theoretical basis for the initial selection of key issues (Watson, 1997). Other researchers have used other key issue selection and survey analysis methods in an attempt to overcome these criticisms. For example, Gottschalk et al. used a three step procedure for the initial selection of key issues and Q-sort techniques for analysing their survey results (Gottschalk et al., 2000a).

Industry and consultancy groups have also undertaken similar studies. For example, Computer Sciences Corporation (CSC) has been publishing the results of its annual

survey of critical issues of IS management since 1988 and published its fourteenth annual 'Critical Issues of IS Management' report in 2002. (Computer-Sciences-Corporation, 2002). This was the last, and final, Critical Issues survey to be published by CSC.

CSC maintained that their top ten critical issues list and other insights are frequently quoted in publications and journals around the globe.

The publishers and authors of these key issue surveys sometimes claim that their reports are important because professional bodies (such as SIM), as well as IS vendors, consultants, educators, and researchers all need to be aware of IS executives' key concerns to serve their markets effectively (Brancheau et al., 1996; Niederman, 1991).

Prior Journal Article Analysis Studies

There have been a number of studies carried out that have surveyed the content of academic articles in IS and related academic disciplines (e.g. software engineering, computing, management, etc.). These studies have analysed the survey data in a number of different ways including research approach and topic analysis.

Research approach and theories in use studies

A number of studies (McBride & Rademacher, 1992; Vogel & Wetherbe, 1985) have investigated the research approaches and methods adopted by the authors of IS journal articles. Rademacher's more recent study (Rademacher, 2001) followed in this tradition and investigated the research methods used by IS researchers in four leading IS journals during the five-year period from 1995 to 2000. The primary goal of Rademacher's research was to determine which research methods were utilised and whether IS researchers were adapting to the changing needs of academicians and practitioners.

In a related vein the Barkhi and Sheetz study of "The State of Theoretical Diversity in Information Systems" (Barkhi & Sheetz, 2001) primarily investigated the amount of theoretical diversity in IS research. The approach they adopted was to analyse the 278 articles appearing in "Management Information Systems Quarterly" and the "Journal of Management Information Systems", over the five-year period from 1994 to 1998. The analysis consisted of identifying all the different theories referred to in the articles – this

yielded a list of 111 different theories. They then analysed how many times the different articles cited each of the theories identified. This analysis revealed that approximately half of the papers explicitly cited one of the 111 theories identified, whilst thirty of the theories were cited multiple times, representing 55% of the citations. Based upon these results the authors concluded that the amount of theoretical diversity in IS is high (i.e. most papers reference different theories so that many theories are each referenced few times) and that no theory emerged as a potential candidate for the role of grand/unified theory of information systems.

Multiple criteria studies

A number of authors have carried out analyses of IS (and related discipline) journal articles using multiple classification criteria.

Alavi and Carlson: conducted an analysis of a sample of MIS articles published in the 1968-88 period (Alavi & Carlson, 1992). They examined articles from eight leading MIS journals - Communications of the ACM, Data Base, Decision Sciences, Harvard Business Review, Journal of Management Information Systems, Management Science, MIS Quarterly, and Sloan Management Review. Their study analysed the articles in terms of the topics and themes they covered and research strategies used.

Vessey et al: Vessey, Glass and Ramesh have carried out three more recent separate (but related) studies involving multiple criteria analysis of journal articles. One of these studies was concerned with the discipline of information systems (Vessey, Ramesh, & Glass, 2001b)¹, one was concerned with the discipline of software engineering (Glass, Vessey, & Ramesh, 2002), and one was concerned with the discipline of computer science (Ramesh, Glass, & Vessey, 2002)¹. Each of their papers examined the state of published research, in one of the disciplines, from the viewpoint of the following research questions:

¹ As shown in the References section of this thesis these papers were downloaded from the Kelley School of Business (Indiana University) 'Information Systems Technical Reports and Working Papers' web site in 2002. New versions of these two papers have since been published in the academic journals (Ramesh, Glass, & Vessey, 2004; Vessey, Ramesh, & Glass, 2002) as have two other papers that deal with all three areas (Glass, Ramesh, & Vessey, 2004) and the unified classification system (Vessey, Ramesh, & Glass, 2005).

1. What topics do the researchers address?
2. What research approaches do the researchers use?
3. What research methods do the researchers use?
4. On what reference disciplines does the research depend?
5. At what levels of analysis do the researchers conduct research?

Each of the studies involved examining articles published in a number of leading journals, relevant to the particular discipline, over the five-year period from 1995 to 1999. For the IS discipline they examined 488 articles in five IS journals, for the software engineering discipline they examined 369 papers published in six software engineering journals, and for the computer science discipline they examined 628 papers published in 13 computer science journals.

For all three studies they used the same classification system. The classification system they devised comprised five key characteristics (reference discipline, unit of analysis, topic, research approach, and research method) and was based upon a review of prior literature. For the topic analysis they used the eight broad subject topic classifiers shown in Table A3.2.1 (Classification Categories Used in the Vessey, Glass and Ramesh Studies) in Appendix 3.2. Each article was assigned just one subject topic classifier.

There are some major differences between the journal article topic classification scheme used in the Vessey et al study and the classification schemes that were developed for use in this study. This is to be expected as the two taxonomic schemes were designed for different purposes and as Stevens et al point out:

“Not only does the purpose determine the scope and granularity to which the same knowledge is represented in different ontologies, but conceptualisations (of the same domain) may differ without one being incorrect...this simply changes what knowledge is captured or how it is captured, it does not change the knowledge itself.”

(Stevens, Goble, & Bechhofer, 2000)

The taxonomy used in the Vessey study was designed to capture the diversity of topics in IS (and Computer Science and Software Engineering) research. The taxonomies¹ used in this study were designed to:

- reflect the major subject areas of (just) the IS discipline and its research publications over the research period.
- reflect the structure of the IS discipline in the full taxonomy and the structure of the published literature in the final taxonomy.
- create a schema that allowed the IS topics covered in the IS journal articles to be classified in a comprehensive and coherent manner which is mappable to the management key issues in the key issue surveys.

The topic classification schemes used in this research have much finer granularity than the scheme used by Vessey et al. Another difference is that each article can be allocated up to three (weighted) topic classification codes².

Prior Similar Studies

Comparison of journal article topic counts and key issue rankings

As far as the author of this thesis can ascertain the only similar (involving a comparison of journal article topic counts and key issue rankings) prior study is Palvia and Basu's paper on "Information systems management issues: Reporting and Relevance" (Palvia, 1999). Palvia and Basu were concerned that some of the claims of the key issue survey authors, (particularly that they provide "*fruitful avenues of inquiry to MIS researchers*") had not been empirically verified. They raised two particular concerns regarding the utility of such studies – reporting and relevance.

Their first, but most minor, reporting concern was that there were possible overlaps and relationships between the supposedly different key issues that were being ranked and reported upon. It is possible that two or more of the supposedly different key issues are

¹ Chapter 6 (Journal Article Classification) explains how the three taxonomies and underlying ontology used in this thesis were developed.

² Full details of the development of the classification schemes and their usage are given in Chapter 6: Journal Article Classification.

actually different aspects of a higher order construct. For example, key issues that are reported upon separately, such as ‘software development’ and ‘CASE technology’, may both be related aspects of an underlying construct such as ‘software development processes’. Palvia pointed out that if the reporting (and ranking) of such key issues is made independently of their underlying constructs, then it is possible that the results will be “*distorted and misleading*”. If supposedly independent issues a_1 , a_2 , a_3 , a_4 , a_5 , and a_6 , which are actually all related aspects of an unreported higher order construct A, are individually reported as being of only moderate importance whereas issue B is reported as being of very high importance then it is possible that researchers may be misled into believing that B is more worthy of research effort than the unreported higher order construct A.

Palvia and Basu suggested that this apparent anomaly could be corrected by treating the originally reported issues as items that measure underlying constructs, establishing the constructs, and then reporting the results for the constructs. They went on to demonstrate this procedure using the original data from the 1989 SIM survey (reported in Niederman, 1991). The procedure involved developing an a priori model, based on “*prior literature, a careful reading of the items, logical reasoning, and the authors’ knowledge and experience*”, of 10 factors underlying the 20 key issues reported on by Niederman et al. After testing the model using confirmatory analysis Palvia and Basu concluded that the model was “*fairly good, properly justified, and a good first attempt*” whilst acknowledging that “*improvements in the model may be possible*”.

Their second, and most important, concern about the of key issue surveys was their usefulness or relevance. They were concerned about two aspects of this issue;

1. Is the information presented in these studies "new" or is it already available in the IS literature?
2. Does the ranking of the key issues identified in the studies act as a predictor of the issues to appear in future IS publications? (As “*the output of educators, researchers, IS management, and to some degree consultants, is reflected in IS publications*”).

The general approach taken to answering both questions involved comparing the ranking of the key issues reported in the 1989 SIM survey (Niederman, 1991) with the

ranking of the frequency of occurrence of journal articles that addressed those key issues. In order to obtain the journal article topic rankings Palvia and Basu analysed the abstracts of the articles published in nine leading MIS journals during the period from the beginning of 1989 to the end of 1994. Each article was allocated from one to three keywords to denote the key issue topic(s) it related to.

In order to ascertain if readily available IS publications could be analysed to provide the same '1989 key issue' information that was published by Neiderman et al in 1991 Palvia and Basu used the key issue topic counts of journal articles published during the period 1989 to 1991 - because these articles were already available before the 1989 SIM survey results were published. Their analysis revealed that about 50% of the top ten critical issues identified in the 1989 SIM survey could have been identified by analysis of the IS literature whereas about 50% would not have been revealed. Palvia and Basu concluded that there was no unequivocal answer to the question about whether or not the information presented in the key issue studies was "new" or already available in the IS literature.

To test the second of these aspects of relevance (i.e. does the ranking of the key issues identified in the studies act as a predictor of the issues to appear in future IS publications?) they compared the issue topic counts of articles published between 1992 and 1994 (three to five years from 1989) to see if they reflected the rankings of the key issues reported for the 1989 SIM survey. They asserted that if they did not, "*then either the predictions were inaccurate or future authors were not paying attention to the key issues. In either case, the purpose of the key-issue studies is defeated.*" It is very difficult to understand the logic behind Palvia and Basu's assertion about the purpose of the studies being defeated. It is much easier to understand the explanation of the usefulness of the surveys as given by their authors.

"For IS executives and general managers, the key issue framework suggests some general directions for emphasis and provides a coarse measure for benchmarking their own concerns against those of their peers. The results of this study also impact educational missions in teaching and research to the extent that they need to be sensitive to the views of practicing IS executives."

(Brancheau et al., 1996)

However, Palvia and Basu's analysis revealed that the top-15 issues in these 1992-94 publications included only six of the top-10 SIM survey issues reported by Niederman (whereas the top-15 issues from 1989-91 publications contained eight of the top-10 SIM survey issues). Palvia and Basu noted that since the survey key issues are claimed to be predictive in nature, one would have expected a greater level of commonality with the 1992-94 publications – their analysis revealed that the opposite was true.

Palvia and Basu concluded that it appeared that the SIM survey of key IS management issues represented more of the issues that were prevalent in the journals at the time and less of the issues that were to be published in the future. *“In other words, they cannot be relied upon as being leading indicators of key IS issues. At best, they are current indicators. At the other extreme, in some cases, they may even be lagging indicators”*.

Differences between the Palvia & Basu study and this study

Journal article dates: The Palvia study analysed articles published between the beginning of 1989 to the end of 1994. This study analysed articles published between the beginning of 1995 and the end of 2001.

Journal article content classification method: the Palvia study used a single-level topic classification scheme based purely upon the twenty-five 1989 SIM survey key issue topics (plus two others - artificial intelligence and expert systems). This study does not assume that the majority of journal articles will map directly to the managers' key issues and therefore uses a quite different, and hierarchical, classification scheme. The nodes in the classification scheme are subsequently mapped to the key issues (many of which exhibit semantic overlap).

Practitioners' key issue data: The Palvia study used the results of a single survey - the 1989 SIM survey published in 1991 (Niederman, 1991). This study uses the results of seven (1995 to 2001) of the annual Computer Sciences Corporation key issue surveys (Computer-Sciences-Corporation, 2002). Reference is also made to the 1994/95 SIM survey published in 1996 (Brancheau et al., 1996).

Lag and lead analysis: The Palvia analysis indicated that the SIM key issues were not good predictors of future journal article content and suggested that there was *“anecdotal evidence of the "lagging" nature of the key issues”*. Due to the fact that the

Palvia study did not analyse the content of journal articles published prior to the target SIM survey no evidence could be produced to support or reject the hypothesis that key issue surveys lagged journal publications. This study uses seven years' of the annual CSC surveys and journal articles covering the same period. Therefore it is possible to ascertain if the key issue surveys are lead indicators or lag indicators (within a seven year time frame).

SEARCH FOR SIMILAR DOCTORAL DISSERTATIONS

The ProQuest academic dissertations abstract database was last searched in March 2005 to determine if any doctoral dissertations, that were similar to this thesis, had already been published. The database was searched using a number of subject filters and keywords. The filter search identified 4230 dissertation abstracts. The keyword searches found that eight of these 4230 dissertations were, on the basis of their titles, possibly related to this thesis. Subsequent examination of the abstracts of these eight dissertations revealed that none of them were actually similar to this thesis.

Appendix 3.3 'ProQuest Dissertation Abstract Search: Method & Results' explains how the database was searched and gives the results of the searches.

Chapter 4

RESEARCH METHOD

CHAPTER INTRODUCTION

Chapter purpose

The purpose of this chapter is four-fold:

1. to explain the ontological and epistemological (philosophical) perspectives of the researcher
2. to outline the general research approach that has been adopted for this particular study
3. to outline the research methods and activities that have been used in each of the main stages of this research
4. to demonstrate cohesion between the researcher's philosophical perspectives, research approach, and choice of research methods for this study.

Chapter contents

This chapter contains the following three main parts:

1. My Ontological and Epistemological Perspectives
2. Research Approach
3. Research Method

The first part outlines my personal ontological and epistemological perspectives and beliefs. These provide a lens through which the choice of research approach and the research as a whole can be viewed. Because this part expresses personal and often normative views (particularly my choice of epistemic justification) it is written in the first person.

The second part outlines the general research approach adopted for this particular study. The outline explains the approach by reference to research approach classifications, 'theory' types, and explanation types given in the IS literature. Hopefully this part

demonstrates that the choice of research method coheres with (in terms of logical consistency) both the underlying philosophy and nature of the research questions being asked.

The third, 'Research Method', first explains the choice of and scope of the primary data used in the research. It goes on to outline the method that was employed in each of the major stages of the research in order answer the research questions.

MY ONTOLOGICAL AND EPISTEMOLOGICAL PERSPECTIVES

Ontological Perspectives

A number of ontological perspectives underlie my approach to this research. These are as follows.

1. the journals and their articles are real (i.e. they have an existence outside the cognition of myself, their authors, reviewers, and readers).
2. the independent objects mentioned in the articles are also real but need to be understood from the perspective of the author and the intentions revealed by the articles.
3. the articles and journal mission statements etc. contain true judgements of their authors.

Assumptions on the Nature of Information Systems Research

I also hold a number of other beliefs that I believe are justified true. These are as follows.

- there is no universally accepted definition of what the information systems discipline actually is or should be.
- there is no single unifying theory of information systems upon which the majority of research is based.
- the approaches to researching information systems are diverse.
- there has, as yet, not been any widespread adoption of any single ontology, classification system, or taxonomy for the information systems research domain.

Because of the current diversity I believe that the development of a universally acceptable (i.e. acceptable to all stakeholders for all purposes) ontology or classification scheme is highly problematical. However, I believe that it is possible to develop a task specific ontology and taxonomy that is appropriate for the purposes of this particular research.

Epistemological Perspectives

I subscribe to Theaetetus' view (Plato, 369 BC) that knowledge is justified true belief (JTB). Although there have been a few minor additions to the concept (most notably the 'no-Gettier-problem conditions' (Gettier, 1963) sometimes labelled JTB+G) JTB continues to be a central epistemological tenet of the Western analytic school of philosophy.

Despite the widespread acceptance of the basic principle of JTB there is a very wide spectrum of philosophical opinion as to what are acceptable justifiers. The spectrum ranges from irrational nihilism and mysticism through subjective idealism and phenomenalism to rational empiricism and positivism.

It is generally accepted (Pollock, 1986, p. 7) that justification is a normative notion and that one's choice of justification method(s) is a normative judgement. Consequently a positivist cannot 'prove' that his choice of positivism is any more 'correct' than the nihilist's choice of nihilism. Similarly, I cannot prove that my choice of epistemological justifiers is correct but I can try to explain my choice.

H.L Mencken satirised analytical philosophy's search for justifiers when he wrote:

A metaphysician is one who, when you remark that twice two makes four, demands to know what you mean by twice, what you mean by two, what by makes, and what by four.

(Mencken, 1982, p. 14)

I have empathy with Mencken's satirical views of philosophy, particularly the empirical branch of analytic philosophy, in that it appears to answer every question with another question. I also believe that scientific empiricism with its emphasis on the observable and measurable can only be used to justify certain types of belief (about physical phenomena). I find even greater difficulty in accepting the subjective idealist view of the external world (i.e. there isn't one).

My personal choice of justification is based upon the common-sense realism tradition as outlined by Lemos in “Common Sense: A Contemporary Defense” (Lemos, 2004). The common-sense realism school was founded by Thomas Reid (1710-1796). More recently its chief representatives have been G.E. Moore (1872-1958) at Cambridge and Roderick Chisholm (1916 – 1999) at Brown. The common-sense school believes that there is a real external world, and that our perceptions are caused directly by that world.

According to Floridi (Floridi, 2004), Moore’s philosophy was based on his refutation of the subjective idealist thesis that ‘to be is to be perceived’. Moore held that there are many common-sense beliefs that everyone is naturally inclined to hold and hence that are endorsed, upon reflection, by all. To a large extent common-sense realism epistemology is concerned with knowledge about what is as opposed to why it is. For example, common-sense tells us that things drop down as opposed to up – but it does not tell us why things drop down.

Moore rejected the idea that a question such as "do you believe the earth has existed for many years past?" required a Menckonian type philosophical analysis before it can be answered with a "yes", "no" or "I'm not sure". However, the fact that it easy to answer the question does not mean that the full proposition is easy to analyse (e.g. what is existence, what does believe mean, etc.). However, the common-sense realists (and I) would argue that in most cases the ‘obvious’ does not need analysing, proving, or supporting with appeals to authority.

Common-sense realism has been labelled ‘naive’ realism and criticised for adopting a naive approach to physics and the sciences and criticised for not taking into account the psychology of perception. Barry Smith (Smith, 1995) rejects these criticisms and points out that common-sense realism embraces the thesis that the common-sense world is capable of being investigated in large part by standard empirical physics. He also cites instances of where both sensory illusions and (and new scientific developments) have proven the prevailing common-sense to be wrong. But he but goes on to say:

“the common-sense world is delineated by our beliefs about what happens in mesoscopic reality *in most cases and most of the time*. It is oriented, in other

words, about the focal instances of the phenomena of the everyday world, rather than about non-standard or deviant phenomena”.

(Smith, 1995, p. 17)

Clearly common-sense realism can be criticised on the grounds that just saying "I know that x is so" does not make it so. However, one can argue that part of the evidential basis for the claim (or justification of the belief) is its coherence with other beliefs.

Smith says

“...the doctrine of common-sense realism is not merely a doctrine concerning the ontological status and nature of the common-sense world. The doctrine also has an epistemological component, embracing a thesis affirming the existence of a network of actually existing relations between the objects in this world and ourselves as cognizing agents, relations which facilitate veridical cognition: the world and its subjects are as it were in tune with each other”.

The other main alternatives to coherentism appear to be the regress argument and foundationism. The regress argument is based upon justifying proposition P_1 with proposition P_2 which is then justified with proposition P_3 – and so on until P_n . The problem with the regress argument is that the series is infinitely long and when P_n is finally reached it is not justified.

Foundationalism solves the infinite series and unjustified final proposition problems of the regress argument by assuming (or arguing) that some statements do not need justification. Empiricists use observations of the physical world as their epistemological foundation. Rationalists and mathematicians have developed axiomatic systems where their axioms provide their epistemological foundations. Personally, I have no problem with mathematical axioms but have doubts about some of the classical rationalist axioms such as Descartes' "I think therefore I am".

Coherentism contends that foundationalism gives an arbitrary spot to stop asking for justification and does not provide reasons to think that certain beliefs do not need justification. For coherentism, justification is a holistic process. Proposition P_1 is not justified as a part of some inferential chain of reasoning, but because it coheres with some system of which it forms a part. Usually the system is taken to be the complete set of beliefs of the individual or group that is he/she's or their theory of the world. In the case of common-sense realism this world theory is common-sense.

Kvanvig states that the most popular objective approach is explanatory coherentism, which defines coherence in terms of that which makes for a good explanation (Kvanvig, 2003). Basically a good objective explanation is one in which the hypotheses or propositions are justified by the supporting data and the data are explained by the proposition or hypotheses. He goes on to cite the five factors, given by BonJour, which can be used to gauge the coherence of an explanation. These are:

1. logical consistency;
2. the extent to which the system in question is probabilistically consistent;
3. the extent to which inferential connections exist between beliefs, both in terms of the number of such connections and their strength;
4. the inverse of the degree to which the system is divided into unrelated, unconnected sub-systems of belief; and
5. the inverse of the degree to which the system of belief contains unexplained anomalies.

(BonJour, 1985, cited in Kvanvig, 2003)

Commons-sense realism and coherentism are not restricted to the external or objective world. Common-sense tells that we all have sensations (such as physical pain) and experience internal emotions such as fear and love. Similarly, coherentism can accommodate subjective systems where coherence is defined in terms of experiential states. We all like to see and hear things that are consistent with our beliefs and feel uncomfortable with things that appear to contradict our beliefs – particularly when these are internal contradictions. Festinger's classical theory of cognitive dissonance (Festinger, 1957) gives an account of this phenomenon.

Criticisms of common-sense realism also include its cultural and temporal relativism. Personally I have no problem with the fact that I have only one word for snow whilst it is often (incorrectly (Pullum, 1991)) claimed that the Inuit may have hundreds of different words. I guess that the Inuit and I have many common justified primary beliefs. For example, there is today, yesterday, and tomorrow; we can see things in front of us and there are things behind us, even if we can't see them at the moment; and so on.

Similarly, I have no problem with temporal relativism. A common-sense system ceases to be common-sense when contradictions arise and the system exhibits incoherence. The contradictory common-sense belief is then modified to regain coherence. This is not much different to the way in which empiricists change their beliefs when new experimental data no longer corresponds with their original belief – other than for the distinction between coherence and correspondence as justifiers.

In the field of knowledge management Boisot has labelled this repeating cycle of knowledge discovery and modification the “Social Learning Cycle (SLC)” (Boisot, 1998) . Boisot’s SLC and his associated “I-Space” models provide a theoretical account of the relationship between personal idiosyncratic (tacit) knowledge, textbook (explicit) knowledge, and common-sense knowledge. Boisot’s models are illustrated in Fig. 4.1 below. The illustration provides a highly simplified version of the actual model. Appendix 4.1, ‘Boisot's Information Space (I-Space) and Social Learning Cycle (SLC) Models’ contains a more detailed account of the models illustrated with a typical scenario.

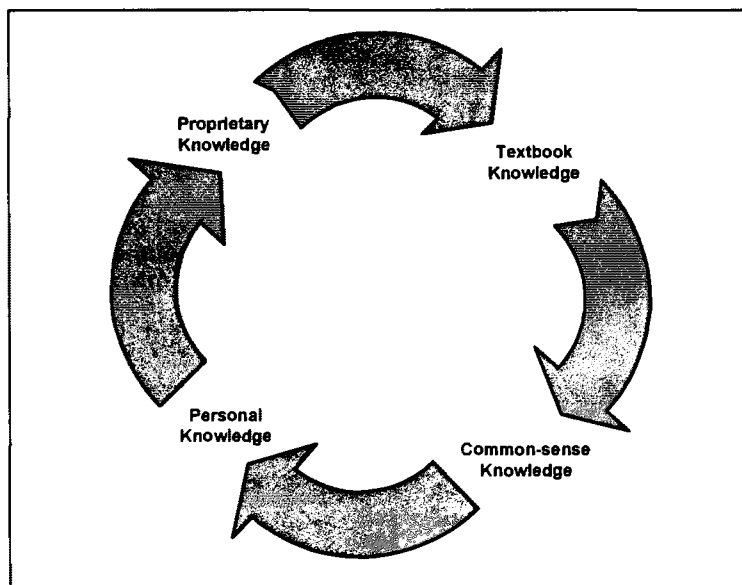


Figure 4.1: Simplified Version of Boisot’s I-Space and SLC Models

Summary of Philosophical Perspectives

Burrell and Morgan put forward a single subjectivist-objectivist dimension that appears to apply to ontology, epistemology and methodology. However, they make it quite clear that this is a dimension (not a dichotomy) upon which a researcher can place himself when they say.

“intermediate points of view have emerged, each with its own distinctive configuration of assumptions about the nature of social science”

(Burrell & Morgan, 1979, p.8)

As explained earlier I believe that a real external world exists and I reject the extreme subjective idealist notion that (all of the) world is internally constructed.

However, I know that research often involves the selection, coding, and abstraction processes (as described in Appendix 4.1). These are carried out by humans. Boisot’s subsequent social learning cycle processes of diffusion and impaction are social processes. I therefore believe that my knowledge of the external world has been gained by subjective and social processes.

Smith states that the thesis of the autonomy of common-sense reality may even be compatible with the idea that frogs might have a common-sense world of their own. Frog common-sense laws would be different from human common-sense laws. “But the two sets of laws would still be consistent with each other, in the sense that they would reflect cuts through the same reality at different angles or of different calibrations...”. (Smith, 1995). My interpretation of Smith’s view is that there is a real world with laws that govern it. However, there are several ways in which that world can be understood and known.

I believe that my ontological perspective is well toward the objectivist end of Burrell and Morgan’s spectrum. My epistemological perspective is toward the middle of their spectrum as commons-sense realism and coherentism accommodates subjective systems as well as external-world systems. Additionally, my version of common-sense realism

and coherentism fully accepts temporal relativism. I also accept, to a lesser extent, cultural relativism – but maybe not Smith's 'Frogism'.

RESEARCH APPROACH

We have already explained the ontological and epistemological assumptions and beliefs held by the researcher. In this section we present an outline of the general research approach that has been adopted for this particular study.

A large amount of IS literature has been published classifying, suggesting, and reviewing the usage of 'research approaches' (Galliers, 1992; Galliers & Land, 1987; Mingers, 2003; Orlikowski & Baroudi, 1991). Several other research approach studies have already been cited in the previous chapter. (Literature Review).

One of the many IS research approach classifications was put forward in 1995 by Morrison and George (Morrison & George, 1995). We use this as the starting for our explanation of the research approach taken by this thesis.

Morrison and George list the following four 'generally accepted research approaches':

1. formulative research
2. evaluative research
3. descriptive research
4. developmental research

They described descriptive research as "where theories or models are developed and described to provide the input for developing units of the theory, its laws of interaction, system states, and model boundaries" (Morrison & George, 1995).

Gregor and Jones take a fairly broad view of theory and identify five inter-related categories of theory based on the primary type of question at the foundation of a research project. Their five categories are summarised overleaf in Table 4.1.

Table 4.1: Gregor and Jones' Theory Categories

	Theory Category	Research Question	IS Examples
I	Analysing and describing	What is?	Taxonomy of information systems development models (Kwon and Zmud 1987)
II	Understanding	How and why?	Structurational model of technology (Orlikowski 1992)
III	Predicting	What will be?	Organisational size as a predictor of innovativeness without justification (Rogers 1995)
IV	Explaining and Predicting "traditional theory"	What is, how, why, what will be?	Theory of representation (Weber, 1997)
V	Design and Action	How to do something	Design of executive information systems (Walls, Widmeyer et al. 1992)

(Gregor & Jones, 2003, Table 1)

Hovorka, Germonprez, et al give the following categories of explanation types.

- Descriptive/Structural Explanations
- Covering-law explanations
- Statistical Relevance Explanations
- Pragmatic Explanations
- Functional Explanations.

They define Descriptive/Structural Explanations as follows:

“Descriptive/structural explanation can be characterized by the presentation of “objective” or “factual” accounts of the phenomena with no theoretical grounding or interpretation (Orlikowski and Baroudi 1991). Taxonomies, observations of an event and descriptions of the impact of an information technology on an organization are examples of structural/descriptive explanations.”

(Hovorka, Germonprez, & Larsen, 2003)

Using the definitions given above we can describe the general research approach adopted in this thesis as one that aims to provide descriptive/structural explanations of

the three basic ‘what is/are?’ questions that make up the primary research question. These are (with slight re-phrasing):

1. what are the (reported) key concerns of IS managers?
2. how can the topics published in the target IS journal articles be classified (the taxonomies)?
3. what degree of coverage do the journal articles provide for the managers’ key issues?

This research does not pose, nor attempt to answer, any major ‘why’ questions. For example, it does not attempt to find out why IS managers have the issues and concerns they are reported to have. The research also does not maintain that the findings it makes regarding the target journals and target years apply to other journals or other years. The research does not make any statistical inferences.

Although, the thesis has a positivist ‘flavour’ in that numbers are used to summarise many of the descriptions it also involves interpretivism. The allocation (by a human researcher) of lightweight¹ taxonomic classification codes to the journal articles provides an example.

The issues of the reliability, validity, and replicability of the approach are discussed in Chapter 9 (Critical Review of Method Adopted).

¹ The taxonomy is referred to here as a ‘lightweight’ because the ontology it is based upon is not axiomatised and expressed in a formal language. This issue is explained in more detail in Chapter 6.

RESEARCH METHOD

Introduction

Chapter 2, 'Research Justification', explained the aims of this research, and the deliverables required to fulfil the aims, as well as enunciating the actual research questions. In this part of this chapter we first explain the sources and scope of the primary data used in the research. We then outline the method that was employed in each of the major stages of the research in order to fulfil the aims of the research and answer the research questions.

This part contains the following sections.

1. Primary Data Sources (IS Managers' Key Issues Data & Target Journals).
2. The Taxonomy Development and Journal Article Classification Stage.
3. The Analysis of Journal Article Topic Coverage Stage.
4. The Analysis of Management Issue Coverage Stage.

This part only gives an overview of the method that was employed to conduct the research. Full details of the methods employed at each stage are contained in the chapters referred to in the outlines that follow.

Primary Data Sources

IS Managers' key issues data

The primary source of the managers' key issues data was the 'Top IS Management Issues' survey responses presented in the Computer Sciences Corporation (CSC) Surveys over the period 1993 to 2001. These are reported in the 13th. and 14th. CSC surveys (Computer-Sciences-Corporation, 2001, 2002).

The CSC survey results were chosen because they provide annual results for all the years covered by this thesis.

The thesis also provides a comparison between the last (1994) SIM key issue survey results as presented in “Key issues in information systems management: 1994-95 SIM Delphi results” (Brancheau et al., 1996) and the 1994 CSC survey results.

Full details of the CSC surveys, the survey results used in this thesis, the analysis of those results, and a summary of the analysis are presented in Chapter 5 ‘Analysis of Managers' Key Issues Data’.

Target journals

It was originally intended (prior to the presentation of the proposal for this research thesis) to use the same journals as used in the Palvia study (Palvia, 1999). This original intention was based upon the fact that the journals were reported by Palvia to be ‘highly regarded in MIS’ according to Gillenson & Stutz, (1991). Palvia’s view was also supported by a more recent study carried out by Mylonopoulos on the ‘Global Perceptions of IS Journals’ (Mylonopoulos & Theoharakis, 2001) that showed that those target journals were still highly regarded/popular. (A summary of the Mylonopoulos results is contained in Appendix 4.2 ‘Global Perceptions of IS Journals’).

As a result of recommendations made by the proposal reviewers both the Management Science (MS) and Communications of the ACM (CACM) journals were removed from the target list on the grounds that they contained a very large number of non-IS related articles.

Also, at the request of the reviewers, two major European-published journals (EJI and ISJ) were added to the target journal list.

The resultant list of target journals was as follows.

Seven academic journals:

- Decision Sciences (DSI)
- European Journal of IS (EJI)
- Information & Management (IFM)
- Information Systems Journal (ISJ)

- Information Systems Research (ISR)
- Journal of MIS (JMI)
- MIS Quarterly (MIS)

Two practitioner journals:

- Harvard Business Review (HBR)
- Sloan Management Review (SMR)

Note. The journal name abbreviations given above in parentheses will be used as journal identifiers in the rest of this thesis

The research covers the articles published in the target journals for the seven-year period 1995-2001. All articles from the IS academic journals were included. The IS-related articles from the two practitioner journals and DSI (the other journal on the target list not solely devoted to IS research) were also included. In total 1376 articles were used for the research. Appendix 4.3 'Number of Journal Articles Used in the Research (By Journal)' contains details of the numbers of articles obtained from each journals as well as an explanation of how the DSI and practitioner journals' IS-related articles were identified.

The Taxonomy Development and Journal Article Classification Stage

Taxonomy development

A taxonomic scheme was developed so that the 'topics' covered in the target journal articles could be classified. A database was also developed to store the taxonomy and store the journal article abstract data in a form suitable for subsequent analysis.

There were three versions of the taxonomy. The 'initial' taxonomy was based upon MIS textbooks and a model undergraduate curriculum. (It was realised that such a taxonomy would not necessarily provide all the detailed topic descriptors required to classify all the journal articles). As the journal article classification process progressed, the initial taxonomy was iteratively developed by adding new detailed topic descriptors. The

version of the taxonomy that included all these additions is referred to as the 'full' taxonomy. The full taxonomy was used to analyse the journal articles' coverage of the 'IS discipline'. The full taxonomy was subsequently modified to more clearly describe the actual content of the IS journal articles - as opposed to how their content covered, or did not cover, 'the IS discipline'. This version of the taxonomy is the 'final taxonomy' and was used in the analysis of how the journal articles covered the management issues.

Journal article classification

The journal articles were topic classified by examining their abstracts (the full articles were rarely examined – this issue is discussed further in Chapter 9: 'Critical Review of Method Adopted'). The abstracts were first loaded into an Abstract table on the database. The contents of the table were subsequently printed and used as coding forms for the classification exercise. Abstracts were classified by reference to a hierarchical visual display of the taxonomy (produced by a software tool called 'TreeView') and the classification details were entered on the coding forms. The classification data on the forms was subsequently used to update the Abstract table through an 'Abstract Coding Form' screen.

The 1376 unclassified abstracts were classified and coded in ten separate batches. Revisions were made to the initial taxonomy after each input batch.

Chapter 6: 'Journal Article Classification' provides further details of the ontology for the classification scheme together with the method that was used to develop the taxonomies. Ch. 6 also contains full details of the various versions of the taxonomies and how they were used during the classification process.

The Analysis of Journal Article Topic Coverage Stage

The analysis consisted of two parts. The first involved identifying which of the topics, contained in the full taxonomy, received little or no coverage by the journal articles included in the survey.

Another part of the analysis was concerned with explaining what topics the articles actually did cover and to what degree they covered them. Another part of the analysis was concerned with the development of a suitable 'IT-relatedness' classification scheme

(the 'IS conceptual net') and analysing how the journal articles covered the various components of the conceptual net.

Chapter 7: 'Analysis of Journal Article Classification Data' contains details of the method that was employed to carry out the analysis as well as the results of that analysis.

The Analysis of Management Issue Coverage Stage

This first part of the analysis involved mapping each management issue to the particular journal articles (or the taxonomy nodes under which the articles had been classified) that related to that issue.

The next part examined the issue-related articles (as a single group) and showed how their values are distributed between the different journals and publication years. The following part examined how well the issue-related articles covered the individual management issues. The fourth part determined if there was any relationship between the rank order of the values of the various groups of issue-related articles and the rank order of the management issues to which they related. The fifth part of the analysis determined if there were any noticeable relationships between the annual changes in the ranking of the particular issues and the annual changes in the values of the articles that related to those particular issues. The final part analysed how well each category of journal (US-published academic, European-published academic, and Practitioner) covered each of the management issues.

Chapter 8: 'Analysis of Relationships between Journal Article & Key Issue Data' contains details of the method employed to carry out the analysis as well as the results of that analysis.

Chapter 5

ANALYSIS OF MANAGERS' KEY ISSUES DATA

CHAPTER INTRODUCTION

Chapter purpose

The primary purpose of this chapter is to produce an analysis and summary of the 'Top IS Management Issues' survey responses presented in the Computer Sciences Corporation (CSC) Surveys over the period 1993 to 2001. These are reported in the 13th and 14th. CSC survey reports (Computer-Sciences-Corporation, 2001, 2002). This analysis and summary is required in order to help answer the 'key issues topics' part of the primary research question of this thesis – which is:

‘Are the topics published in IS journal articles related to the key issues topics reported to be of concern to IS managers?’

This chapter does not attempt to critique the CSC surveys and their reporting of them. Rather, we subscribe to a view that is similar to Palvia et al's view of the SIM surveys (Ball, 1982; Brancheau et al., 1996; Brancheau & Wetherbe, 1987). In their Decision Sciences paper 'The Information systems management issues: Reporting and relevance' Palvia & Basu stated:

“We understand that there are methodological imperfections in almost any study, for example, sample size, sample representativeness, and respondent bias. Our purpose is not to critique these aspects. In fact, we assume that the data in these studies is fairly sound”.

(Palvia, 1999)

Neither does the chapter attempt to provide explanations of how or why the managers' key issues arose. Nor does it attempt explain the underlying reasons for the trends and differences (between North America and Europe) in the Key Issues data presented in the chapter. This level of analysis, and the data required to conduct it, is outside the scope of this thesis.

The analysis that is presented is restricted to simply comparing the North American (NA) and European (EU) issue rankings and tracking their histories throughout the survey period. The analysis also includes the derivation of an ‘overall importance’ ranking for each of the issues and some brief observations on the eight ‘enduring’ issues and four ‘new’ issues that occupy the the top twelve positions in the overall importance rankings.

References used for this chapter

Most of the material on the CSC surveys, presented in this chapter, is based upon the contents of the 13th. and 14th. CSC annual survey reports (Computer-Sciences-Corporation, 2001, 2002).

In order to prevent repeated occurrences of the same source material references individual references to the CSC reports are omitted. References to other sources, used in the chapter, are given in the normal manner.

Chapter contents

In addition to this Introduction the chapter contains another four main parts.

- The Computer Sciences Corporation (CSC) Surveys.
- CSC Survey Results Used in this Thesis.
- Analysis of Managers’ Key Issues Data.
- Summary Results and Observations.

The first part outlines the background to the CSC surveys and then describes the survey instrument (a structured questionnaire) and how the survey results are presented in the CSC survey reports.

The second part explains which particular parts of the survey results (the ‘Top IS Management Issues’ parts), which survey years (1993 to 2001), and which regions (North America and Europe), have been used as raw data for this thesis - and why they have been used. At the end of this part the raw data extracted from the CSC reports, for use in this thesis, is presented.

The third part first provides a brief analysis of the relationships between the key issues rankings from the two different regions. It goes on to explain how the different issues have been classified and labelled (with an ordinal relative importance indicator) in this thesis. An appendix to this part (Appendix 5.6 ‘North American (NA) & European (EU) Management Issue Ranking Comparisons’) contains a detailed comparison of the NA and EU rankings of each of the issues. The appendix also tracks the ranking history of each of the issues throughout the survey period.

The fourth, and final, part first summarises the results of the detailed analyses – including presenting an ‘overall importance’ ranking for each of the issues. It then goes on to make some brief observations on the eight ‘enduring’ issues and four ‘new’ issues that occupy the the top twelve positions in the overall importance rankings. This final part ends with a brief comparison of the rankings of the nine common issues listed in both the SIM 1994 survey data (Brancheau et al., 1996) and the CSC 1994 survey data.

THE COMPUTER SCIENCES CORPORATION (CSC) SURVEYS

Background to the CSC Surveys

CSC survey history

Computer Sciences Corporation (CSC) started conducting its annual 'Critical Issues of Information Systems Management' surveys in North America in 1987. The 1987 survey results were reported in the five page 1988 CSC survey report. The most recent, and last, CSC survey report - which contains the results of the 2001 survey - is more than 150 pages long.

The surveys were initially (1987 – 1992) conducted in North America. Europe was included in the surveys from 1993. In 1995 the Asia/Pacific region was included in the surveys. In 1999 the Asia/Pacific region was (for survey purposes) split into the Australia/New Zealand and Asian regions. Since then the surveys have been carried out in, and reported by, four geographical regions – North America, Europe, Asia, and Australia/New Zealand.

Contents of the surveys

The first survey questionnaire (1987) just asked respondents to identify their key information systems management issues. The most recent (2001) survey and report included 'Key Initiatives' (applications development, e-business applications, and technology trend) issues and 'IS Organisation' (the position of the IS function in the organisation, its role in strategy formulation, IS budget, etc.) issues in addition to the key information systems management issues – which are now referred to as 'Top IS Management Issues'.

Outline of the methodology used for the 'Top IS Management Issues' part of the survey

Survey respondents were requested to complete a structured questionnaire indicating the ten most important information systems management issues (from a list of twenty-two in 2001) for their own organisations.

The issues that appeared on the list appeared to be based upon the issues that appeared on the responses to the previous year's list and the results of:

“worldwide brainstorming sessions with our executives and experts to determine the content for the survey and ...capture new business issues while maintaining our historical tracking and trend analysis methodology”.

(Computer-Sciences-Corporation, 2002)

Presentation of ‘Top IS Management Issues’ survey results

The results of the global survey are presented in tabular form listing each of that year's issues and showing the percentage of respondents that reported that issue as one of their ten most important issues. These results are also presented by region. The regional results are presented in tables that list the issues in regional rank order (for the survey year) together with the global rank order position for each issue (for the survey year). The regional results also show, for each issue, the ranking of that issue in the previous survey years.

The later part of this chapter, on ‘CSC Survey Results used in this Thesis’, describes in more detail how the ‘Top IS Management Issues’ survey are presented. (These descriptions are in the ‘Content and Format of Managers’ Key Issue Raw Data/ Presentation of Global Survey Results’ and ‘Content and Format of Managers’ Key Issue Raw Data/ Presentation of Regional Survey Results’ section/sub-sections within that part of the chapter).

Respondent demographics

The tables, overleaf, outline the following characteristics of the respondents and their organisations.

- Organisational unit the response is for (2001-2000) Table 5. 1
- Size of respondent's organisation (2001-2002) Table 5.2
- Position of respondent in the IS function (2001-2000) Table 5.3
- Numbers and regions of the respondents (2001 – 1995) Table 5.4

Table 5.1: Organisational Unit

	2001	2000
Corporate	70.4%	77.7%
Division	18.2%	9.7%
Subsidiary	11.4%	12.6%

Table 5.2: Size of Organisation

	2001	2000
Less than USD 250M	36.3%	31.5%
USD250M-USD 500M	22.8%	24.0%
USD 500M-USD 1B	12.5%	18.4%
USD 1B-USD 5B	21.0%	17.3%
USD 5B-USD 10B	3.0%	4.0%
More than USD 10B	4.4%	4.9%

Note.

In the Introduction we stated that ‘This chapter specifically does not attempt to critique the CSC surveys’. However, it may be worth noting that the CSC respondent organisations appear to be fairly large (more than 60% have turnovers of > USD 250M). According to some of the stage theorists (Chan & Swatman, 2004; Earl, 1989; Galliers & Sutherland, 1991; Rayport & Jaworski, 2002) the nature, role and focus of an organisation’s IS strategy and applications portfolio changes as its usage of IS matures. If one assumes that larger organisations tend to be more mature in their usage of IS then it is possible that quite different survey results may have been obtained if the size/maturity profile of the respondents had been more skewed toward smaller/less mature organisations.

Table 5.3: Position of Respondent (Are You the Top IS Executive?)

	2001	2000
Yes	71.7%	70.1%
No	28.3%	29.9%

Table 5.4: Numbers and Regions of the Respondents

Year	Total Number of Respondents	% in North America	% in Europe	% in Asia/ Pacific	% in Asia	% in Australia
2001	1009	34.2	29.2		24.0	12.5
2000	822	26.0	27.4		32.0	14.6
1999	803	35	20		31	14
1998	594	36	16	48		
1997	614	37	40	31		
1996	DNA	DNA	DNA	DNA		
1995	603	DNA	DNA	DNA		

Notes

1. DNA = data not available
2. Prior to 1999 the responses from Asia and Australia were grouped together under the Asia/Pacific region.

For comparison purposes the number of respondents of the earlier five SIM (Society of Information Managers) Key Issue Surveys is given below in Table 5.5. The respondents to the SIM surveys were all members of the US Society of Information Managers.

Table 5.5: Number of SIM Survey Respondents (1980 – 1994/5)

Data Collection Year	Citation	No of Respondents
1980	Ball & Harris, 1982	417
1983	Dickson, et al., 1984	102
1986	Brancheau & Wetherbe, 1987	90
1990	Niederman, et al., 1991	175
1994/95	Brancheau, et al., 1996	108

The Survey Questionnaire (2001)

The CSC survey instrument was a structured questionnaire. A copy of the full questionnaire can be found in Appendix 5.1 'CSC (2001) Covering Letter & Questionnaire'.

The survey questionnaire was divided into three main parts as follows.

1. The **'Top Issues'** part. This presented a list of IS issues and the asked the respondents to identify which ones were the most important to their organisations. The results of the analysis of this part of the questionnaire were one of the primary data sources for this thesis. These are presented in the 'Analysis of Managers' Key Issue Data' part of this chapter.
2. The **'Key Initiatives'** part. This asked the respondents to answer a number of questions about applications development, e-business applications, and the importance of various technology trends within their organisations.
3. The **'IS Organisation'** part. This requested responses to questions about the position of the IS function in the organisation, its role in strategy formulation, and budgetary issues.

Details of the content of 'Top IS Issues' parts of the survey instrument are given directly below. The 'Key Initiatives' and 'IS Organisation' parts of the instrument are not directly relevant to this thesis but further details of them are given in Appendix 5.3 'CSC Survey Instrument: Other Parts'.

The 'Top IS Management Issues' part

In this part respondents were presented with the numbered list of issues given overleaf and asked to:

- identify the ten most important issues to their organisations in the survey year (2001)
- indicate, from the ten issues selected, the organisation's first, second, and third most important issues.

1. Optimising enterprise-wide IS services

Delivering integrated coordinated technology services throughout the geographically dispersed organisation.

2. Implementing business transformation initiatives

Building the information systems, processes and technology infrastructure to support transformation or reengineering initiatives.

3. Updating obsolete systems

Revitalising information systems by updating, migrating, renovating, augmenting, replacing, or eliminating them.

4. Optimising organisational effectiveness

Partnering with the leadership team to determine how IT can improve business processes rather than focusing on operational efficiencies.

5. Restructuring the IS function

Establishing the right organisational structures, affiliations, and locations for IS professionals and their work.

6. Connecting to customers, suppliers, and/or partners electronically

Using electronic links to tie into customers' and/or suppliers' systems.

7. Instituting cross-functional information systems

Integrating business processes, information systems, and data across functions or departments for improved business coordination.

8. Using IT for competitive breakthroughs

Finding and implementing ways in which information technology can create profound competitive advantage.

9. Improving the systems application process

Increasing productivity, speed, flexibility, and quality in the building or sourcing of new applications.

10. Developing an electronic business strategy

Determining the best way to capitalise on the Internet for competitive advantage.

11. Aligning IS and corporate goals

Making sure the goals of the information systems function closely support overall corporate business goals.

12. Organising and utilising data

Managing data and technology so that information is accessible and used by the right people at the right times.

13. Integrating systems with the Internet

Solving the technical problems of integrating heterogeneous hardware, software, and applications with Internet technologies.

14. Improving the IS human resource

Finding and developing the right people to handle current and future challenges.

15. Educating management on IT

Increasing management's understanding of the business impact and technical capabilities of IT, and its own role in capitalising on it.

16. Capitalising on advances in IT

Determining which advances in information technology (or which new technologies) will most benefit the corporation, and then introducing them into the business.

17. Creating an information architecture

Creating a high-level "map" of the organisation's information requirement, and using it to deploy IT, develop applications, and share data.

18. Cutting IS costs

Reducing expenses and improving cost structures without impairing service levels.

19. Protecting and securing information systems

Eliminating vulnerabilities in systems to minimise risks and to safeguard information resources.

20. Managing complex organisational changes

Overseeing the people and organisational elements of complex, large-scale technology implementations.

21. Managing knowledge assets

Building and leveraging knowledge to support information driven organisational goals.

22. Designing the mobile workplace

Building the infrastructure and systems to support mobile work processes.

23. Other

(Respondents were asked to specify the nature of any other issues.)

Presentation of CSC Survey Results (2001)

The CSC survey results are published in their annual survey of IS management issues reports. The results of the 2001 survey were published in their '14th Annual Survey of IS Management Issues'. The reports were divided into a number of parts – each part generally covered the results of one of the parts of the survey. The survey results, in each part, were usually presented in tabular numeric (often rank order) form with an accompanying narrative analysis.

The 2001 report contained the following major parts and sub-parts.

Overview

This part introduced the survey and the report and also contained an 'Executive Summary' and information on 'Respondent Demographics'.

Regions

This part presented an analyses the major results of the survey (i.e. the 'Top IS Management Issues' and some of the major topics from other two sections of the questionnaire) by region. The four regions (in the 2001 report) were; Asia, Australia, Europe and North America.

The IS organisation

The major results of the 'IS Organisation' part of the survey are presented here. Both numeric results and narrative analysis are presented at a global level with some analyses at regional level.

Information security

CSC had collated the results of the 2001 by August of 2001. As the results showed that 'protecting and securing information systems' was number two in North America (number five globally and only number ten in Europe) they conducted a separate survey on information security in late September 2001. In this survey they polled 56 CIOs in North America. The results of this extra survey are contained in this part of the 2001 report.

Key IT initiatives

The major results of the 'Key IT Initiatives' parts of the survey are presented here. The presentation of the results reflects the sub-parts of the questionnaire (Systems Development, E-Business, and Emerging Technologies). In addition, the results of the Outsourcing questions that appeared in the Systems Development part of the questionnaire are presented in their own section. The analysis of the results is mainly presented at a global level supported by some analyses at regional and industry levels.

Industries

This part presents an analyses of the major results of the survey (i.e. the 'Top IS Management Issues' and some of the major topics from the two other main parts of the questionnaire – 'Key IT Initiatives' and 'IS Organisation') by industry. The part is divided into the following industry sections: Chemicals, Consumer Goods, Financial Services, Government/Public Sector, Healthcare, Manufacturing, Oil/Energy, and Retail.

Survey results

This part provided the global (as opposed to regional or industry) responses to all questions in all parts of the survey instrument – including the separate 2001 North American security issues pole. This part did not contain any narrative analysis.

CSC SURVEY RESULTS USED IN THIS THESIS

Source of Managers' Key Issue Raw Data

In this thesis we will primarily be using the North American and European results for the period 1993 to 2001. This corresponds to the period used for the academic journal article topic analysis (1995 to 2001) plus the previous two years. The Asian and Australia/New Zealand results have not been used because they are only available separately from 1999. Between 1998 and 1995 Asia and Australia were grouped together under the Asia/Pacific region. Prior to 1995 they were not included in the CSC surveys.

The managers' key issue raw data, used in the thesis, is mainly extracted from the reports of the 13th and 14th Annual Surveys of IS Management Issues published by CSC in 2001 and 2002 respectively. The 13th report contains the results collected in 2000 and the 14th report contains the results collected in 2001. Both reports contain the results of the previous North American and European surveys going back to 1991.

Content and Format of Managers' Key Issue Raw Data

CSC presentation of global survey results

As mentioned earlier in this chapter, the 'Survey Results' part of the CSC annual reports provide the global (as opposed to regional or industry) responses to all questions in all parts of the survey instrument. The results of 'Top IS Management Issues' part of the survey are presented by listing each of that year's issues and showing the percentage of respondents that reported that issue as one of their ten most important issues. For example, the global results of the 2001 survey are reported as shown in Table 5.6 overleaf.

Table 5.6 Top IS Management Issues Globally (2001)

Optimising Enterprise-wide IS Services	64.8%
Optimising Organisational Effectiveness	62.6%
Organising and Utilising Data	61.4%
Connecting to Customers, Suppliers, and/or Partners Electronically	57.2%
Protecting and Securing Information Systems	55.3%
Updating Obsolete Systems	54.2%
Aligning IS and Corporate Goals	54.2%
Instituting Cross-Functional Information Systems	52.4%
Implementing Business Transformation Initiatives	49.5%
Improving the Systems Application Process	48.0%
Using IT for Competitive Breakthroughs	46.1%
Developing an Electronic Business Strategy	44.9%
Integrating Systems with the Internet	42.4%
Cutting IS Costs	41.4%
Capitalising on Advances in IT	40.2%
Managing Knowledge Assets	39.5%
Educating Management on IT	35.5%
Restructuring the IS Function	34.2%
Improving the IS Human Resource	33.2%
Creating an Information Architecture	29.7%
Designing the Mobile Workplace	20.2%
Managing Complex Organisational Changes	19.9%

CSC presentation of regional survey results

The regional results of the 'Top IS Management Issues' part of the survey are presented as ordered rankings - as shown Table 5.7 below.

Table 5.7: North American Region Results for 'Top IS Management Issues' (2001)

Top IS Management Issues	GL	01	'00	'99	'98	'97	'96	'95	'94	'93
Optimising Enterprise-wide IS Services	1	1	2	5	NR	NR	NR	NR	NR	NR
Protecting and Securing Information Systems	5	2	NR	NR	NR	NR	NR	NR	NR	NR
Aligning IS and Corporate Goals	8	2	5	3	1	1	1	1	2	2
Organising and Utilising Data	3	4	5	2	3	2	2	3	3	4
Optimising Organisational Effectiveness	2	5	3	NR	NR	NR	NR	NR	NR	NR
Connecting to Customers, etc	4	6	1	1	4	5	7	7	16	16
Etc.										
Etc.										

Note: 'NR' = not recorded (i.e. that particular issue was not included in that year's survey)

- The 'Top IS Management Issues' column contains the issues listed in the survey instrument.
- The 'GL' column shows the overall global ranking (for that survey year) of each issue.
- The next column to the right (in this case the '01' column) shows the regional (in this case North American) ranking of each issue in the survey year (in this case 2001).
- The remaining columns ('00, '99, '98, etc.) show the regional rankings of each of issues in previous survey years.

Managers' Key Issues Raw Data Used in this Thesis

Appendix 5.4, 'Managers' Key Issues Data (US & Europe)' contains the raw managers' key issues data that has been extracted from the CSC reports for use in this thesis. Table A5.4.1 shows the data obtained from the North American survey respondents and Table A5.4.2 shows the data obtained from the European respondents. Both tables cover the survey years 1993-2001.

Table 5.8, below, shows an extract (the first five rows) from the North American results table contained in the appendix. The columns in the tables have the same meanings/ contents as described directly above except for the addition of the following column and row.

- The 'id' column shows the issue identifier that is used in this thesis.
- The 'No. of Issues in Survey (N)' row shows the number of issues that were used in each of the survey years.

Table 5.8: Extract of North American Results for 'Top IS Management Issues' (2001-1993)

IS Management Issues	id	01	00	99	98	97	96	95	94	93
No. of Issues in Survey (N)		22	22	20	19	18	18	15	14	13
Aligning IS and Corporate Goals	1	2	5	3	1	1	1	1	2	2
Capitalising on Advances in IT	2	14	12	8	5	3	5	14		
Connecting to Customers, etc	3	6	1	1	4	5	7	6	13	12
Creating an Information Architecture	4	18	16	12	8	8	9	7	5	7
Cutting IS Costs	5	15	14	13	12	12	14	11	11	6
Etc.										
Etc.										

Extracted from Table A5.4.1 in Appendix 5.4

ANALYSIS OF MANAGERS' KEY ISSUES DATA

Relationship between the Rankings of the Different Regions

In order to determine if the results from the different regions show that they (the different regions) are tending to rank the issues in the same way the following Spearman's rank order correlations were carried out between:

- the North America (NA) and European (EU) rankings with the Global rankings (for 2001 and 2000)
- the NA rankings and EU rankings (for 2001 – 1993).

The Spearman's rho (ρ)¹ value for the NA and EU to Global rankings and the NA to EU rankings are given below in Tables 5.9 and 5.10 respectively.

Table 5.9: Spearman's ρ Values for the NA & EU to Global Ranking Comparisons

Year	2001	2000
N	22	22
NA ρ	0.8216	0.9718
EU ρ	0.9046	0.9701

Notes:

1. N = the number of paired rankings
2. Global ranking data was only available for 2001 and 2000
3. The significance level is less than 0.1% for the four correlations in Table 5.9.
4. Appendix 5.2 (Ch. 5 Spearman's ρ Data) contains the formula and data used to obtain the ρ values.

Table 5.10: Spearman's ρ Values for the NA to EU Ranking Comparisons

Year	2001	2000	1999	1998	1997	1996	1995	1994	1993
N	22	22	20	19	19	18	15	14	13
ρ	0.5940	0.9226	0.6992	0.5789	0.6491	0.5562	0.4643	0.6549	0.8214
Sig. Level <	0.1%	0.1%	0.1%	5%	0.1%	5%	>5%	0.5%	0.1%

Note: Appendix 5.2 contains the formula and data used to obtain the ρ values.

¹ In this thesis whenever the term "Spearman's ρ " is used it denotes Spearman's (non-parametric) rank order correlation coefficient. It does not denote the population parameter (ρ) that is inferred from the computed r statistic obtained when using Pearson's parametric product-moment correlation on a population sample.

Analysis of Issue Types and Importance

Issue types

The issues have been classified as belonging to one of three types based upon how long and when they appeared in the surveys. The issue type classifications used are as follows.

- **'Enduring' (E) issues**

Occurred in 6 or more of the 9 surveys including the most recent (2001).

All of these occurred in 8 or more surveys (EXCEPT id's 20 and 2 which occurred in the last 6 and 7 surveys respectively).

- **'New' (N) issues**

Occurred in between 1 and 4 of the most recent (2001-1998) surveys.

- **'Old' (O) issues**

These were withdrawn before the most recent (2001) survey.

Issue importance

The issues have been classified in terms of their relative importance based upon how frequently they occurred in the upper, middle, and lower third of the rankings. As the number of issues (N) surveyed varied between years the rank order position of an issue in a particular year was compared to $N/3$ and $2 \times N/3$ to determine whether it occurred in the upper ($> 2 \times N/3$) middle ($> N/3$ and $\leq 2 \times N/3$), or lower ($\leq N/3$) third of the rankings for that particular year. The counts of how often the issues occurred in the different thirds of the rank orders are shown in the tables later in this section as follows.

- **U3C:** contains a count of the number of times the issue occurred in the top third of the rankings
- **M3C:** contains a count of the number of times the issue occurred in the middle third of the rankings
- **L3C:** contains a count of the number of times the issue occurred in the lower third of the rankings.

The ‘**Imp Ind**’ column, in Table 5.11, contains an indicator of the overall relative importance of each issue. This indicator was obtained as follows.

$$\frac{(Wt1 \times U3C) + (Wt2 \times M3C) + (Wt3 \times L3C)}{N}$$

Where:

- U3C, M3C, and L3C are counts of the number of times the issue occurred in the upper, middle, and lower thirds of the annual rankings
- Wt1, Wt2 and Wt3 are multipliers (with values of 3, 2, and 1 respectively) that are used to weight the count values so that issues appearing more frequently in the upper annual ranking positions obtain higher importance indicator rankings than the issues that occur more frequently in the lower annual ranking positions.
- N is the number of years (duration) the issue appeared in the surveys. This was included so that an issue that had been highly ranked for fewer years did not obtain an overall relative importance position that was lower than an issue that had been ranked in lower positions for more years.

The relative importance indicator ‘**Imp Ind**’ is an ordinal indicator – not a continuous quantitative value. The importance indicator (**Imp Ind**) is derived from the counts of how frequently the issue occurred in the upper, middle, and lower thirds of the rankings. It is not arithmetically derived directly from the rank order values themselves. When an issue I_1 has an importance indicator (**Imp Ind**) that is greater than issue I_2 it just means that issue I_1 was ranked more important more frequently than I_2 . With the data used in this thesis if I_1 has an Importance Indicator (**Imp Ind**) of 3.0 and issue I_2 has an Importance Indicator of 1.0 it specifically it means that I_1 was in the top third of the rankings in every survey year it occurred whereas I_2 was in the lower third of the rankings in every survey year it occurred. It does not mean that over the survey period I_1 had an importance measure of 3.00 (as a continuous variable) whilst I_2 had an importance measure of 1.00 (as a continuous variable) - and therefore I_1 is exactly 3.0 times ‘more important’ than I_2 .

One could still (quite correctly) argue that the **Imp Ind** values are dependent upon the choice of weights and that if values other than the arbitrary 3, 2, and 1 (as given above)

were used then the actual numeric values of Imp Ind would change and this in turn could change their ordering. Although using different weights (e.g. 1.2, 1.1, 1.0, or 15, 5, 1, or 25, 5, 1) with the data (that is used in this thesis) clearly alters the actual numeric values of Imp Ind it does not have any significant effect upon the ordering of the Imp Ind values. When using weights of 3, 2, 1 and 1.2, 1.1, 1.0 the resulting Imp Ind order is identical. When weights of 15, 5, 1, and 25, 5, 1 a minor change in Imp Ind order occurs. Four Imp Ind values that are ranked as 12th with the 3, 2, 1 and 1.2, 1.1, 1.0 as weights become ranked as 12th, 13th, 14th, and 15th when weights of 15, 5, 1, and 25, 5, 1, are used.

To summarise the Imp Ind is an ordinal value that is used to provide an indication of an issue's relative (to other issues') importance over the survey period. In this context the term 'importance' refers to how frequently the issue occurred in the upper, middle, and top thirds of the rankings. For example, more important issues occur more frequently in the upper thirds of the rankings than do less important issues.

Tables A5.5.1 and A5.5.2 (in Appendix 5.5 'Management Issues Type & Importance Classification Details') list all the North American (NA) and European (EU) issues respectively. Both tables include the issue name, ID, Duration, Type, and Importance Indicators for each issue.

Table 5.11, below, is an extract (the first six rows) of Table A5.5.1

Table 5.11: Extract of Issue Types and Importance (North America - NA)

1	2	3	4	5	6	7	8
Top IS Management Issues	id	Dur	Type	U3C	M3C	L3C	ImpInd.
Aligning IS and Corporate Goals	1	9	E	9			3.0
Organising and Utilising Data	18	9	E	9			3.0
Instituting Cross-Functional Information Systems	12	9	E	7	2		2.8
Connecting to Customers, etc	3	9	E	5	4		2.6
Integrating Systems with the Internet	13	9	E	5	2	2	2.3
Capitalising on Advances in IT	2	7	E	3	3	1	2.3
Etc.							

Extracted from Table A5.5.1 in Appendix 5.5

The meanings of the column headings used in the table above (and in Appendix 5.5) are given overleaf.

Col	Heading	Meaning
2	id	Issue identification number
3	Dur	The issue duration, in terms of the number of surveys the issue occurred in.
4	Type	The issue type (<u>E</u> nduring, <u>N</u> ew, <u>O</u> ld) based upon for how long and when they appeared in the surveys.
5	U3C	Upper third count. The number of times the issue occurred in the top third of the rankings.
6	M3C	Middle third count. The number of times the issue occurred in the middle third of the rankings.
7	L3C	Lower third count. The number of times the issue occurred in the lower third of the rankings.
8	Imp Ind	Importance Indicator. An ordinal value that is used to provide an indication of an issue's relative (to other issues') importance over the survey period. (Based its U3C, M3C, & L3C values)

NA and EU Ranking Comparisons and Trend Analysis

Notation used in this section

In this section we compare the North American (NA) and European (EU) rankings of each of the issues. We also track the history of each of the issues throughout the survey period.

Appendix 5.6, 'North American (NA) & European (EU) Management Issues Ranking Comparisons' provides a table, a figure, and a brief narrative commentary for each of the important issues. (See the next sub-section on 'Issue presentation order and importance' for an explanation of the term 'important' as used in this context).

Tables. The first nine data columns of the tables show the inverted rank order (see below for an explanation of inversion) for each of the nine survey years together with the number of issues (N) included in each year. The last three data columns show: the duration of the issue, 'Dur', (i.e. the number of years the issue was included in the surveys); the issue 'Type' (Enduring, New, or Old); and, the importance indicator (Imp Ind) of the issue. The tables show these data values for the North American (NA) and European (EU) regions.

Use of inverted rank orders. In both the tables and figures the original ranks, that appeared in the CSC reports, are inverted (subtracted from the number of issues appearing in that years survey plus one) so that higher (more important) rankings are depicted higher on the figures' vertical axes. The same inversion technique was used by Brancheau et al in their 1996 MIS Quarterly paper that described the results of the 1994/95 SIM survey (Brancheau et al., 1996).

Figures. These give a graphical representation of the annual rank order data shown in the tables. They provide a visual history of the issue's ranking in the CSC surveys since 1993. Brancheau et al used similar figures for each of their important issues to "track its history in the key-issue framework since 1980". Fig. 5.1 below shows the type of line chart, with markers at each data value, they used.

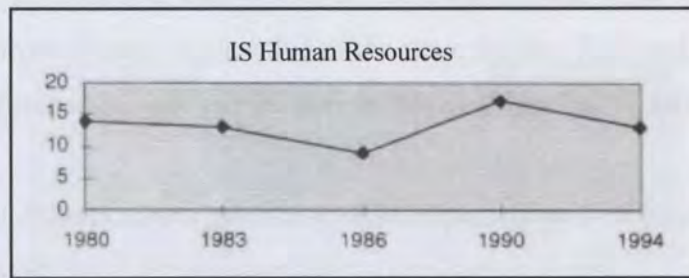


Figure 5.1: Type of Line Chart Used by Brancheau et al

(Brancheau et al., 1996)

We chose to use to use a slightly different 3-dimensional vertical column charting technique as shown in Fig. 5.2 below. Discrete columnar representation was chosen (instead of a connected line chart representation) because the rank orders portrayed are discrete ordinal variables as opposed to continuous quantitative variables. Any apparent trends discernible from the charts are trends in the issue's rank order position throughout the survey period and not trends in any quantitative measure of the issue's importance.

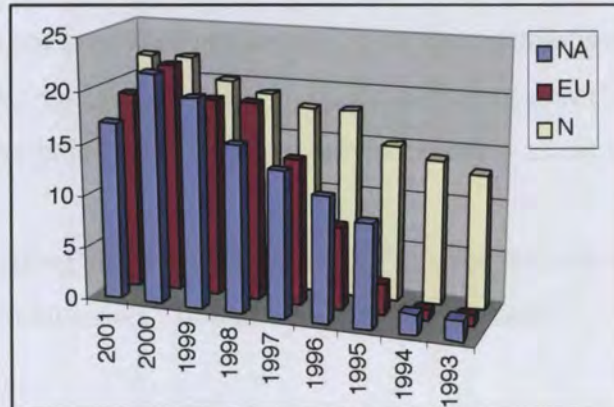


Figure 5.2: 3-dimensional Vertical Column Chart

The legend used in the charts is shown and explained in Fig. 5.3.

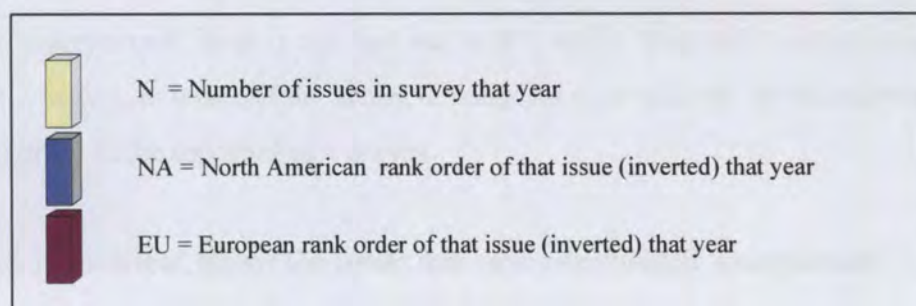


Figure 5.3: Chart Legend

The horizontal axis, or x-axis, shows the CSC survey year. The vertical axis, or y-axis, shows the inverted rank order value of the issue for the 'NA' and 'EU' columns. It shows the number of issues in the survey that year for the 'N' columns.

The vertical column charts provide a visual representation of how the rank orders of particular issues have altered over the various survey years.

Brief commentary. The brief narrative provided for each issue generally comments on the apparent similarities/differences between the overall levels of the NA and EU issue rank orders over the survey period. It also comments upon any apparent 'trends' in the issue's rank order position over the survey period.

Issue presentation order and 'importance'

Presentation order. There is one section in Appendix 5.6 for each of the important issues. The issues are presented in order of importance within issue type. The important enduring (E) issues appear first followed by the important new (N) issues. None of the old (O) issues were judged important enough to include – as explained below.

Importance. As stated above and at the start of this section tables etc. are provided for each of the 'important issues'. In the context of this section:

- an 'important' issue is one that has a NA or EU 'Imp Ind' rank of at least 1.9 – which, in terms of the actual rankings, is equivalent to the issue occurring at least once in the top third of a survey.
- an 'unimportant' issue is one that has no NA or EU 'Imp Ind' rank of greater than 1.6 – which, in terms of the actual rankings, is equivalent to the issue never having occurred in the top third of a survey.

Table 5.12, overleaf, shows the issues that have been judged 'unimportant'.

Table 5.12: 'Unimportant' Issues

id	IS Management Issues	Dur	Type	NA DATA				EU DATA			
				U3C	M3C	L3C	Imp Ind	Imp Ind	U3C	M3C	L3C
8	Educating Management on IT	9	E		5	4	1.60	1.40		4	5
20	Restructuring the IS Function	6	E			6	1.00	1.50		3	3
6	Designing the Mobile Workplace	2	N			2	1.00	1.00			2
14	Managing Complex Org. Changes	1	N			1	1.00	1.00			1
15	Managing Knowledge Assets	1	N			1	1.00	1.00			1
23	Changing Technology Platforms	8	O		1	7	1.10	1.30		2	6
24	Determining the Value of IS	5	O			5	1.00	1.00			5
25	Managing Dispersed Computing	5	O			5	1.00	1.00			5

Only two of the fifteen enduring (E) issues have been judged unimportant. All three of the old (O) issues have been judged unimportant. This is not surprising as their relatively low rankings were probably the main reason for their withdrawal from the issues list. Three of the seven new (N) issues have also been judged unimportant. In summary, eight out of twenty-five of the issues have been judged unimportant.

Summary of North American (NA) & European (EU) Issue Ranking Comparisons

This section presents, in tabular form, a summary of the individual NA and EU issue comparisons given in Appendix 5.6. This section contains the following summary tables.

- Summary of Important Enduring (E) Issues (Table 5.14)
- Summary of Important New (N) Issues (Table 5.13)
- Overall Issue Importance Rankings (Table 5.15)

Table 5.13: Summary of Important New (N) Issues

id	IS Management Issues	Dur/ Type	NA Imp Ind	EU Imp Ind	NA/EU Ranking Positions	Apparent Trends
17	Optimising Org. Effectiveness	2/N	3.00	3.00	Very similar (over 2-yrs.)	Started in a very high position (20/22) in 00 and then rose to 21/22 in EU and dropped slightly in NA to 18/22 in 01.
16	Optimising Enterprise-wide IS Services	3/N	3.00	2.70	Very similar (over 3-yrs.) -except for '99.	Started in 99 at fairly high position (NA 16/22 & EU 10/22) rose to 21/22 & 19/22 in 00 and top position (22/22) in both EU and NA by 01.
19	Protecting and Securing Info. Systems	1/N	3.00	2.00	Major difference (over 1-yr.)	No trend because only included in 1 yr. But, there is a considerable difference in the NA (21) and EU (13) rankings.
7	Developing an E-Business Strategy	4/N	2.30	2.00	Very similar (over 4-yrs.)	Started low (4/19) in 1998 and then rose significantly in 1999/2000 (NA 17/20 & EU 14/20 and NA 19/22 & EU 21/22) before dropping to lower positions (NA 10/22 & EU 12/22) again in 2001.

Table 5.14: Summary of Important Enduring (E) Issues

id	IS Management Issues	Dur/ Type	NA Imp Ind	EU Imp Ind	NA/EU Ranking Positions	Apparent Trends
1	Aligning IS and Corporate Goals	9/E	3.00	2.70	Very similar	Slight increase in importance over the period (except for 00/01 in EU).
18	Organising and Utilising Data	9/E	3.00	2.70	Very similar	Slight increase in importance over the period
12	Instituting Cross-Functional Info. Sys.	9/E	2.80	2.80	Quite similar (except '97).	Two slight peaks in importance (98 & 01).
3	Connecting to Customers, etc.	9/E	2.60	2.20	Very similar	Significant increase in importance over the period until 00. Dropped significantly in importance in 01.
5	Cutting IS Costs	9/E	1.60	2.80	EU > NA	No apparent trends
9	Implementing Bus. Transform. Initiatives	9/E	1.90	2.30	Fairly similar	Rankings appear to rise until 95/96 then drop until 98 and then both rise again in 00/01.
13	Integrating Systems with the Internet	9/E	2.30	1.80	Quite similar	Significant increase in importance over the period until 00. Dropped significantly in importance in 01 (particularly in EU).
2	Capitalising on Advances in IT	7/E	2.30	1.70	Fairly similar	NA ranks rise & peak in 97 then reduce. EU ranks rise & peak in 00 then reduce for 01.
10	Improving the IS Human Resource	9/E	1.90	2.00	Very similar	No clear trends until 98 from when the rankings show a decrease. The rate of decrease is more pronounced for NA.
21	Updating Obsolete Systems	9/E	1.90	2.00	Very similar	Rankings increase over the period. EU rankings show a steeper increase than the NA rankings
4	Creating an Information Architecture	9/E	1.80	2.00	Very similar	Rankings show a slight increase over the period 93/98 followed by a more pronounced rate of decrease to 01.
11	Improving the Sys. Application Process	9/E	1.90	1.90	Very similar	No clear trends.
22	Using IT for Competitive Breakthroughs	8/E	2.00	1.60	Fairly similar	Rankings appear to have two slight peaks (in 96/97 and 00).

COMBINED SUMMARY RESULTS AND OBSERVATIONS

Table 5.15, below, lists the issues in 'overall importance' order - where an 'Imp Rank' of 1 indicates the most important issue. A fuller explanation is given after the table.

Table 5.15: Overall Issue Importance Rankings

id	IS Management Issues	Dur	Type	NA Imp Ind	EU Imp Ind	Gen Imp Ind	Imp Rank
17	Optimising Orgl. Effectiveness	2	N	3.00	3.00	6.00	1
1	Aligning IS and Corporate Goals	9	E	3.00	2.70	5.70	2=
16	Optimising Enterprise-wide IS Services	3	N	3.00	2.70	5.70	2=
18	Organising and Utilising Data	9	E	3.00	2.70	5.70	2=
12	Instituting Cross-Functional Info. Systems	9	E	2.80	2.80	5.60	5
19	Protecting and Securing Info. Systems	1	N	3.00	2.00	5.00	6
3	Connecting to Customers, etc	9	E	2.60	2.20	4.80	7
5	Cutting IS Costs	9	E	1.60	2.80	4.40	8
7	Developing an E-Business Strategy	4	N	2.30	2.00	4.30	9
9	Implementing Bus. Trans. Initiatives	9	E	1.90	2.30	4.20	10
13	Integrating Systems with the Internet	9	E	2.30	1.80	4.10	11
2	Capitalising on Advances in IT	7	E	2.30	1.70	4.00	12
10	Improving the IS Human Resource	9	E	1.90	2.00	3.90	13=
21	Updating Obsolete Systems	9	E	1.90	2.00	3.90	13=
4	Creating an Information Architecture	9	E	1.80	2.00	3.80	15=
11	Improving the Sys. Application Process	9	E	1.90	1.90	3.80	15=
22	Using IT for Competitive Breakthroughs	8	E	2.00	1.60	3.60	16
8	Educating Management on IT	9	E	1.60	1.40	3.00	17
20	Restructuring the IS Function	6	E	1.00	1.50	2.50	18
23	Changing Technology Platforms	8	O	1.10	1.30	2.40	19
6	Designing the Mobile Workplace	2	N	1.00	1.00	2.00	20=
14	Managing Complex Orgl. Changes	1	N	1.00	1.00	2.00	20=
15	Managing Knowledge Assets	1	N	1.00	1.00	2.00	20=
24	Determining the Value of IS	5	O	1.00	1.00	2.00	20=
25	Managing Dispersed Computing	5	O	1.00	1.00	2.00	20=

The position of an issue in the 'Imp Rank' column indicates its relative (to other issues') overall importance in terms of how frequently the issue has occurred in the upper, middle, and lower thirds of the rankings. The issues appearing toward the top of the list

are judged to be more important overall than those toward the bottom of the list. In other words, the issues judged to be more important were generally ranked higher in the each of the annual surveys than the issues judged to be less important.

The 'Gen Imp Ind' (General Importance Indicator) value was used to determine the positions of the issues in the overall importance rankings. The general importance indicator was derived as follows.

$$\frac{Wt1(UC_{NA} + UC_{EU}) + Wt2(MC_{NA} + MC_{EU}) + Wt3(LC_{NA} + LC_{EU})}{N \text{ (Issue Duration)}}$$

We explained the derivation of a similar formula earlier in this chapter (in the section/sub-section on 'Analysis of Managers' Key Issue Data/Analysis of Issue Types and Importance/Issue importance'). The formula given directly above is the same except that both North American and European rankings are used at the same time - the NA and EU subscripts refer to the North American and European rankings.

Observations on Summary Results

Table 5.15, above, shows the rankings of each of the issues in terms of overall importance over the nine survey years. The top twelve positions are occupied by four new (N) issues and eight enduring (E) issues.

Top eight enduring (E) issues

The two highest ranked enduring issues are issues 1 (Aligning IS and Corporate Goals) and 18 (Organising and Utilising Data) – both of which are ranked 2=.

- Issue 1 occurred in the top third of the NA and EU rankings 15 out of 18 times. It was placed in the top three rankings 14 out of 18 times.
- Issue 2 occurred in the top third of the rankings for 16 out of 18 times. It was placed in the top three rankings 9 times out of 18.

The next highest is issue 12 (Instituting Cross-Functional Information Systems) – ranked 5th).

- Issue 12 occurred in the in top third 14 out of 18 times and was placed in the top three rankings 4 out of 18 times.

The next highest ranked is issue 3 (Connecting to Customers, etc.) – ranked 7th.

- Issue 3 occurred in the in top third 10 out of 18 times and was placed in the top three rankings, all during the period 1998-2000, 5 out of 18 times.

The next highest is issue 5 (Cutting IS Costs) – ranked 8th.

- Issue 5 occurred in the in top third 7 out of 18 times and was placed in the top three rankings 4 out of 18 times. All of these high placings occurred in the EU rankings. None of them occurred in the NA rankings.

The next highest ranked is issue 9 (Implementing Bus. Transformation Initiatives) – ranked 10th.

- Issue 10 occurred in the in top third 7 out of 18 times and was placed in the top three rankings 6 out of 18 times (all before 1997).

The next two highest ranked issues are issues 13 (Integrating Systems with the Internet) and 2 (Capitalising on Advances in IT) - ranked 11th and 12th respectively.

- Issue 13 occurred in the in top third 7 out of 18 times but was never placed in the top three rankings.
- Issue 2 was once placed in the top three rankings (3rd in NA in 1997) but only occurred in the top third 3 out of 18 times.

In general, the overall ranking levels and trends (if any) of the eight highest-ranked enduring issues were broadly similar between NA and Europe - with one notable exception. Issue 5 (Cutting IS Costs) consistently obtained much higher (more important rankings) in EU than in NA.

Top four new (N) issues

Two of the four new issues are ranked in the overall top four issues. These are:

- Issue 17 (Optimising Organisational Effectiveness) defined in the CSC questionnaire as “Partnering with the leadership team to determine how IT can improve business processes rather than focusing on operational efficiencies” – was ranked highest (1st.)

- Issue 16 (Optimising Enterprise-wide IS Services) defined in the CSC questionnaire as “Delivering integrated, coordinated technology services throughout the geographically dispersed organisation” – was ranked at 2=.

Between them, these two new issues were in the top three rankings 6 of the 10 times they occurred in the NA and EU surveys.

In general the overall ranking levels and trends of the four highest-ranked new issues were broadly similar between NA and Europe - with one notable exception. This was issue 5 (Protecting and Securing Information Systems) defined in the CSC questionnaire as “Eliminating vulnerabilities in systems to minimise risks and to safeguard information resources”. This issue only occurred in the most recent (and last) survey which was 2001. In the NA survey it ranked extremely important at 21/22. In Europe it was ranked far less important at 13/22. The destruction of the WTC, on September 11, cannot have contributed to the very high NA ranking because the NA survey returns were obtained and collated before September 11.

Possible effects of the bursting of the ‘Internet bubble’

The Internet/dotcom bubble rapidly grew in 1999 before reaching a peak and bursting in Q1 of 2000 – as exemplified by the NASDAQ Index shown in Fig. 5.4 below.



Figure 5.4: and NASDAQ Index (and Cisco Systems Stock Price) 1999-2004

(Hoovers_On-line, 2004)

It is probable that the growth and subsequent bursting of the ‘Internet bubble’ helps account for the fact that the ‘Internet-related’ issues generally increased in importance through the survey period until 1999/2000 and then dropped significantly in 2001.

There are three 'Internet-related' issues in the top twelve issues. These are:

- Issue 3 (Connecting to customers, suppliers, and/or partners electronically) – defined in the CSC questionnaire as “Using electronic links to tie into customers' and/or suppliers' systems”- overall rank 7th. This reached the top ranking (1) in both NA & EU in 2000. Then, in 2001, dropped to 6 and 4 in NA and EU respectively.
- Issue 13 (Integrating systems with the Internet) – defined in the CSC questionnaire as “Solving the technical problems of integrating heterogeneous hardware, software, and applications with Internet technologies”– overall rank 11th – reached ranks 4 (EU) and 5 (NA) in 1999. Then, in 2001, dropped to 10 and 18 in NA and EU respectively.
- Issue 7 (Developing an electronic business strategy) – defined in the CSC questionnaire as “Determining the best way to capitalise on the Internet for competitive advantage” – overall rank 9th – reached ranks 4 (NA) and 2 (EU) in 2000. Then, in 2001, dropped to 13 and 11 in NA and EU respectively. (This new issue has only been in the surveys since 1998).

Observations on Comparison of SIM (1994) Issues with CSC (1994) Issues

There are nine similar/comparable issues listed in both the SIM 1994 survey data (Brancheau et al., 1996) and the CSC 1994 survey data. These issues, together with their rankings in the two surveys, are shown overleaf in Table 5.16.

Table 5.16: Actual Rankings of the Nine Comparable SIM and CSC Issues in 1994

SIM Rnk (N=20)	SIM (1994) Key Issue	CSC Rnk (N=14)	CSC (1994) Key Issue
2	Facilitating and Managing Business Process Redesign	1	Implementing Bus. Trans. Initiatives
10	Improving IS Strategic Planning	2	Aligning IS and Corporate Goals
7	Making Effective Use of the Data Resource	3	Organising and Utilising Data
4	Developing and Implementing an Information Architecture	5	Creating an Information Architecture
6	Improving the Effectiveness of Software Development	6	Improving the Sys. Application Process
15	Managing the Existing Portfolio of Legacy Applications	7	Updating Obsolete Systems
8	Recruiting and Developing IS Human Resources	9	Improving the IS Human Resource
17	Using IS for Competitive Advantage	12	Using IT for Competitive Breakthroughs
13	Understanding IS Role and Contribution	14	Educating Management on IT

Although the surveys are not strictly comparable, in that the SIM survey asked respondents to identify issues of concern over the next 3-5 years (1994 to 1996/98) and the CSC survey asked them to identify issues of concern in the survey year (1994), it is still interesting to compare the rankings of the common issues in the two surveys. In particular, it is interesting to compare the issue rankings of the two groups of respondents to see if they appeared to be judging the common issues in a similar manner.

Table 5.17, overleaf, shows the relative positions of the nine common issues in the two 1994 surveys. The positions given in the two rank order columns (SIM Rnk and CSC Rnk) have been obtained by assuming that the respondents were just asked to rank the common issues – and further assuming that their rankings of the common issues would have been in the same order as they were in the full surveys!

Table 5.17: Relative Rankings of the Nine Comparable SIM and CSC Issues in 1994

Common Issue	SIM Rnk	CSC Rnk
Implementing Bus. Trans. Initiatives	1	1
Aligning IS and Corporate Goals	6	2
Organising and Utilising Data	4	3
Creating an Information Architecture	2	4
Improving the Sys. Application Process	3	5
Updating Obsolete Systems	8	6
Improving the IS Human Resource	5	7
Using IT for Competitive Breakthroughs	9	8
Educating Management on IT	7	9

The Spearman's ρ correlation coefficient for the nine pairs of SIM and CSC rankings in the above table is 0.683 (sig. < 5%). This shows a fairly strong positive correlation between how the two groups of respondents judged the relative importance of the common issues.

Note: Appendix 5.2 (Ch. 5 Spearman's ρ Data) contains the formula and data used to obtain the ρ values.

Chapter 6:

JOURNAL ARTICLE CLASSIFICATION

CHAPTER INTRODUCTION

Chapter purpose

The primary research question of this thesis is:

‘Are the topics published in IS journal articles related to the key issue topics reported to be of concern to IS managers?’

The primary purpose of this chapter is to explain how the data required to answer ‘the topics published in IS journal articles’ part of the research question was obtained.

The chapter first explains how a taxonomic scheme was developed so that the ‘topics’ covered in the target journal articles could be classified. It also explains the design of the database that was required to store the taxonomy and store the journal article abstract data in a form suitable for subsequent analysis. It goes on to explain how the taxonomy and database were used to classify the topic coverage of the target journal articles.

Chapter contents

In addition to this Introduction the chapter contains the ten main parts and a summary.

1. The Ontology for the Classification Scheme
2. Outline Structure of the Initial Taxonomy
3. The Detailed Initial Taxonomy
4. Design of the Journal Abstracts Database
5. Other Facets of the Article Classification Scheme
6. The Usage and Iterative Modification of the Initial Taxonomy
7. Summary of All Changes Made to the Initial Taxonomy
8. The Full Taxonomy and its Purpose & Usage
9. Derivation of the Final Taxonomy
10. The Final Taxonomy

The first part outlines how the ontology, upon which the taxonomic scheme is based, was developed. The second and third parts explain the hierarchical taxonomy that was developed and used to classify the topic coverage of the abstracts. The fourth part explains the design of the database that was required to store the taxonomy and store the journal article abstract data. It also demonstrates how the use of the database helps ensure the validity of the data capture/input process.

The fifth part outlines some secondary facets of the article classification scheme. These were included on the grounds that they may be useful in the 'Analysis of Journal Abstract Data' chapter this thesis and may be useful for further research.

The sixth part explains how the taxonomy and database were used to create and store the classification codes for each of the journal articles. It also explains how the initial taxonomy was iteratively developed throughout the classification coding process. The need to ensure classification consistency after changes were made to the taxonomy, and how this need was satisfied, are also explained

The seventh part summarises the iterative changes that were made to the 'initial taxonomy'¹, during the classification coding of each batch of the nine batches of abstracts, to arrive at the 'full taxonomy'¹. The eighth part reviews the purpose and usage of the full taxonomy. The ninth and tenth part outline why and how the final taxonomy was derived from the full taxonomy.

¹ **Preliminary explanatory note on 'initial', 'full', and 'final' taxonomies:** The very first version of the taxonomy is referred to as the 'initial' taxonomy. This was based upon MIS textbooks and a model undergraduate curriculum. It was realised that such a taxonomy would not necessarily provide all the detailed topic descriptors required to classify all the journal articles. Consequently, as the journal article classification process progressed, the initial taxonomy was iteratively developed by adding new detailed topic descriptors. The version of the taxonomy that included all these additions is referred to as the 'full' taxonomy. The full taxonomy was used to analyse the journal articles' coverage of the 'IS discipline' - as presented in the 'Initial Analysis & Observations on Missing Topics' part of Chapter 7 (Analysis of Journal Article Classification Data).

It was also realised that the initial taxonomy (based on the 'IS Discipline') may need to be modified to make the analysis of the topics that actually had been covered by the journal articles easier and clearer. So it was planned to modify the full taxonomy to more clearly describe the actual content of the IS journal articles - as opposed to how their content covered, or did not cover, 'the IS discipline'. The final taxonomy is the one that is used as the basis of the 'Final Analysis' part of Chapter 7.

THE ONTOLOGY FOR THE CLASSIFICATION SCHEME

Types of Ontology

In philosophy ‘ontology’ is a systematic account of existence. The term is now used widely in the database, AI, and knowledge representation worlds with a rather different meaning. The difference in meaning can probably be attributed to the fact that AI is more concerned with representations of knowledge about things that exist rather than existence *per se*.

Any body of (data, information, or) knowledge is based upon some abstract, simplified view of the part of the world, or universe of discourse, that we wish to represent for some purpose. Genesereth & Nilsson refer to this simplified view as a ‘conceptualisation’. Such a conceptualisation will include the objects, concepts, and other entities that are assumed to exist in the area of interest and the relationships that hold among them (Genesereth & Nilsson, 1987). This abstract view of the universe of discourse is referred to as a conceptual model in the database world.

In the AI and database world an ‘ontology’ is an explicit, and often formal, specification of a conceptualisation. In AI the ontology of a program can be described by a set of definitions of the entities in the universe of discourse (e.g. classes, relations, functions, or other objects) together with definitions of the formal axioms that constrain the interpretation and use of the defined entities.

Ontologies that are fully axiomatised and expressed in a formal language can sometimes be used to support automated reasoning. Such ontologies are often referred to as ‘heavyweight’ ontologies. At the other end of the ontology spectrum are the so-called ‘lightweight’ ontologies that are primarily used to organise and standardise information content. Controlled vocabularies, standardised taxonomies, concept hierarchies, and object models are common ways of expressing lightweight ontologies.

Welty provides the following spectrum of ontology types, differentiated in terms of their “*ontological depth*” (i.e. the degree to which they eliminate unintended models and interpretations).

1. Lexicon (Vocabulary with Natural Language definitions)
2. Simple Taxonomy
3. Thesaurus (Taxonomy plus related-terms)
4. Relational Model (Unconstrained use of arbitrary relations)
5. Taxonomy and relational model. (Type restrictions and is-a links, some notion of inheritance)
6. Fully Axiomatised Theory

(Welty, 2000)

Different levels of ontologies can also be developed to serve different levels of generality. Guarino proposes that ‘top-level’ ontologies describe all primitive general concepts such as space, time, matter, object, event, action, and so on (Guarino, 1997). Top or upper-level ontologies, are also sometimes referred to ‘foundational’ ontologies

Lower level ontologies are more domain, or task, specific. Several ontologies specific to the law domain have been developed and are used in systems such as:

POWER: Program for an Ontology-based working environment for rules and regulations (van Engers & Glasee, 2001)

GetAid (Stranieri & Zeleznikow, 2001)

ON-LINE: A Legal Information Server (Valente, 1995)

(All quoted in Zeleznikow & Stranieri, 2001)

Other domain specific ontologies have been developed for patient medical care (Falasconi et al., 1998), new product development in the chemical industry (Moore, Stader, Chung, Casson-du Mont, & Macintosh, 1999), and many other fields.

There is considerable debate on the relative importance of ‘upper-level’ versus ‘lower-level’ ontologies and ‘heavy-weight’ versus ‘light-weight ontologies’ (Masolo et al., 2002, page 6; Chandrasekaran, Josephson, & Benjamins, 1999). Most of this debate is outside the scope of this thesis (Masolo et al’s work is concerned with machine-processable ontological hierarchies for the Semantic Web).

Stevens et al (2000) provide a survey of biological ontologies and concludes that:

“the use to which the ontology is put largely determines the content of the ontology”.

(Stevens et al., 2000)

They make a number of other observations including the following.

“That ontology use influences the content and nature of the knowledge captured within an ontology is not a contradiction of the knowledge holding ability of ontologies. Not only does the purpose determine the scope and granularity to which the same knowledge is represented in different ontologies, but conceptualisations may differ without one being incorrect...

....so conceptualisations of the same domain may differ. Sometimes a constraint is necessary for an application and sometimes it is not needed for another, this simply changes what knowledge is captured or how it is captured, it does not change the knowledge itself.”

Stevens et al's Ontology Development Method

The method, used in this thesis, to develop the ontology is based upon a modification of “*the skeletal development lifecycle method*” described by Stevens et al. Their overall process moves through the life-cycle stages depicted in Figure 6.1 overleaf.

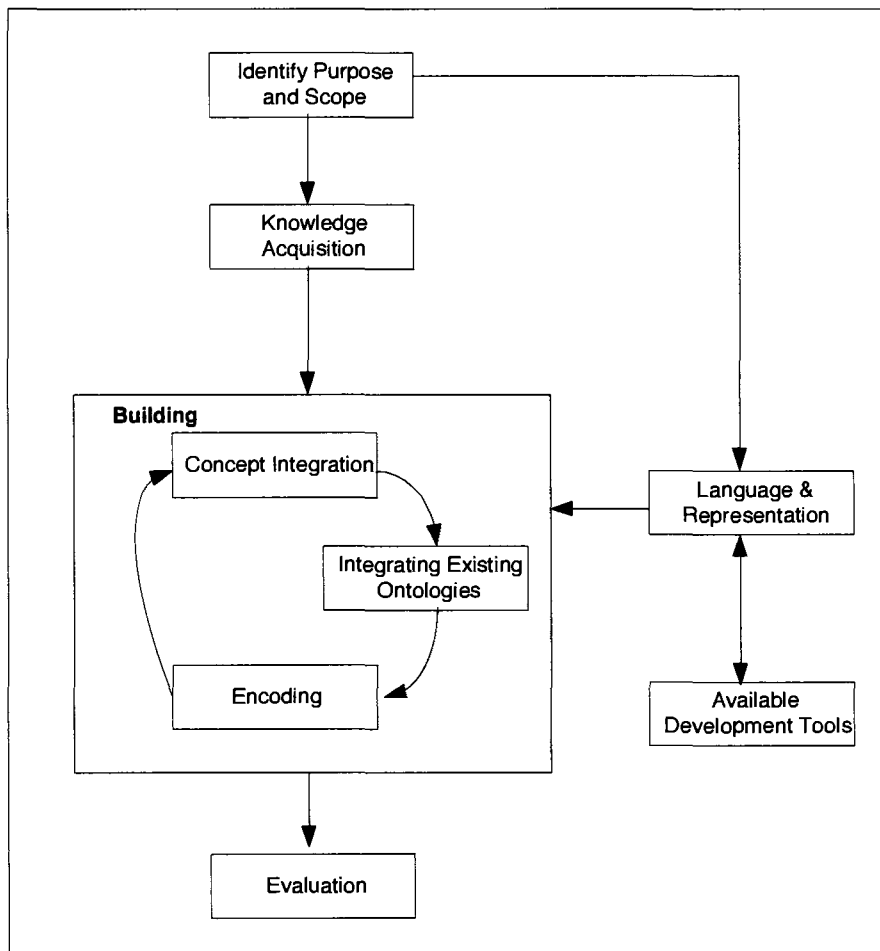


Figure 6.1: Stevens et al's Ontology Building Life Cycle.

(Stevens et al., 2000, Figure 2)

Salient extracts of each of Stevens et al's (Stevens et al., 2000) stage descriptions are given below.

Identify purpose and scope:

"...developing a requirements specification for the ontology by identifying the intended scope and purpose of the ontology ...It can be seenthat the use to which an ontology is put has a great effect on the content and style of that ontology".

Knowledge Acquisition:

"...the process of acquiring domain knowledge from which the ontology will be built. Sources span the complete range of knowledge holders: Specialist biologists; database metadata; standard text books; research papers and other ontologies. ...The TaO, being built

to query databases, extracted a large part of its knowledge from database documentation. Standard texts also contributed to the knowledge of core molecular biology.”

Conceptualisation:

“... identifying the key concepts that exist in the domain, their properties and the relationships that hold between them; identifying natural language terms to refer to such concepts, relations and attributes; and structuring domain knowledge into explicit conceptual models.The ontology is usually described using some informal terminology. Gruber suggests writing lists of the concepts to be contained within the ontology and exploring other ontologies to re-use all or part of their conceptualisations and terminologies. At this stage it is important to bear the results of the first step, that of requirements gathering, in mind.”

Integrating:

“...use or specialise an existing ontology: a task frequently hindered by the inadequate documentation of existing ontologies, notably their implicit assumptions. Using a generic ontology, such as MBO (Molecular Biology Ontology)... gives a deeper definition of the concepts in the chosen domain.”

Encoding:

“...representing the conceptualisation in some formal language, e.g. frames, object models or logic”.

Documentation and Tools:

“...informal and formal complete definitions, assumptions and examples are essential to promote the appropriate use and re-use of an ontology. Tools are essential to aid the ontologist in constructing an ontology, and merging multiple ontologies. These tools also usually contain mechanisms for visualising and checking the resulting model...”

Evaluation:

“...determining the appropriateness of an ontology for its intended application. Evaluation is done pragmatically, by assessing the competency of the ontology to satisfy the requirements of its application, including determining the consistency, completeness and conciseness of an ontology.... Conciseness implies an absence of redundancy in the definitions of an ontology and an appropriate granularity. For example, an ontology that modelled protein molecules at the atomic resolution when the amino acid level would suffice would not be considered concise”.

Ontology Development Method and Stages Used in this Thesis

Method outline

A slightly modified version of Stevens et al's method was used to develop the ontology for this thesis. The overall process used moves through the life-cycle stages depicted in Figure 6.2 below.

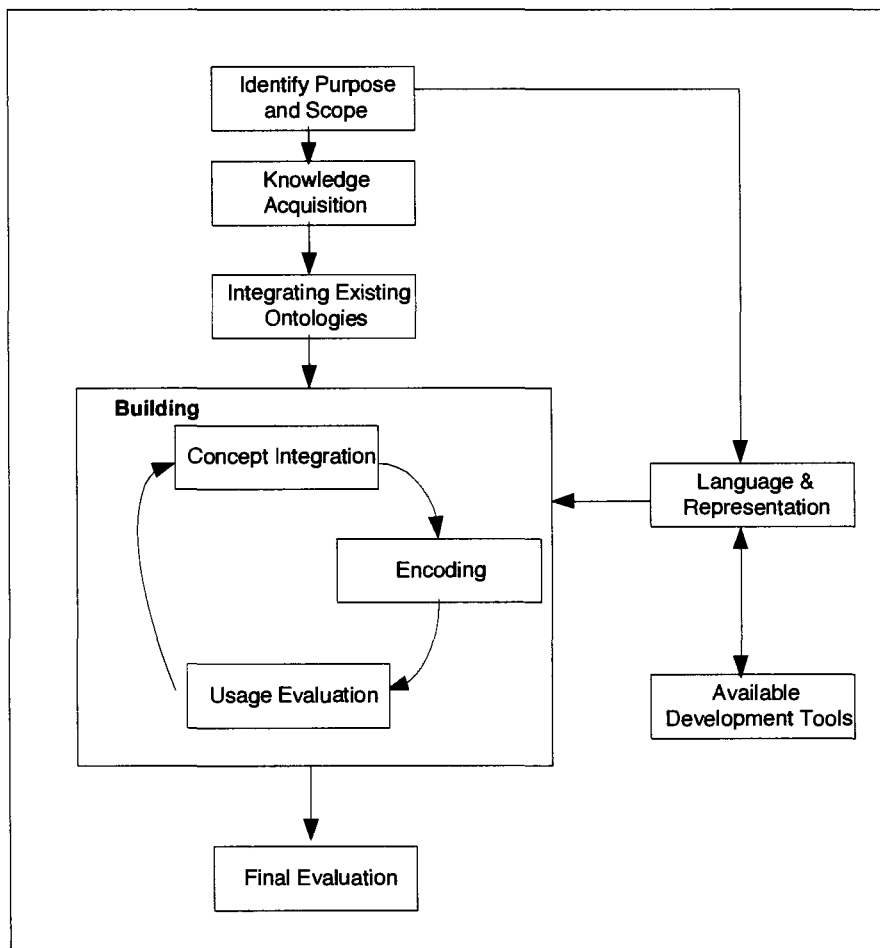


Figure 6.2: The Ontology Building Life-cycle Used in this Thesis.

The main changes made to Stevens' methodology were;

- Moving the 'Integrating Existing Methodologies' stage from the iterative 'Building' phase to an earlier one-off stage.
- Creating a new 'Usage Evaluation' stage and incorporating it into the iterative 'Building' phase.

Purpose and scope of the ontology and resultant taxonomy

The primary research question to be answered by this research is:

‘Are the topics published in IS journal articles related to the key issue topics reported to be of concern to IS managers?’

Secondary research questions include determining if managers key concerns are lag or lead indicators of IS journal topic counts and determining if the nature of these relationships vary between journals. In particular the ontology has to provide means of:

- Reflecting the major subject areas of the discipline over the research period.
- Reflecting the structure of the discipline and its published literature.
- Creating a schema that will allow the IS topics covered in the IS journal articles to be classified in a comprehensive and coherent manner which is mappable to the management key issues in the key issue surveys.
- Serving the general classification needs of the researcher (comprehensiveness, ease of use, and ideally parsimony)
- Creating a logical schema for the capture, storage and analysis of the journal article abstract data (that is appropriate for answering the research questions).

Bearing in mind the above requirements it was decided that a low-level (i.e. IS domain specific) and lightweight (i.e. not fully axiomatised) ontology would be most suitable. The classification and analysis was to be carried out by the researcher, as opposed to using automatic AI techniques, and therefore full axiomatisation was not required. The ontology was to consist of a basic hierarchical taxonomy and relational model providing some type restrictions, is-a links, and some notion of inheritance - as described by Welty (Welty, 2000).

The hierarchical taxonomy and relational model provided the basis of the design of the database used to store, classify, and analyse the abstract data.

Investigation of existing taxonomies

A number of subject taxonomies and classification systems, which are widely used for classifying IS and computing journal articles, already exist. Therefore, one may ask why does this research project require yet another classification system and why cannot an existing system suffice?

The major existing classification systems (e.g. the ISRL system used by MISQ, and the CCS used by the ACM journals) were designed to meet objectives that are quite different to the objectives of a classification scheme suitable for this research project. The existing classification schemes are primarily designed to facilitate article retrieval as opposed to article subject classification.

Also, when such schemes have been updated and redesigned in the past the redesign exercises have been constrained by a number of factors that have led to design weaknesses. One particular constraint has been the need to ensure that references to articles classified under previous versions of the schemes were not lost or obliterated. This has led to two major redesign problems. First, obsolete subject descriptors are often kept to prevent obliterating the references to articles that were originally classified under them. Second, the redesign of the higher levels of a classification tree, when required by changes in the structure of the discipline, has sometimes been avoided so as to maintain a strong resemblance to their earlier versions.

The 1998 ACM CCS Update Committee Report (Coulter et al., 1998) cited the latter as the reason for not altering the overall structure of the CCS even though it no longer accurately reflected the contemporary taxonomy of the discipline. (They did state that a major design of the CCS that would reach into the higher node levels was being considered for the future).

The author assumes that the difficulties associated with deleting/retiring obsolete subject descriptors and the difficulties of introducing new ones helps account for the fact that some of the major classification schemes appear to be somewhat dated at the lower levels. For example, the MISQ Keyword Classification Scheme (Barki, Rivard, & Talbot, 1993) – which appears to have been last updated in June 1993 – does not contain many contemporary IS/IT subject descriptors. Terms such as: eB (Electronic Business), EC (Electronic Commerce), Internet, WWW (Web or World Wide Web), Intranet, Extranet; are not included in the scheme. Similarly, applications such as: data warehousing, data marts, call centres, CRM systems; are not included in the scheme. Additionally, some contemporary conceptual terms, such as “virtual”, are only included with their archaic usage (i.e. virtual memory).

Knowledge acquisition for the development of the initial taxonomy

The ACM CCS Update Committee Report (1998) pointed out that a major weakness of the ACM's CCS was that:

“...some of the nine major subject areas identified in the 1989 ACM report “Computing as a Discipline” [5] and further refined in such documents as the ACM/IEEE-CS report “Computing Curricula 1991” [6] and the 1997 *CRC Handbook of Computer Science and Engineering* [7] are not coherently identified in the higher levels of the CCS”.

(Coulter et al., 1998)

Consequently, the starting point for the development of the initial taxonomy for this project was to try to identify the major subject areas that currently make up the ‘IS discipline’ and ‘IS Curricula’. The source material for the subjects in the IS discipline was obtained from leading MIS textbooks and the source material for the subjects in the IS curriculum was obtained from the ACM/AIS/AITP “IS 2002: Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems” (Gorgone et al., 2002).

It was realised that the initial taxonomy, based upon MIS textbooks and a model undergraduate curriculum, would not necessarily provide all the detailed topic descriptors that would be required to classify all the journal articles. However, it was hoped that the initial taxonomy would provide a fairly coherent upper-level classification system.

Subject areas in IS curricula

In order to ascertain the subject areas and subject topics that are included in ‘IS Curricula’ the content of the “IS 2002: Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems” was examined. The ‘model curriculum’ was jointly produced by a number of academic/professional IS associations in the US. The members of the group producing the model curriculum include representatives from the: Association for Computing Machinery (ACM), Association for Information Systems (AIS), and Association of Information Technology Professionals (AITP).

The IS 2002 report points out that the overarching objective for IS professionals is to enable organisations to utilise computer and communications and related information technology to achieve their strategic objectives with a customer service orientation. The report goes on to present a high-level categorisation of the desired IS graduate exit characteristics that emphasises the central role of Technology-Enabled Business Development at the intersection of the following four major areas.

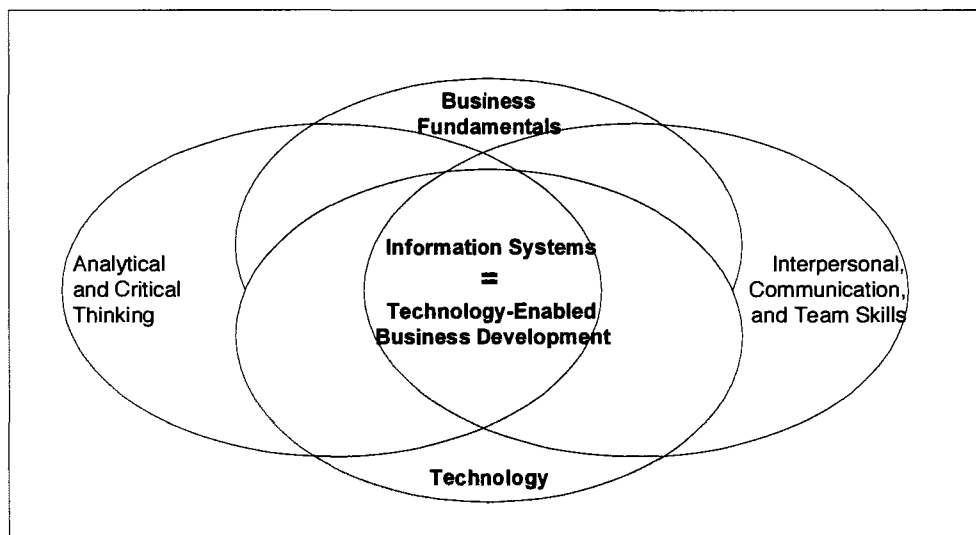


Figure 6.3: High-level Characterisation of IS Graduate Exit Characteristics

(Adapted from Fig. 1 in Gorgone et al., 2002)

The report divides the main categories into subcategories. However, for our purpose, of developing our taxonomy, we are only really concerned with the 'Business Fundamentals', 'Technology', and 'Information Systems = Technology Enabled Business Development Categories'. The sub-categories of these are shown in Table 6.1 overleaf.

Table 6.1: Subset of Representative Capabilities and Knowledge Expected for IS Program Graduates

<p><u>Business Fundamentals</u></p> <p>Business Models: Contemporary and emerging business models; Organizational theory, structure, and functions; System concepts and theories</p> <p>Functional Business Areas: Accounting, Finance, Marketing, Human Resources, Logistics and Manufacturing</p> <p>Evaluation of Business Performance: Benchmarking; Value chain and value network analysis; Quality, effectiveness, and efficiency; Valuation of organizations; Evaluation of investment performance.</p> <p><u>Technology</u></p> <p>Application Development: Programming - principles, objects, algorithms, modules, testing; Application development – requirements, spec's, development; Algorithmic design - data, object, and file structures; Client-server software development</p> <p>Internet Systems Architecture and Development: Web page development; Web architecture design and development; Design and development of multi-tiered architectures</p> <p>Database Design and Administration: Modeling and design, construction, schema tools, and DB Systems; Triggers, stored procedures, design and development of audit controls; Administration: security, safety, backup, repairs, and replicating</p> <p>Systems Infrastructure and Integration: Computer systems hardware; Networking (LAN/WAN) and telecommunications; LAN/WAN design and management; Systems software; Operating systems management; Systems configuration, operation, and administration.</p> <p><u>Information Systems</u></p> <p>Systems Analysis and Design, Business Process Design, Systems Implementation, IS Project Management: including - Strategic utilization of information technology and systems; IS planning; IT and organizational systems; Systems analysis; Logical and physical design; Design execution; Testing; Deployment; Maintenance; Use of IT; Customer service.</p> <p>Ethics and Professionalism: including Ethical theory, Legal and regulatory standards</p>

(The contents of the table above are extracted from Table 2 'Representative Capabilities and Knowledge Expected for IS Program Graduates' of Gorgone et al., 2002)

Subject areas in the IS discipline

In order to ascertain the subject areas and subject topics that are included in the 'IS discipline' the contents of nine leading MIS textbooks, published between 2000 and 2003, were examined and collated (Alter, 2001a; Curtis, 2001; Jessup & Valacich, 2002; Laudon & Laudon, 2002; McLeod & Schell, 2000; O'Brien, 2003; Post & Anderson, 2003; Thompson & Cats-Baril, 2003; Zwass, 2001).

The analysis revealed that there was considerable similarity between the subject area content of the various texts. A summary of the results of the analysis is shown in Table 6.2 below. The cell entries in the body of the table show in which chapters of the texts the subject topics occurred. Entries in parentheses indicate that the subject area was given only a fairly superficial treatment.

Table 6.2 MIS Textbook Subject Groupings

Subject Area	Alter	C & C	J & V	L & L	M & S	O'B	P & A	Thom.	Zwas.
1 IS & Bus. Concepts & Drivers	(2)	1	1	2,3	1,2, 6	1	1	1 (&6)	1,2,18
2 Business Processes & BPR	3			12		2.1		10	13
3 Computer Hardware	8	3	A. A	6	(8)	3	2	(2)	4
4 Computer Software	9,5	3	A. B	6		4	2	(2)	5
5 Data Management	4	8	3	7	(9)	5	6	3	6
6 Telecoms. & Networks	10	4	A. C	8	(10)	6	3	4	7
7 Strategic IS & Comp. Advantage	(1)	(2)	2	(13)	2	2	9	(6),9	3
8 Functional Systems	5		6	(2)	11,12,1 4-18	7	(5)		8,9,12
9 Web & EC Fundamentals & Apps.	6	5		9	3	8	(3,5,10)	5	7
10 eB & Cross-functional Systems	5,6	(6)	7	4		7	7	(10)	
11 Decision Support, AI, & KM	3,5	7,17		10,11	13	9	8,9	8	10,11
12 Sys. Procurement (Dev. & Imp.)	12	10-16	8		7	10	12	11,12	15,16
13 Security & Control	13	9	9	14		11.2	4	(13)	(14)
14 IS Management				(1,3,6,7)	18	12	13	13	14
15 IS Planning	11	2	(2)	(3)		12	(9)	7,(6)	13
16 Social & Ethical Issues	7		9	5	4,5	11.1	14	14	17

Key to author name abbreviations used in column headings

Alter = Alter; C & C = Curtis & Cobham; J & V = Jessup & Valacich; L & L = Laudon & Laudon; M & S = Macleod & Schell; O'B = O'Brien; P & A = Post & Anderson; Thom. = Thompson; and Zwas. = Zwass.

Omission of journal articles from the knowledge acquisition process

As stated earlier, the starting point for the development of the initial taxonomy was to try to identify the major subject areas that currently make up the 'IS discipline' based upon MIS textbooks and IS curricula. This initial taxonomy is then to be used to classify the topics covered by IS journal articles. It was realised that journal articles may include topics that do not occur in IS textbooks and curricula – and therefore do not

occur in the initial taxonomy. However, as explained earlier, the full taxonomy was to be developed iteratively. Consequently, journal article topics that did not appear in the initial taxonomy were added to the taxonomy as they were discovered. The analysis of the topics covered (based upon both the full and final taxonomies) by the IS journal articles will be discussed in the next chapter.

It was also expected that not all the topics included in the initial taxonomy would necessarily occur in the journal articles. The analysis of the major differences between the content of the 'IS discipline', as expressed in the full taxonomy, and the content of IS journal articles will be discussed in the next chapter.

Conceptualisation and coding scheme development

The results of the conceptualisation and coding scheme development stages are the hierarchical taxonomy and relational model that provides the basis of the design of the database used to store, classify, and analyse the abstract data. These are detailed in the next three major parts of this chapter (i.e. the 'Outline Structure of the Initial Taxonomy', 'The Detailed Initial Taxonomy' and the 'Design of the Journal Abstracts Database' parts of the chapter.).

Documentation and tools

The tools chosen to develop and document the taxonomy were Microsoft Access and TreeView. Access was used to store, classify, and analyse the abstract and taxonomy data.

TreeView, which is a simple Java application, was used to provide the graphic visualisation of the hierarchical taxonomy. This visualisation was used while classifying the abstracts. TreeView is free (but unsupported) software provided by Wordmap Ltd (www.wordmap.com).

Iterative usage evaluation

As explained earlier, a new 'Usage Evaluation' stage was incorporated into the iterative 'Building' phase of the original Stevens' et al methodology. How this was done is explained in the later part of this chapter which covers the 'Usage and Iterative Modification of the Taxonomy'.

Final evaluation

The penultimate part of this chapter 'The Final taxonomy' provides a brief evaluation of the number and type of changes that were required during the iterative development of the full taxonomy from the initial taxonomy. It also summarises how the number of taxonomic nodes was significantly reduced during the derivation of the final taxonomy from the full taxonomy.

OUTLINE STRUCTURE OF THE INITIAL TAXONOMY

Overall Structure

The heart of the taxonomy is a hierarchical tree structure that allows the scheme to be displayed in a collapsible/expandable 'Windows Explorer' type format.

In addition to the root node the hierarchy contains five hierarchical levels (CASTL).

These are:

Subject Class

 Subject Area

Subject

Topic

Leaf (Topic Descriptor)

The classification tree extends to four letter-coded levels in order that the tree was able to accurately reflect the essential structure of the discipline over the period covered by this research. Topic descriptors (a numerically coded fifth level of the tree) provide both classification precision and flexibility. Topic descriptors were intended to change during the iterative taxonomy evaluations that take place at various stages in the classification exercise. New descriptors were introduced for new topics that occurred in the articles but were not present in the original scheme. Also, topic descriptors that did not get used were retired (at the end of the classification exercise). Newly introduced and retired items were recorded.

Subject Classes

At the top level the tree consists of just three first-level Subject Class nodes. These are:

ORG: Organisational

MIS: MIS, and

TEC: Technology

These three Subject Classes roughly map to the 'Business Fundamentals', 'Information Systems', and 'Technology' subject areas of the 'IS 2002: Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems' (Gorgone et al., 2002).

The three subject classes also map to Lee's 'Technology', 'Organisational Setting', and 'MIS' triad (Lee, 1999).

These three subject classes are also identified by our earlier definition of the focus of the MIS discipline which was 'the focus of the MIS discipline lies at the intersection of, or interaction between, ICT (information and communications technology) and its organisational impact and effects'.

Subject Areas

At the second level, each of the top-level nodes is exploded into between 2 and 4 Subject Area nodes. For example, the MIS Subject Class node is exploded into the four Subject Areas shown below.

M: MIS

MS:	MIS Scholarship
MM:	MIS Management
MI:	MIS Implementation
MA:	MIS Applications

Subjects

At the third level each Subject Area node is further sub-divided into between two and six Subject nodes. For example, the 'MM: MIS Management' Subject Area node is exploded into the six Subjects as shown in Fig. 6.4 below.

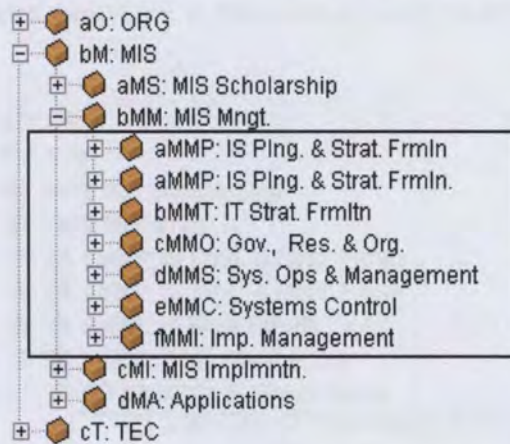


Figure 6.4: Example of the Position of 'Subjects' in the Taxonomy

Topics

Each Subject node is further sub-divided at the fourth level into several Topic nodes. For example, the 'MMO: IS Function Governance, Resourcing & Organisation' node is sub-divided at the fourth level into four Topic nodes – as shown in Fig. 6.5 below.

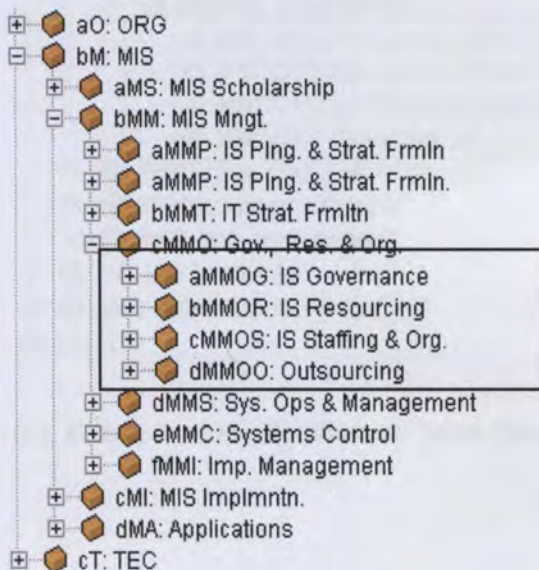


Figure 6.5: Example of the Position of 'Topics' in the Taxonomy

Topic Descriptors (Leaves)

Each Topic node is further sub-divided at the fifth, and most detailed, level into between one and ten 'Topic Descriptors' or leaf nodes. Fig. 6.6, below, shows how the 'IS Function Governance, Resourcing & Organisation' Subject node is decomposed to four Topic nodes which are in turn decomposed to fifteen low-level Topic Descriptors

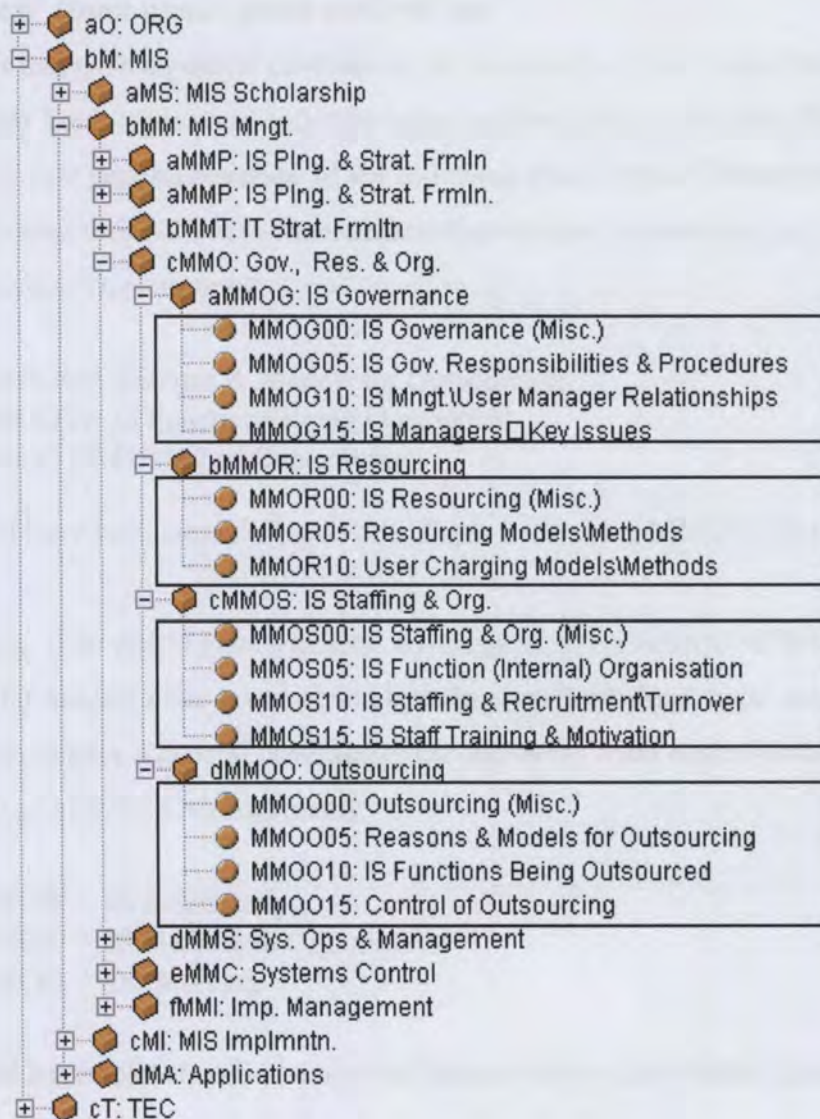


Figure 6.6: Example of the Position of 'Topic Descriptors/Leaves' in the Taxonomy

'Miscellaneous' topic descriptors (leaves)

Most of the Topic nodes in the taxonomy have a 'Miscellaneous' (Misc.) topic descriptor leaf. A journal article abstract was allocated a 'Miscellaneous' topic leaf classification if it covered topics judged to be within the general area of the Topic but it did not specifically cover any of the established Topic Descriptors.

'General' topic descriptors and roll-up

Articles that gave a general coverage of all (or several of) the Topic Descriptors under a particular Topic node were coded by using just the Topic node value. For example, if an article gave a general coverage of the following three Topics Descriptors (within the overall context of MIS/MIS Management/Governance, Resourcing, & Organisation/Outsourcing):

- MMOO05: Reasons & Models for Outsourcing
- MMOO10: IS Functions Being Outsourced
- MMOO15: Control of Outsourcing

it would have been classified under the Topic node value MMOO (Outsourcing)

Similarly, if an article gave a general coverage of all (or several of) the Topics under a particular Subject node it was coded by using just the Subject node value. For example if an article gave a general coverage of the following three topics (within the overall context of MIS/MIS Management):

- MMOR IS Resourcing
- MMOS IS Staffing & Organisation
- MMOO Outsourcing

it would have been classified under the Subject node value MMO (Governance, Resourcing, & Organisation).

This type of roll-up was used in cases where an article covered all of (or several of) the categories contained in the next lower level of the taxonomy.

THE DETAILED INITIAL TAXONOMY

The Initial Taxonomy

Appendix 6.1, 'The Initial (Detailed) Hierarchical Taxonomy' contains screen shots (from the TreeView tool) that show the complete initial taxonomic hierarchy. The screen shots are displayed in the following tables in the Appendix.

1. Table A6.1.1 shows the top three levels (Subject Class, Subject Area, and Subject) of the complete taxonomy.
2. Table A6.1.2, shows the bottom three levels (Subject, Topic, Topic Descriptor) of the hierarchy for the 'Organisational' Subject Class of the taxonomy.
3. Table A6.1.3, shows the bottom three levels (Subject, Topic, Topic Descriptor) of the hierarchy for the 'MIS' Subject Class of the taxonomy.
4. Table A6.1.4, shows the bottom three levels (Subject, Topic, Topic Descriptor) of the hierarchy for the 'Technology' Subject Class of the taxonomy

Number of Topic Descriptors in the Initial Taxonomy

The numbers in the last (L5) column of Table 6.3 show how many detailed topic descriptors are associated with each Subject (Level 3) node and their component Level 4 Topic nodes (Level 4 Topics are not shown in Table 6.3 but they are shown in Appendix 6.1).

Table 6.3: Subject Class, Subject Area, and Subject Levels of the Taxonomy

LEVEL 1 Subject Class		LEVEL 2 Subject Area		LEVEL 3 Subject		L5			
O: ORGANISATIONAL	66	OE: Org. Environment	31	OEB: Business Environment	13				
				OES: Socio-pol. Environment	8				
				OEL: Legal Environment	10				
		OD: Org. Dynamics	35	ODC: Organisation Creation	10				
				ODS: Organisation Structure	9				
				ODT: Org. Transformation	13				
				ODD: Org. Decision Making	3				
				M: MIS	191	MS: MIS Scholarship	23	MSR: MIS Research	12
								MSE: MIS Education	11
						MM: MIS Mngt.	86	MMP: IS Plng. & Strat. Fmln.	23
MMT: IT Strat. Fmrltn	19								
MMO: Gov., Res. & Org.	15								
MMS: Sys. Ops & Management	10								
MI: MIS Implmntn.	26	MA: Applications	56	MMC: Systems Control	9				
				MMI: Imp. Management	10				
				MIP: Apps. Procurement Procs.	17				
				MIM: Maint. & Migration Procs.	9				
				MAS: Support Applications	20				
				MAF: Core Functional Apps.	13				
T: TECHNOLOGY	89	TN: Ntwks. & Coms.	32	MAM: Multi-fcnl./EW Apps.	8				
				MAE: Extended Enterprise Apps.	15				
				TNG: Networks - General	22				
		TH: Hardware	33	TS: Software Tech	12	TNT: Network Types & Tech.	10		
						THC: Computer Systems	10		
						THS: Data Storage Technology	8		
						THP: Processor Technology	5		
						THI: Input/Output Technology	10		
		TT: Tech. Standards	12	TTO: Other Standards	2	TSS: Systems Software	6		
						TSX: Expert Sys. & AI	6		
						TTG: Standards Issues	1		
						TTW: Intrnt/Web Stnds. & Prtcls.	9		
						346			

Contents of the Initial Taxonomy Topics Table

Appendix 6.2 shows the initial contents of the Taxonomy_Topics table. The data typing and format of the taxonomy topic identification (Tax_ID) column was designed to be suitable for display by the TreeView graphical presentation tool.

DESIGN OF THE JOURNAL ABSTRACTS DATABASE

Need for the Database

A database was required to store the taxonomy and store the journal article abstract data in a form that was suitable for subsequent analysis. Subsequent analysis included deriving topic scores counts by journal and period over the journal publication period covered by the research (1995 – 2001). The use of a database also helped ensure the validity of the data capture/input process.

Logical Schema for the Database (Primary Tables)

The entity-relationship diagram for the database primary tables is shown in Fig. 6.7 below

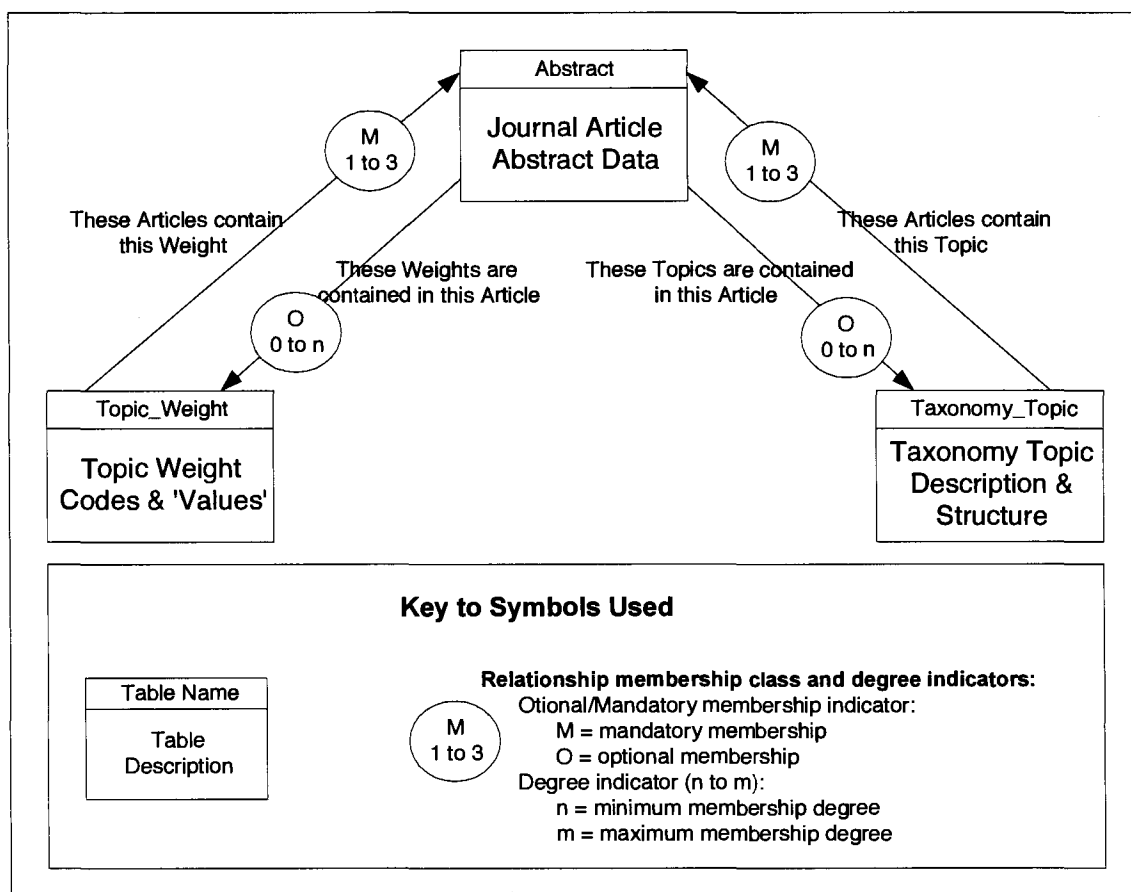


Figure 6.7: ERD for Abstract Database (Primary Tables)

Primary and secondary tables

The tables shown in the figure above are referred to as ‘primary tables’ because the data they contain is concerned with answering the basic research question of what ‘topics’ were published in which IS journals and when they were published. However the overall classification scheme also used a number of other minor facets – these gave rise to a number of secondary tables. These are described in more detail in the later part of this chapter on ‘Other Facets of the Article Classification Scheme’. The minor facets were included on the grounds that they may be useful in the ‘Analysis of Journal Abstract Data’ chapter of this thesis and may also be useful for further research.

Design of the Journal Article Abstract (Abstract) Table

Axioms underlying the design of the Abstract table

The basic axioms underlying the design of the table follow.

1. Articles are created by (at least one and possibly more) AUTHOR(s).
2. Articles are published in a (single) JOURNAL at a single time-point (PUBLICATION QUARTER).
3. All articles have TITLES and ABSTRACTS.
4. All articles will address (at least one and up to three) information systems TOPICs.

(Axioms 1 –3 are a simplified adaptation of Gruber’s “Bibliographic Data Ontology” appearing in Gruber, 1994).

The term ‘TOPIC’ in the above list refers to the ‘Topic Descriptor’ value(s) used to classify the topic(s) covered by the article. Topic Descriptors (Leaves) were explained in the earlier part of this chapter – ‘Outline Structure of the Initial Taxonomy’. (That part also explained how ‘roll-up’ would be used in cases where an article covered all (or several) of the categories contained in the next lower level of the taxonomy).

All the rest of the terms in the above list are self-explanatory. These axioms formed the basis of the design of the Abstract table – as shown overleaf in Table 6.4.

Table 6.4: 'Abstract' Table Design

id	Field Description	Field Name	M or O	id	Field Description	Field Name	M or O
01	Reference Number	RefNo	M	18	Author's Abstract	AuthAbstract	O
02	Journal Name	JCode	M	19	Author's Key Words	AuthKeyWords	O
03	Journal Publication Year	PubYr	M	20	ISRL Categories	ISRLCategories	O
04	Journal Volume	Vol	M	21	Geographic Area	Geo_Area	M*
05	Journal Issue	Iss	M	22	Industrial Sector	Ind_Sector	M*
06	Publication Quarter	MyQuarter	O	23	Organisational Unit Size	Org_Unit	M*
07	Start Page	StartPage	O	24	IT Unit Size	IT_Unit	M*
08	End Page	EndPage	O	25	Research Purpose	Res_Purpose	M*
09	Page Count	PageCount	O	26	Research Method	Res_Method	M*
10	Number of Pages	NoOfPages	O	27	Research Perspective	Res_Perspective	M*
11	Article Title	Title	M	28	Topic 1 Identifier	Topic_1_ID	M*
12	Name of First Author	Author1	M	29	Topic 2 Identifier	Topic_2_ID	O*
13	Names of Other Authors	AuthorsOther	O	30	Topic 3 Identifier	Topic_3_ID	O*
14	ProQuest Subject Terms	PQSubjTerms	O	31	Topic 1 Weight	Topic_1_Wgt	M*
15	ProQuest Classification Terms	PQClassCodes	O	32	Topic 2 Weight	Topic_2_Wgt	O*
16	Article Abstract	PQAbstract	M	33	Topic 3 Weight	Topic_3_Wgt	O*
17	ProQuest Geographic Area	PQGeographic	O	34	Notes	Notes	O

Notes.

1. Field 1 (RefNo) is the primary key – the value was generated by the DBMS on data entry.
2. The 'Mandatory or Optional' column shows whether the presence of the field (during input) is mandatory or optional.
3. M* - indicates that the mandatory field value must exist in the referenced (parent) table.
4. O* - indicates if a value for the field is entered, even though the presence of the field is optional, the value must exist in the referenced (parent) table.
5. Fields 3 to 20 (except for field 6) are obtained from the ProQuest abstracts.
6. Field 6 'MyQuarter' refers to the year and quarter in which the article was published. As different journals use different methods of describing their publication date this field was left empty until all the abstract data had been entered. It was then manually entered by using Fields 3, 4 and 5 (PubYr, Vol, Iss) to derive the required 'MyQuarter' date value.
7. Fields 21 to 27 are explained in the later part of this chapter on 'Other Facets of the Article Classification Scheme'.
8. Fields 28 to 33 are explained directly below.

The Topic_ID and Topic_Weight fields

The Topic_ID fields (Topic_1_ID, Topic_2_ID, and Topic_3_ID) fields were used to enter the Topic Descriptors (taxonomy leaf node values) that were used to classify the topics covered in the article. More than just one Topic Descriptor can be used to classify a single article because a single article could cover more than one taxonomy descriptor (or Topic). A maximum of three Topic Descriptor values was decided upon because it seemed adequate and had been reported to as being adequate to classify IS journal articles in a similar study (Palvia, 1999).

If the article was exclusively (or almost exclusively) concerned with a single topic then only one of the Topic_ID fields (Topic_1_ID) was entered. However, if the article was concerned with more than one topic then Topic_2_ID, and Topic_3_ID values may have been entered. Each article must have had at least one topic value entered but could have no more than three topic values entered.

The Topic Weight (Topic_Wgt) values were used to indicate the judgement made (when coding the abstracts) of the relative coverage of the different topics for articles that covered two or three topics. They were not intended to be precise numeric measures of topic coverage. Topic_Wgt 'values' of 4, 3, 2, 1, or E could be assigned.

If an article covered only one topic then a topic weight of 4 was assigned to indicate that the article was concerned exclusively (or almost exclusively) with that single topic.

If an article was primarily concerned with more than one topic then the following weight combinations could have been used.

Table 6.5: Topic Weight Combination Cases

	Topic_1_Wgt	Topic_2_Wgt	Topic_3_Wgt
Case 1	3	1	
Case 2	2	2	
Case 3	2	1	1
Case 4	E	E	E

Case 1 values would indicate that most of the article (say between than 70% to 80%) was judged to be concerned with topic 1 but that a significant minority (say between 20% and 30%) of the article was judged to be concerned with topic 2.

Case 2 values would indicate that about half of the article (say between than 40% and 60%) was judged to be concerned with topic 1 and about half the article (say between 40% and 60%) of the article was judged to be concerned with topic 2. (Case 2 also covered the situation where an article appeared to cover three topics but one of the topics was ignored because it was judged to be less than 20% of the whole article).

Case 3 values would indicate that the majority of the article (say between than 40% and 60%) was judged to be concerned with topic 1 but that a significant minority (say between 20% and 30%) of the article was judged to be concerned with topic 2 and a significant minority (say between 20% and 30%) was judged to be concerned with topic 3.

Case 4 values would indicate that about one third of the article (say between 30% and 35%) was judged to be concerned with topic 1 and similarly for topics 2 and 3.

Table 6.6 below summarises the permissible combinations of Topic Weights and their 'approximate values'. It is important to remember that the Topic Weight values are intended to indicate the judgement made (when coding the abstracts) of the relative coverage of the different topics in articles that cover two or three topics. They are not intended to be precise numerical measures of topic coverage.

Table 6.6: Permissible Topic Weight Combinations & 'Approximate Values'

Topic_1_Wgt	Topic_2_Wgt	Topic_3_Wgt
4 (>80%)		
2 (45-55%)	2 (45-55%)	
3 (70-80%)	1 (20-30%)	
2 (45-55%)	1 (20-30%)	1 (20-30%)
E (30-35%)	E (30-35%)	E (30-35%)

Design of the Taxonomy_Topics and Topic_Wgt Tables

Taxonomy_Topics table

Previous parts of this chapter ('Outline Structure of the Initial Taxonomy' and 'The Detailed Initial Taxonomy') have explained the taxonomy and its structure. The taxonomy and its structure are stored on the database in the Taxonomy_Topics table.

The structure of this table is shown in Table 6.7 below. Appendix 6.2 ‘Contents of Initial Taxonomy_Topics Table’ also shows the initial contents of the table.

Table 6.7: ‘Taxonomy_Topics’ Table Design

id	Field Description	Field Name	Notes
01	Topic Identifier	Topic_ID	The node identifier e.g. ‘OEBD05’. This is the table’s primary key. All Abstract.Topic_IDs must refer to a valid Taxonomy_Topics.Topic_ID value.
02	Topic Level	Topic_Level	The level of the node in the taxonomy e.g. Class, Area, Subject, Topic, or Leaf
03	Topic Name	Name	Short node label e.g. ‘OEBD05:Turbulent Business Environment’
04	Topic structure identifier	Tax_ID	See Note1 below

Notes.

1. The Topic structure identifier (Tax_ID) column was designed to be suitable for display by the TreeView graphical presentation tool – as explained in Appendix 6.2. TreeView requires that each node identifier contains all that node’s antecedents’ identifiers separated by solidi (/). For example; if the leaf node ‘OEBD05: Turbulent Business Environment’ is a member of the Topic ‘OEBD: Contmp. Bus. Drivers’ which is a member of the Subject ‘OEB: Business Environment’ which is a member of the Area ‘OE: Org. Environment’ which is a member of the Class ‘O: ORG’, then the topic structure identifier would be (in simplified form) – ‘O: ORG/OE: Org. Environment/OEB: Business Environment/OEBD: Contmp. Bus. Drivers/OEBD05: Turbulent Business Environment’.
2. All fields are mandatory and NOT NULL

Topic_Wgt Table

The Topic Weights table (Topic_Wgt) table contains just two columns. The first column, the Topic_Wgt column, is the primary key of the table and contains the five permissible topic weight identifiers (1, 2, 3, 4, and E) as explained in earlier in the ‘The Topic_ID and Topic_Weight fields’ sub-section. The second column, the Topic_Wgt_Desc column, contains the ‘Approximate Values’ associated with each of the topic weights – as explained in the earlier sub-section referred to directly above. All Abstract.Topic_Wgt entries must refer to a valid Taxonomy_Topics.Topic_Wgt identifier.

Use of Unnormalised Tables

As can be seen from Figure 6.7, ‘ERD for Abstract Database (Primary Tables)’, the database design is not in third normal form. There are many-to-many relationships between the Abstract and Taxonomy_Topic tables and between the Abstract and Topic_Weight tables. The unnormalised structure of the data in the Abstract table is also

shown in Table 6.4 where there is a repeating group of Topic_ID and Topic_Weight fields.

The main reason for designing an unnormalised database was to minimise the number of tables required and the amount of data capture/entry. Many other bibliographic 'databases' (e.g. ProQuest) are also unnormalised.

However, in order to analyse the data in the unnormalised tables it was necessary to create a view (virtual Table) that contains one row for each individual Topic_ID entry in the Abstract table. Consequently, if a single (unnormalised) Abstract table record contained three repeating Topic_ID and Topic_Wgt values it would give rise to three separate rows in the view table. The view {YA09AllAbstractTopicCodings} was created by joining the columns from the Abstract and Taxonomy Topics tables (using the columns Taxonomy_Topics.Topic_ID, Abstract.RefNo, Abstract.TopicID, Abstract.TopicWgt) to give a table that contains one row for each individual Topic ID entry in the Abstract table.

OTHER FACETS OF THE ARTICLE CLASSIFICATION SCHEME

Other Facets

As already explained, earlier in this chapter, the overall classification scheme uses a number of other minor facets. The minor facets were included on the grounds that they may be useful in the 'Analysis of Journal Abstract Data' chapter of this thesis and may be useful for further research. The minor facets included:

- Geographic Area Classification
- Industry Sector Classification
- Organisational Unit Classification
- Informational Technology Unit Size Classification
- Research Approach (Purpose, Method, Perspective) Classification

The details of the classification schemes and code values used for the minor facets are presented Appendix 6.3, 'Other Facets of the Classification Scheme'.

Final Database Schema

The final database schema includes tables and relationships to provide for the minor facet classifications of the abstracts. Figure 6.8, below shows the ERD for the final database schema.

On the ERD the tables that are required to provide for the minor facet classifications of the abstracts are shown in light grey. The membership type of the Abstract records in all relationships with the minor facet tables is mandatory. (This constraint is not specifically shown on the ERD).

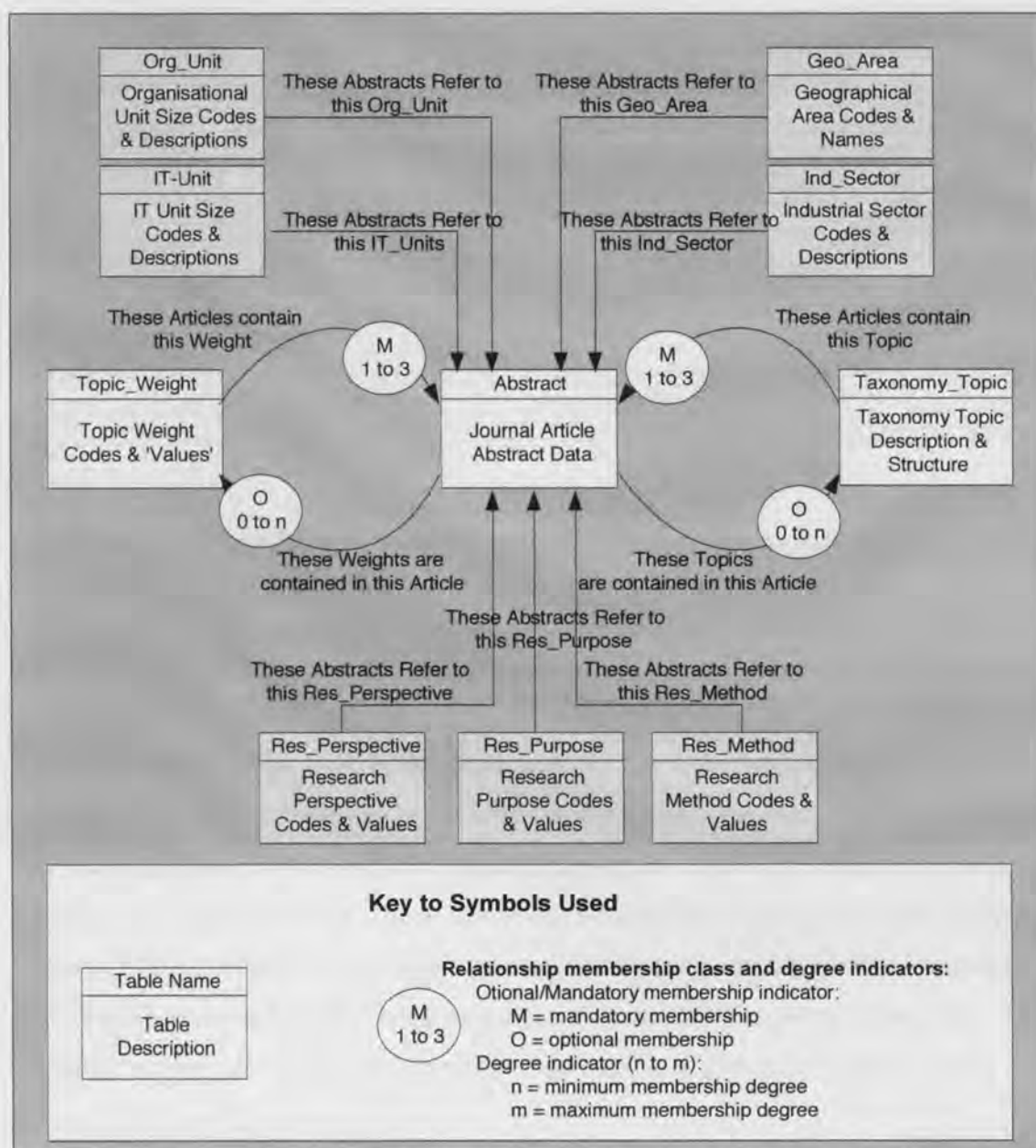


Figure 6.8: ERD for Final Database Schema

THE USAGE AND ITERATIVE MODIFICATION OF THE INITIAL TAXONOMY

Usage of the Taxonomy and Database

The journal article abstracts were first loaded into the Abstract table in the database. Once the Abstract table has been populated the abstracts it contained could be displayed/printed via the AbstractCodingForm screen shown in Fig. 6.9 below.

AbstractCodingForm					
RefNo	Title			Author	
1021	The effects of MIS steering committees on information technology management sophistication			Jahangi Karimi	
PubYr	Vol	PQSubTerms	PQClassCodes	AuthAbstract	
2000	17	Studies Information technology Managerial skills	9130: Experimental/theoretical 5220: Information technology management 2200: Managerial skills	Despite the ever increasing importance of information technology (IT) in firms, the extent to which IT management practices are applied creatively to critical tasks varies widely across firms. For over a decade, firms have employed IT steering committees to manage their IT resources. However, the impacts of such committees on the IT management function have not been examined in depth. This paper hypothesized relationships between the level of sophistication of IT steering committees and level of IT sophistication of management within firms, and tested those relationships empirically via a field survey of 213 IT managers in the financial services industry. Results of the study suggest that presence and roles of IT steering committees are significantly related to the level and nature of IT management sophistication within firms. Firms interested in achieving the most benefit from their steering committees should carefully select their preferred roles depending on the type and the level of IT management sophistication desired. The article concludes with discussion and implications for IT researchers and firms' executives.	
JCode	Iss	AuthKeyWords			
JMI	2	information technology management, information technology management sophistication, steering committees			
PQGeographic	PQAbstract				
Despite the ever increasing importance of information technology (IT) in firms, the extent to which IT management practices are applied creatively to critical tasks varies widely across firms. For over a decade, firms have employed IT steering committees to manage their IT resources. However, the impacts of such committees on the IT management function have not been examined in depth. This paper hypothesized relationships between the level of sophistication of IT steering committees and level of IT sophistication of management within firms, and tested those relationships empirically via a field survey of 213 IT managers in the financial services industry. Results of the study suggest that presence and roles of IT steering committees are significantly related to the level and nature of IT management sophistication within firms. Firms interested in achieving the most benefit from their steering committees should carefully select their preferred roles depending on the type and the level of IT management sophistication desired. The article concludes with discussion and implications for IT researchers and firms' executives.					
Geo_Area	Org_Unit	Res_Purpose	Topic_1_ID	Topic_1_W/gt	Topic_Coding_Notes
Ind_Sector	IT_Unit	Res_Method	Topic_2_ID	Topic_2_W/gt	
		Res_Perspective	Topic_3_ID	Topic_3_W/gt	

Figure 6.9: AbstractCodingForm Screen (Without Classification Code Entries)

The Taxonomy_Topics table in the database holds the taxonomy structure and node labels. Data from this table can be imported into the TreeView tool. TreeView can then be used to produce the hierarchical visual display of the taxonomy (examples of which are shown in Appendix 6.2). The abstracts can be classified using the on-line TreeView display of the taxonomy. The classification codes for each abstract can then be entered into the Abstract table in the database using the AbstractCodingForm screen. An example of the screen, with classification code entries, is shown in Fig. 6.10 below.

AbstractCodingForm					
RefNo	Title				
1021	The effects of MIS steering committees on information technology management sophistication				
PubYr	Vol	PQSubjTerms	PQClassCodes	AuthAbstract	
2000	17	Studies Information technology Managerial skills	9130: Experimental/theoretical 5220: Information technology management 2200: Managerial skills	: Despite the ever increasing imp practices are applied creatively to steering committees to manage th function have not been examine of IT steering committees and lev empirically via a field survey of 2 presence and roles of IT steering sophistication within firms. Firms i carefully select their preferred rol The article concludes with discu:	
JCode	Iss				
JMI	2				
PQGeographic					
AuthKeyWords					
information technology management, information technology management sophistication, steering committees					
PQAbstract					
Despite the ever increasing importance of information technology (IT) in firms, the extent to which IT management prac decade, firms have employed IT steering committees to manage their IT resources. However, the impacts of such con paper hypothesized relationships between the level of sophistication of IT steering committees and level of IT sophistic field survey of 213 IT managers in the financial services industry. Results of the study suggest that presence and roles management sophistication within firms. Firms interested in achieving the most benefit from their steering committees sh management sophistication desired. The article concludes with discussion and implications for IT researchers and firms					
Geo_Area	Org_Unit	Res_Purpose	Topic_1_ID	Topic_1_Wgt	Topic_Co
XX	CO	D	MMOG05	4	
Ind_Sector	IT_Unit	Res_Method	Topic_2_ID	Topic_2_Wgt	
10	XXX	S			
		Res_Perspective	Topic_3_ID	Topic_3_Wgt	
		P			

Figure 6.10: AbstractCodingForm Screen (With Classification Code Entries)

Iterative (and Other) Modifications Made to the Initial Taxonomy

The iterative batch input and taxonomy revision process

The 1376 unclassified abstracts, initially loaded to the database, were classified and coded in ten separate batches. Revisions were made to the initial taxonomy after each input batch.

Each batch was coded by reference to the current version of the TreeView taxonomy. During the coding of each batch a small number of article classification 'problem cases' would arise. These problem cases were noted on the abstract coding forms and dealt with after the rest of the batch had been input. Dealing with the problem cases involved modifying the taxonomy to cater for them. The revised versions of the TreeView and

database taxonomies were then used to code and input the problem case articles. (The next sub-section, 'Modifications made to the taxonomy to cater for classification problem cases' explains the nature and treatment of these cases in more detail). The revised version of the taxonomy that was used to code and input the problem cases for batch n became the current version of the taxonomy for the coding and input of batch n+1.

The abstracts contained in each batch are shown in Table A6.4.1 of Appendix 6.4. 'Details of the Iterative Changes Made to the Initial Taxonomy'. The full details of the process used to input each batch are explained in the 'Detailed batch input procedure' sub-section of the same appendix.

Modifications made to the taxonomy to cater for classification 'problem cases'

A classification 'problem case' arises when it is judged that an abstract cannot be correctly coded using the current version of the taxonomy. As outlined above, the problem cases were examined (toward the end of each batch) and the taxonomy was modified to cater for them. Three of the most typical reasons for this type of situation - and the actions that need to be taken to resolve it are shown in Table 6.8.

Table 6.8: Classification Problems and Required Actions

Chng. Type	Classification Problem	Required Action
1	The article covers a topic that is included in the taxonomy but the current node descriptor does not explicitly describe that facet of the topic.	Qualify (Q) the meaning of the existing node by recording its additional facet(s)
2	The article covers a topic that is judged to be included in the current taxonomy but the current node descriptor does not adequately describe the topic	Modify (M) the label of existing node descriptor so that it more clearly describes the topics it includes.
3	The article covers a topic that is not included in the current taxonomy	Add (A) a new node to the taxonomy to cater for the article
4	Several articles cover a topic that is just part of an existing taxonomy node.	Split the existing node into two or more nodes. This usually involves adding (A) a new node that it is more specific to the group of articles and modifying (M) the label of the existing node so as to exclude articles that should now be classed under the new node.

Examples of the four types of changes, outlined in the table above, are given in the 'Iterative Taxonomy Revision Process & Resultant Taxonomy Changes' section of Appendix 6.4.

Maintaining classification consistency after taxonomy changes

Whenever changes (particularly structural changes such as node splitting) are made to the taxonomy it is possible for classification consistency to be compromised. To prevent loss of classification consistency it was necessary to identify any articles, already classified under a previous version of the taxonomy, that need to be re-classified as a result of any changes made to the taxonomy.

The 'Classification Consistency Maintenance Procedure' section of Appendix 6.4 outlines the general procedure that was used to maintain classification consistency after taxonomy changes. The appendix also provides a specific example of the procedure as it was used for specific taxonomy changes.

Outline of Other Changes Made to the Taxonomy

Two minor structural changes and one re-classification change were also made to the taxonomy. These were as follows.

1. Merging the Strategic Information Systems Planning (SISP) 'Scope' & 'Focus' topic groups into a single SISP Locus (Scope & Focus) topic group.
2. Merging the IT Strategy (ITS) 'Scope' & 'Focus' topic groups into a single ITS Locus topic group.
3. Re-examination and re-coding of the '00: Misc' classifications at the end of Batch 7

The first two structural changes were made because there was semantic overlap between the two pairs of topic groups. A more detailed explanation of these changes including how they were carried out and details of the previously coded abstracts that needed to be re-classified as a result of the changes is given in the 'Details of the Merging of the SISP and ITS 'Scope' & 'Focus' Topics' in Appendix 6.5 (Details of the Other Changes Made to the Initial Taxonomy).

The '00: Misc' re-examination was done to ascertain whether several of the abstracts originally classified under a particular Topic's '00: Misc.' leaf covered common material and therefore warranted the creation of a new leaf node within that Topic. A more detailed explanation of why this was done, the processes that were used, and the summary results are given in 'Details of the Re-coding of '00: Misc' Classifications' section of Appendix 6.5. The appendix also shows the details of the re-examination and the detailed taxonomy and classification changes that resulted from the re-examination.

SUMMARY OF ALL CHANGES MADE TO THE INITIAL TAXONOMY

Table A6.5.2 in the last section of Appendix 6.5 (Summary of All Changes Made to the Initial Taxonomy) provides a summary of all the changes that were made to the taxonomy. These include the changes made to the taxonomy during the input of each batch of abstracts (as detailed in Appendix 6.4) as well and the merging of the strategic 'scope & focus' topics and the '00: Misc' re-classification exercises detailed in Appendix 6.4.

The table shows the changes by the type of node changed (Subject, Topic, and Leaf) and the type of change made – node Qualification (Q), node Modification (M), node Addition (A), and node Deletion (D).

Table 6.9, directly below, is a summary of Table A6.5.2 and shows the net percentage increase in the number of nodes that occurred as a result of all the changes that were made to the initial taxonomy.

Table 6.9: Percentage Increase in Node as a Result of All Taxonomy Changes

	Class	Area	Subject	Topic	Leaf
Initial taxonomy node counts	3	10	32	93	346
Net node additions during usage	0	0	2	4	97
% Increase in nodes during usage	0%	0%	6%	4%	28%

As explained toward the start of this chapter it was realised that the initial taxonomy, based upon MIS textbooks and a model curriculum, would not necessarily provide all the detailed topic descriptors that would be required to classify all the journal articles. It was expected that new nodes would need to be iteratively added to each version of the initial taxonomy to cater for the new topics that were discovered during each the input of each batch of journal article classifications. It can be seen, from Table 6.11, that the number of leaf nodes (the lowest level of the taxonomy) had to be increased quite considerably (by 28%) during usage – as expected. However, very few changes were required to the upper levels (Class, Area, Subject, and Topic) of the taxonomy.

THE FULL TAXONOMY AND ITS PURPOSE & USAGE

The version of the taxonomy that resulted from the iterative additions (and minor restructuring and '00-Misc' re-classifications) made to the initial taxonomy is referred to as the 'full taxonomy'. Appendix 6.6 contains TreeView screen shots of the full taxonomy. The first figure (Fig. A6.6.1) shows the higher-level (Class, Area, and Subject) nodes of the complete taxonomy. The subsequent figures show all the nodes (including Area, Subject, Topic and Leaf nodes) of the three Classes of the complete full taxonomy.

The purpose of the full taxonomy is to describe the content and structure of the IS discipline as reflected in the discipline's textbooks, syllabus, and target research publications.

The primary intended uses of the full taxonomy were to:

1. classify the topics covered by the target research publication articles
2. provide a means of assessing the target journal articles' coverage of the discipline.

The 'Initial Analysis & Observations on Missing' Topics' part of the next chapter makes use of the full taxonomy to analyse the journal articles' coverage of the IS discipline.

DERIVATION OF THE FINAL TAXONOMY

Introduction

It was expected that not all the topics included in the initial or full taxonomies would necessarily occur in the journal articles. So it was planned to modify the full taxonomy to more clearly describe the actual content of the IS journal articles – as opposed to how their content covered, or did not cover, the IS discipline. The resultant modified version of the full taxonomy is referred to as the ‘final’ taxonomy. The final taxonomy was subsequently used to conduct the ‘Final Analysis’ that is presented in Chapter 7.

Summary of the Changes Made to the Full Taxonomy to Create the Final Taxonomy

One major restructuring change and five other minor changes were made to the full taxonomy to arrive at the final taxonomy. The basic purpose of these changes was to reduce the size of the taxonomy in terms of the number of nodes it contained and, more importantly, to make the analysis of the topics that had actually been covered by the journal articles easier and clearer.

The major restructuring change first involved identifying the major IS research subject areas that had been covered by the articles that had been classified. The structure of the taxonomy was then modified to more clearly reflect these major IS research Subjects and their component Topics and Leaves. The final part of the change process required the re-classification of the abstracts that now belonged to these newly created Topic and Leaf nodes. This major IS research area re-classification exercise was carried out before the minor changes. Details of the IS research area re-classification exercise are given in the next section.

Summaries of the five minor changes are given directly below. The summaries are listed in the same sequence that the taxonomy changes were carried out. Further details of the rationale and change process used for these changes can be found in the appendices shown in square brackets after the summary description. The appendices also contain a summary and full detail of the taxonomy and re-classification changes that were made.

1. **Further Rationalisation of the IS & IT Strategy Subject Areas of the Taxonomy** – this involved rationalising the taxonomy by merging two overlapping Subject areas into a single new Subject node. The purpose of the restructuring was to remove the semantic overlap between the two subject areas in the full taxonomy and to reduce the overall number of nodes (particularly unused nodes) in those areas. The resultant merged taxonomy contained 18 nodes compared to 44 in original full taxonomy.
[Appendix 6.7: Details of the MMP & MMT Re-Classification & Re-Coding Exercise]

2. **Re-Examination of '00: Misc.' Container Classifications** - this was done to ascertain whether several of the abstracts originally classified under a particular Topic's '00: Misc.' leaf covered common material and therefore warranted the creation of a new leaf node within that Topic.
[Appendix 6.8: Details of the Re-examination of the '00: Misc' Container Classifications]

3. **Empty Leaf Node Deletion** - empty leaf nodes, and their parent nodes not having any populated child nodes, were deleted to help simplify, and reduce the size of, the final taxonomy. 132 empty nodes were removed from the taxonomy as a result of this exercise.
[Appendix 6.9: Details of the Empty Leaf Node Deletion Exercise]

4. **'Insignificant' Leaf Node Roll-Up and Deletion** – the basic rationale for this exercise was to help simplify, and reduce the size of, the final taxonomy. This exercise involved changing the classification codes of the abstracts allocated to leaf nodes that had less than three abstracts classified under them (deemed 'insignificant' nodes) to their container class values (i.e. the associated '00: Misc' node values) followed by deleting the emptied insignificant nodes from the database. The exercise revealed that 98 leaf nodes had less than three abstracts classified under them. In total these nodes contained 139 article classifications which were subsequently re-coded to the relevant '00: Misc' leaf node values. The 98 that had been emptied were then deleted.
[Appendix 6.10: Details of the Insignificant Leaf Node Roll-Up & Deletion Exercise]

5. Addition of CASTL Roll-Up Codes and Publication Period Codes to the

Database – the CASTL roll-up codes were added to the Taxonomy_Topics table to allow the topic count data to be analysed by Class, Area, Subject, and Topic as well as by Leaf. Standard publication period (MyQuarter) codes were added to each record in the Abstract table to allow the topic count data to be analysed by standard time period.

[Appendix 6.11 Addition of 'CASTL' Roll-Up & Publication Period Codes]

The Major IS Research Area Re-Classification Exercise

Rationale for the re-classification exercise

It was expected that if major IS research areas could be identified then the taxonomy could be modified to more clearly reflect them and their component Topics and topic descriptor Leaves. Part of the improvements to the clarity of the taxonomy, for describing the actual content of the IS journal articles, was expected to be:

- Improved precision of classification in terms of reducing the number of articles with multiple classification codes, and
- Finer specificity and granularity of 'popular' IS research area topics.

To illustrate the above two points let us consider just one of the topic descriptor leaves in the original taxonomy - MASG35 (GDSS\Computer Mediated Collab. Support). This was one of the leaves under the MIS Applications/Support Applications/Group-work Support topic group node. Articles that were concerned with GDSS applications, for example, were classified under MASG35. However, many of the articles that were given a MASG35 classification were not solely concerned with GDSS applications *per se*. They were often also concerned with theoretical group decision making models and processes. Consequently, such articles were also given another classification.

In fact, 68% (45) of the 66 articles originally coded as MASG35 had more than one classification code. Twenty-five of these 45 articles, were also coded with one of the ODDM (Org. Dynamics /Org. Decision Making/ODDM: Decision\Learning Models) topic descriptors. After the completion of the Major MIS Research Area Re-

Classifications exercise less than 17% (11) of the articles originally coded as MASG35 required more than one classification code.

Two of the new leaf nodes created in the re-classification process were:

- MIS Scholarship /Major Research Areas/Computer Supported Cooperative Communication Systems research (CSCCS)Research/MRAC20: Process (& Cog. Proc.)\Outcome Expmnts. & Models
- MIS Scholarship /Major Research Areas/Computer Supported Cooperative Communication Systems research (CSCCS) Research/MRAC25: Social Psych. Expmnts. & Models (inc. AST)

These two nodes have a much greater degree of specificity than the initial classifications (GDSS applications + Decision/Learning models) for two very popular IS research areas. In the final taxonomy MRAC25 had the second highest count (54 articles) and MRAC20 had the seventh highest count (27).

Initial identification of major IS research areas

After the completion of the journal article abstract classification exercise 348 nodes (out of the total of 586) in the full taxonomy had been used in the classifications. Appendix 6.12 'Full Taxonomy Non-Zero Topic Counts and Values' shows these nodes in descending order of node value (Val).

An initial visual analysis of the top 50 nodes (which accounted for more than 50% of all article values) revealed three 'major IS research area' subject groupings that were not already catered for in the full taxonomy. These 'new' IS subject areas were subsequently labelled:

- SUPA** User Satisfaction, Usage, Performance & Acceptance research
- CSCCS** Computer Supported Cooperative Communication Systems research
- DEESS** Decision, Expert, & Exec. Support Systems research

Outline of the basic procedure used for the 'Major IS Research Area Re-Classification' exercise

The general re-classification process contained the following main steps.

1. Analysing the results of the journal article abstract classification exercise (the 'Full Taxonomy Non-Zero Topic Counts and Values' list) to identify candidate 'new' research area sub-taxonomies.
2. Designing a sub-taxonomy for each of the new areas.
3. Determining which articles (already coded under the full taxonomy) needed to be re-examined so as to determine if they could be more correctly coded under the new sub-taxonomy.
4. Re-examining the relevant articles and re-coding them when necessary.

Further details of the 'Major IS Research Area Re-Classification' exercise

Full details of the research area re-classification exercise are contained in the following appendices:

Appendix 6.13: Details of the 'SUPA' Re-Classification & Re-Coding Exercise

Appendix 6.14: Details of the 'CSCCS' Re-Classification & Re-Coding Exercise

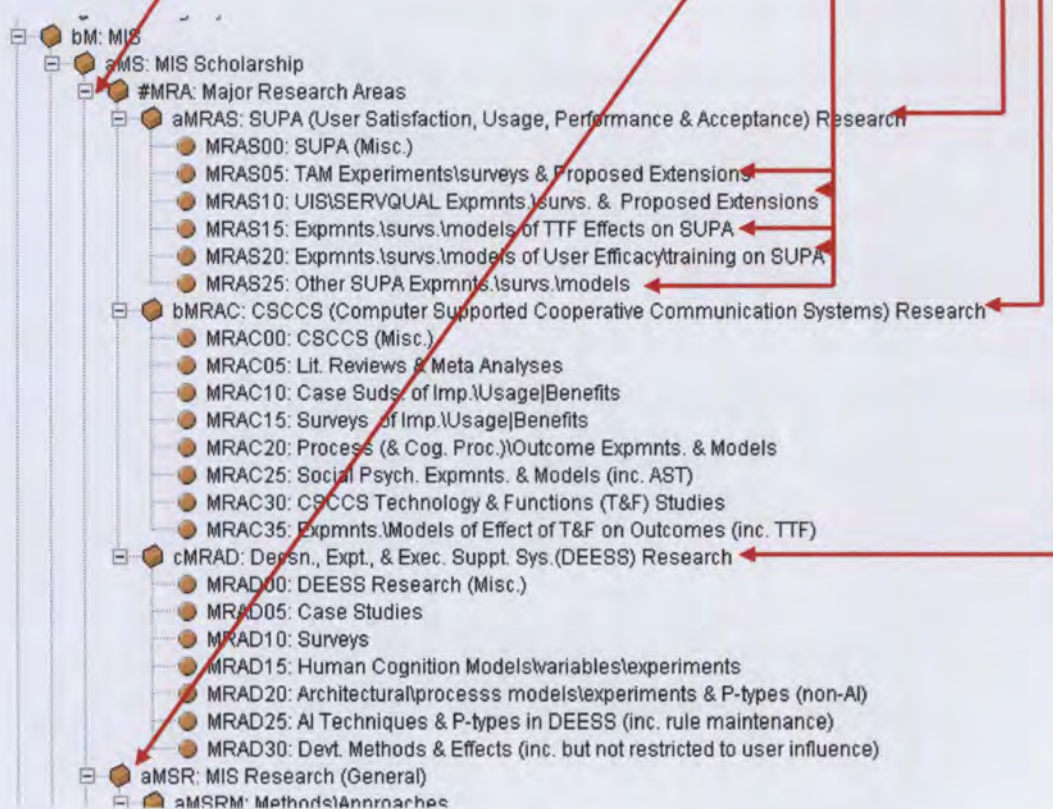
Appendix 6.15: Details of the 'DEESS' Re-Classification & Re-Coding Exercise

The appendix for each area contains the following details.

- The 'Top 50' nodes leading to the identification of the 'new' area
- The references used in the design of the sub-taxonomy
- The resultant research area sub-taxonomy
- Details of which articles were re-examined to determine if re-coding was required
- Results of the re-examination and resultant re-coding

Summary of the new sub-taxonomies produced as a result of the exercise

A new subject node 'Major Research Areas' was added to the 'MIS\MIS Scholarship' subject area (Subject Class\Subject Area) node. The three new research area topic nodes (SUPA, CSCCS, and DEESS) were then created as children of the 'Major Research Areas' subject node. Then, the associated topic leaf descriptor nodes were added to each of the new topic nodes. The existing 'MIS Research' subject node (MIS\MIS Scholarship\MIS Research) was renamed 'MIS Research (General)'



Summary of the SUPA, CSCCS, and DEESS re-classification exercises

Table 6.10, overleaf, provides a summary of the SUPA, CSCCS, and DEESS re-classification exercise results in terms of the:

- No. of abstracts re-examined.
- No. of re-examined abstract codings left unchanged (ASWAS).
- No. of re-coded abstracts originally having a single classification code.
- No. of re-coded abstracts having a single classification code after re-coding.

Table 6.10: Summary of Results of SUPA, CSCCS, and DEESS Re-classification Exercise

	SUPA	CSCCS	DEESS	Totals
No. of abstracts re-examined to determine if re-coding was required	58	156	154	368
No. of abstract codings left 'ASWAS'	0	18	74	92
No. actually re-coded	58	138	80	276
No. of re-coded abstracts originally having a single classification code	36	58	23	117
No. of re-coded abstracts having a single classification code after re-coding	34	108	73	215

THE FINAL TAXONOMY

Appendix 6.16 ‘The Final Taxonomy’ shows screen shots of the TreeView display of the final taxonomy.

Tables 6.11, 6.12, and 6.13, below, show the distribution of node counts by Class (ORG, MIS, and TEC) and type (C, A, S, T, and L) for the Initial, Full, and Final taxonomies respectively.

Table 6.11: Initial Taxonomy Node Counts

	Class	Area	Subject	Topic	Leaf	Total
ORG	1	2	7	15	66	91
MIS	1	4	14	49	191	259
TEC	1	4	11	29	89	134
Total	3	10	32	93	346	484

Table 6.12: Full Taxonomy Node Counts

	Class	Area	Subject	Topic	Leaf	Total
ORG	1	2	8	18	93	122
MIS	1	4	15	49	239	308
TEC	1	4	11	30	111	157
Total	3	10	34	97	443	587

Table 6.13: Final Taxonomy Node Counts

	Class	Area	Subject	Topic	Leaf	Total
ORG	1	2	8	17	47	75
MIS	1	4	15	48	155	223
TEC	1	4	7	17	22	51
Total	3	10	30	82	224	349

It can be seen from the three tables above that the number of leaf nodes increased significantly during the iterative development of the taxonomy during the article classification exercise. The number of leaf nodes increased from 346 in the initial taxonomy to 443 in the full taxonomy – a 28% increase. This was expected as it was

realised that the initial taxonomy (based on textbooks and an IS syllabus) would be unlikely to contain all the topic descriptor leaves to classify IS research articles.

It can also be seen that the number of leaf nodes was significantly reduced during the derivation of the final taxonomy. The number of leaf nodes decreased from 443 in the full taxonomy to 224 in the final taxonomy – a 49% decrease. This was also expected as it was realised that the IS research articles may not cover all the topics in a taxonomy based upon the ‘taught IS discipline’ (upon which the full taxonomy was partially based).

CHAPTER SUMMARY

This chapter first explained how a taxonomic scheme was developed so that the topics covered in the target journal articles could be classified. The content and structure of this initial IS taxonomy was based upon the content of some of the IS discipline's textbooks and a syllabus. The chapter then went on to explain the design of the database that was required to store the taxonomy and store the journal article abstract data in a form suitable for subsequent analysis.

We then explained how the initial taxonomy and database were used to classify the topic coverage of the target journal articles. This was followed by a summary of the iterative changes that were made to the initial taxonomy during article the classification exercise. These expected taxonomic changes were necessary because the initial taxonomy, based on textbooks and a syllabus, did not contain all the topic descriptor nodes required to classify all the research articles. These iterative changes, made to the initial taxonomy, resulted in the full taxonomy.

It was planned to modify the full taxonomy because it was expected that not all the topics included in the full taxonomy would necessarily occur in the journal articles. The chapter has shown that this expectation was correct. After the completion of the journal article abstract classification exercise 238 out of the total of 586 nodes in the full taxonomy had not been used. The chapter went on to explain how the full taxonomy was modified to more clearly describe the actual content of the IS journal articles - as opposed to how their content covered, or did not cover, the IS discipline.

These modifications reduced the size of the taxonomy - the number of leaf nodes was reduced by almost 50%. They also improved classification precision by providing more specific sub-taxonomies for the most popular IS research area topics and by reducing the number of articles with multiple classification codes.

The resultant modified version of the full taxonomy is referred to as the 'final' taxonomy. The basic purpose of producing the final taxonomy was to improve the precision of classification and to make the subsequent analysis of the topics that had actually been covered by the journal articles easier and clearer.

The next chapter, Chapter 7: 'Analysis of Journal Article Classification Data' will make use of both the full and final taxonomies. The first part of Ch. 7 identifies which of the topics in the full taxonomy received little or no coverage by the journal articles. The latter parts of Ch. 7 present an analysis of the degree of coverage the journal articles provided for the final taxonomy topics.

Chapter 7:

ANALYSIS OF JOURNAL ARTICLE CLASSIFICATION DATA

CHAPTER INTRODUCTION

Chapter purpose

The primary question this research is attempting to answer is:

“Are the topics published in IS journal articles related to the key issue topics reported to be of concern to IS managers?”

In order to answer the question we need to know what topics the articles published in the target research journals actually covered.

The previous chapter (Chapter 6: Journal Article Classification) explained how a taxonomic scheme was developed so that the topics covered in the target journal articles could be classified. It also explained how the taxonomy, and associated database, were used in the journal article classification exercise. This involved allocating up to three taxonomic classification codes (and weights) to each of the target journal articles to describe the topic(s) each article covered.

The purpose of this chapter is to present an analysis of the data obtained during the journal article classification exercise.

The first part of the chapter presents an initial analysis which is based on the ‘full’ as opposed to the ‘final’ taxonomy. The purpose of the initial analysis is to identify which of the topics, contained in the full taxonomy, received little or no coverage by the journal articles included in the survey.

The main body of the chapter is concerned with presenting an analysis of the degree of coverage the journal articles provided for the (final) taxonomy topics. The purpose of

the main body of the chapter is to explain what topics the articles, published in the target research journals actually covered (and to what degree they covered them).

Chapter contents

In addition to this Introduction the chapter contains another six main parts.

1. Initial Analysis & Observations on 'Missing' Topics
2. Introduction to the Final Analysis
3. Top 30 Nodes Analysis
4. Top 50 Nodes Analysis
5. Analysis & Observations on Journal Article Coverage of all the Taxonomy Nodes
6. Analysis Summary

The first part presents the results of the initial analysis of the journal abstract data. The initial analysis was carried out to identify which of the topics, contained in the full taxonomy, received little or no coverage by the journal articles included in the survey.

The second part explains how the 'Final' analysis is concerned with analysing what topics the journal articles did cover and is therefore based upon the classifications of the articles under the final taxonomy. It also shows how the distribution of the node scores was heavily skewed with a relatively small number of nodes (the 'popular' nodes) accounting for a relatively high proportion of the total node score.

The third part, 'Top 30 Nodes Analysis', identifies the Top 30 nodes (i.e. the thirty nodes having the highest article classification values) and then provides a fairly detailed drill-down and content analysis of the articles classified under those nodes.

The fourth part, 'Top 50 Nodes Analysis' places the Top 50 nodes into taxonomy-based subject and topic groupings and provides a time-series analysis of the group (and individual node) scores throughout the survey period. This part also examines the variations in how the different categories of journal cover the Top 50 nodes and the top ten to twelve topics groups.

The fifth part 'Analysis & Observations on Journal Article Coverage of all the Taxonomy Nodes' adopts a more 'top-down' approach and starts by providing an analysis of node scores by taxonomy Class. An analysis of the two most important Areas within the most important Class (MIS) is then presented. This is followed by a value analysis of the Subjects that are included in each of these Areas and an analysis of the Topic (and Leaf) values that make up the Subjects. The various levels of analyses include analyses of node type values by year, journal, and journal category.

The final part 'Analysis Summary' contains a summary of the findings presented in the earlier parts.

INITIAL ANALYSIS & OBSERVATIONS ON ‘MISSING’ TOPICS

Introduction to this Part

Timing and purpose of the ‘Initial Analysis’

As explained toward the end of Chapter 6 (in the ‘Derivation of the Final Taxonomy’ part) a number of changes were made to the taxonomy after the completion of the journal abstract classification process. These taxonomy changes were made in order to reduce the size of the taxonomy, in terms of the number of nodes it contained, and make the analysis of the topics that were actually included in the journal articles easier and clearer.

In this part of the chapter we present the results of the initial analysis of the journal abstract data. The term ‘initial’ refers to the fact that this particular analysis was carried out on the full taxonomy before the taxonomy changes, referred to directly above, were carried out. The initial analysis was carried out in order identify which of the topics, contained in the full taxonomy, received little or no coverage by the journal articles included in the survey. Clearly, this had to be done before the empty and insignificant leaves were deleted during the taxonomy change exercise.

Subjectivity of analysis

Included in this part is a section on ‘Missing Topics: Specific’. This contains a brief discussion on a few of the main groups of topics whose omission, or scanty coverage, the author personally finds rather surprising. Clearly, the author’s selection of these particular missing topics to include in this section is quite subjective. A more ‘objective’ analysis is obtained by referring to Appendix 7.1, ‘Initial Analysis: All Topic Counts’ and examining all topics that were omitted (or scantily covered) by the journal articles.

Brief review of ‘Topic (node) Counts’ and ‘Topic (node) Values’

These two terms are used frequently in this chapter to provide measures of how well the journal articles covered the various topics in the taxonomy. The two measures are derived from the topic identifiers and topic weights that were allocated to each abstract

during the abstract classification exercise. Each abstract was allocated between one and three pairs of topic identifiers and topic weights. Fig. 7.1 below provides an example.

Topic_1_ID	Topic_1_Wgt
MRSRM05	3
Topic_2_ID	Topic_2_Wgt
OESS25	1
Topic_3_ID	Topic_3_Wgt

Figure 7.1: Example of the Topic/Topic Weight Classification for Abstract X

- A topic '**count**' is a property of a taxonomy topic (or node). It is a simple count of the number of times that topic was used to classify an abstract. For example, Abstract X contributes one (1) to each of the topic counts for MRSRM05 and OESS25. If a particular topic has a count of 15 it means that fifteen different abstracts covered that particular topic.
- A topic '**value**' (or score) is also a property of a taxonomy topic (or node). It is the sum of all the topic weights that have been allocated to that topic during the abstract classification process. For example, Abstract X contributes three (3) and one (1) to the values of the topics MRSRM05 and OESS25 respectively.

Initial analysis: topic count and topic value details

The journal abstract classification process classified the 1376 target journal articles. Appendix 7.1 'Initial Analysis: All Topic Counts' shows the topic counts (Tot_Cnt) and topic values (Tot_Val) that resulted from this process. The appendix provides the counts and values for each of the 586 nodes of the full taxonomy. Of the 586 nodes 444 were topic descriptors or 'leaf' nodes. The other 142 nodes were Class, Area, Subject, or Topic level nodes. The topics are listed in the same order that they appear in the taxonomy.

Not surprisingly, the rank orders of the topics sorted by count and sorted by value are very similar (Spearman's ρ is 0.913).

Most of the nodes had very low (or zero) counts. 237 nodes had zero counts (not shown in the Figure) and about 100 nodes had counts of just 1. Very few nodes had very high counts - as shown in table 7.1 above. The highest count of 67 (and second highest value of 171) was for the 'MASG35: GDSS\Computer Mediated Collab. Support (CMCS)' leaf node.

Distribution of node counts and values by Class, Area, and Subject

The upper three levels of the taxonomic hierarchy were Class, Area, and, Subject. The three Classes in the taxonomy were:

- ORG: Organizational(O)
- MIS: MIS, and (M)
- TEC: Technology (T)

Appendix 7.2, 'Initial Analysis: Node Count and Value Distribution by Class, Area and Subject', shows how the nodes (the number of nodes and their values) were distributed over the higher levels of the taxonomy. The appendix contains three tables which show the:

- Distribution of Node Counts (All Nodes) by Class (Table A7.2.1)
- Distribution of Node Counts (Leaf Nodes) by Class (Table A7.2.2)
- Distribution of Node Values by Subject, Area, and Class (Table A7.2.3)

Distribution of node counts by Class

Table A7.2.2 shows that:

- about half (239) of the leaf nodes in the full taxonomy were MIS nodes, about a quarter (93) were ORG nodes, and about a quarter (112) were TEC nodes.
- about half (44%) of the ORG leaves and about half (49%) of the MIS leaves had been used to classify more than two articles
- only 7% of the TEC nodes had been used to classify more than two articles.

Distribution of node values by Subject, Area, and Class

Table A7.2.3 shows that:

- ORG Class article classifications contributed about 25% of the overall node values
- MIS Class article classifications contributed about 71% of the overall node values
- TEC Class article classifications contributed less than 5%¹ of the overall node values.

'Missing' Topics: General

General paucity of TEC classifications

We subscribe to Alan Lee's views that:

"... an information system ... consists of not just the technology (hardware, software, data, networks) or the social setting (people, business processes, politics, economics, psychology, culture, organization, and management), but also the rich phenomena that emerge from the interactions between the two...Rigorously researched understandings of the rich, emergent interactions between the two (the technology and the social setting) have been, and should continue to be, among the best contributions that we can offer to the practice of managing information systems on the daily, operational, and strategic levels." (Lee, 1999)

It is therefore not surprising to find that the MIS classifications accounted for more than 70% of the overall topic values. Neither is it surprising that the ORG classifications accounted for a significant minority (25%) of the overall topic values. However, it is surprising (to the author) that the TEC classifications accounted for such a very small proportion (less than 5%) of the overall topic values.

(The previous section showed that 67% of the 112 TEC leaves were not used in the classification exercise and that of the 33% of the TEC leaves that were used only 7% had more than two articles classified under them).

¹ It is interesting to note that nearly half of the TEC contribution (2.2% out of 4.5%) comes from just one Subject - T:TEC/TS: Software Tech/TSX: Expert Sys. & AI. Further drill-down of the data (given in Appendix 7.1, 'Initial Analysis: All Topic Counts') shows that 41 of the 42 articles classified under the TSX: Expert Sys. & AI Subject belonged to just 1 Topic - T: TEC/TS: Software Tech/TSX: Expert Sys. & AI/TSXQ: Expert Sys. & AI Techniques.

If this one Topic (TSXQ: Expert Sys. & AI Techniques) were ignored then the TEC nodes would contribute to less than 2.5% of the overall value of the journal article classifications.

Orlikowski and Iacono raised the issue of the lack of IT coverage in IS research journal articles in their research commentary paper “Desperately seeking ‘IT’ in IT research - A call to theorizing the IT artefact” (Orlikowski & Iacono, 2001). They examined the (188) articles published in ‘Information Systems Research’ (ISR) during the period 1990 to 1999 and reported that the largest cluster of articles “engage with information technology minimally or not at all”. They went on to say:

“This cluster, which we labelled the nominal view, accounted for 25 percent of all the articles published in a decade of ISR issues. As we noted, these articles essentially treat technology as absent, referring to it in passing as the context, motivation, or background against which to set examinations of phenomena such as IT governance mechanisms, IS professionalism, and IS strategy or planning approaches.”

Their paper went on to propose a research direction for the IS field that took technology as seriously as its effects, context, and capabilities. In particular, they proposed that IS researchers began “to theorize specifically about IT artefacts, and then incorporate these theories explicitly into their studies”.

However, Orlikowski and Iacono also reported that about 75% of the papers they examined did “engage with information technology“. In contrast this research has revealed that the ‘IT-related nodes’ contribute to only about 30% (23% for ISR journal articles) of the overall value of the journal article classifications. (Appendix 7.4, ‘Initial Analysis: IT-Related Node Values’, shows how the initial ‘IT-related node’ contributions were derived).

A possible explanation for the very big difference between these percentages may be the meaning that Orlikowski and Iacono attribute to the term “engage with information technology”.

Their second largest category of articles (after the 25% category that “used the ‘nominal view’ - not engaging with information technology at all”) used the “Technology as Model” view. Orlikowski and Iacono regard these articles as “engaging with

information technology” but go on to define the use of the “Technology as Model” view as follows.

“Research in this category attempts to represent social, economic, and informational phenomena through the methodology of data modelling or simulation. ... Specifying, building, and programming models - often based on game theory, information theory, or systems dynamics - are distinctive ways of representing (and thus examining) a range of organizational phenomena. ... We have put them together here because these streams of research have in common the intent to build new computational capabilities that facilitate the representational and modelling work of the researcher.”

The author of this thesis find it difficult to understand how building a computerised model to investigate a non-IS related phenomenon can be regarded as IS-related research. For example, building a computerised model to help test an hypothesis about the macro-economic variables affecting foreign exchange rate movements does not seem to be IS-related research. If we argue that the use of any computerised model to study any phenomenon is IS research then we could use the same ‘logic’ to argue that the use of any language to describe any phenomenon in any academic paper is linguistic research.

Benbasat and Zmud have also raised the issue of the lack of IT coverage by the IS research community in their paper “The Identity Crisis Within the IS Discipline: Defining and Communicating the Discipline's Core Properties” (Benbasat & Zmud, 2003). Their paper expresses the concern:

“... that the IS research community is making the discipline’s central identity even more ambiguous by, all too frequently, under-investigating phenomena intimately associated with IT-based systems and over-investigating phenomena distantly associated with IT-based systems.” (Benbasat & Zmud, 2003, p.184)

They suggest that IS researchers should focus more on the issues and constructs that lie within the immediate nomological net of the IT artefact (see Fig. 7.3 overleaf) and less on those issues and constructs that fall outside the net.

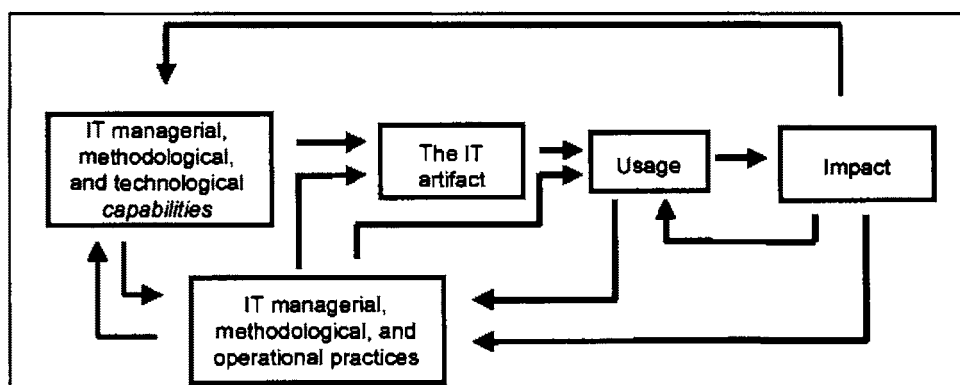


Figure 7.3: Benbasat & Zmud's "IT Artefact and its Immediate Nomological Net"

(Benbasat & Zmud, 2003, p.187, Figure 2)

The Benbasat & Zmud paper has generated considerable debate in the IS literature. Most of the articles debating the issue support some of Benbasat & Zmud's views – particularly the need for an IS core. However, most of them suggest either a different (usually more pluralistic) core for the IS discipline or different ways of identifying the core (Alter, 2003a, 2003b, 2003c; Benbasat & Zmud, 2003; Dufner, 2003; El Sawy, 2003; Gray, 2003; Hirschheim & Klein, 2003; Iivari, 2003; Lyytinen & King, 2004; McCubbrey, 2003; D. J. Power, 2003; Salisbury, Huber, Piercy, & Elder, 2004; Weber, 2003; Wu & Saunders, 2003).

At least one author (Myers, 2003) argues that the field of information systems is nowhere near ready to define a core in information systems and believes that *"the attempt to narrow the field to a core is misguided"* (p. 582)

In summary, on the basis of Orlikowski and Iacono's findings (Orlikowski & Iacono, 2001) and Benbasat and Zmud's assertions (Benbasat & Zmud, 2003) it was to be expected that 'IT-related' coverage could be quite low. However, it was surprising to find out how very low this coverage actually was. The initial analysis revealed that 'IT-related nodes' contributed to only about 30% of the overall value of the journal article classifications and that specific TEC (Technology) nodes accounted for less than 5% of the overall topic values.

Missing (or Poorly Covered) Topics: Specific

Section introduction

The term ‘missing topics’ refers to the topics (in particular the topic descriptor Leaves) included in the full taxonomy that were not, or only very superficially, covered by the journal articles. This section provides a brief commentary on a selection¹ of these poorly covered topics. The commentary includes some of the reasons why the author expected the topics might have had better coverage.

Appendix 7.3 contains a table for each of the poorly covered topics. Each table lists the taxonomy nodes associated with a particular topic and gives the counts of the articles classified under each associated node. References are made to these tables in the following commentary.

Missing (or poorly covered) ORG Topics

Internet Start-ups

The leaf nodes concerned with the creation (and demise) of ‘dotcoms’ were classified under the ‘ORG/Org. Dynamics /Organisation Creation/ODCI: Internet Start-ups’ node. Considering that the period 1995 to 2001 saw the phenomenal rise (and crash) of the dot.com boom one may have expected to see more than 7 (or ½. % of all) articles covering the topics above. More than half of the 7 articles that did address these topics were in the ‘practitioner’ journals.

(Table A7.3.2 shows the associated node counts and the journals the articles occurred in).

Electronic Trading Laws & Issues

Another aspect of the phenomenal growth in Internet usage during the period 1995 to 2001, that was scantily covered by the journal articles, was the topic of Electronic Trading Laws & Issues. Only 8 (or ½. % of all) articles addressed these issues. Half of these articles occurred in a practitioner journal (HBR).

¹ As mentioned in the ‘Introduction to this Part’ the author’s selection of the particular missing topics to include in this section is subjective. A more ‘objective’ analysis is obtained by referring to Appendix 7.1, ‘Initial Analysis: All Topic Counts’ and examining all the topics that were omitted (or scantily covered) by the journal articles.

The leaf nodes concerned with this issue were classified under the 'ORG/Org. Environment/Legal Environment/E. Trading Laws & Issues' node. (Table A7.3.3 shows the associated node counts and the journals the articles occurred in).

Missing (or scantily covered) MIS Topics

System Maintenance & Migration Processes

During the period 1993 to 2001 the issue of updating obsolete systems continued to rise in importance in the CSC surveys. In 2001 the issue was the third most important issue in Europe and the eighth most important issue in the US (Computer-Sciences-Corporation, 2002). Only 16 journal papers (or 1% of all) referred to this issue. Four of these papers occurred in the practitioner journal HBR and six occurred in the 'Information & Management (IFM)' journal.

The Y2K topic was, arguably, one of the most widely publicised IS issues of the 1990s. Only three papers covered Y2K. According to Kappelman the Y2K effort required an enormously extensive and expensive upgrade of the world's system and software assets. He estimates that the cost of this effort was between \$375 and \$750 billion and involved the modification of 45%, and complete replacement of 20%, of the world's application systems (Kappelman, 2000). CSC reported that, by 1998, 79% of the organisations they had surveyed (globally) had either completed (16%) or at least started on (63%) their Y2K remediation (Computer-Sciences-Corporation, 1998). Maybe the issue received scant attention from IS researchers because of its 'transitory' (say 5 years) nature. However, Y2K was a very significant manifestation of the much wider – and eternal – issue of system maintenance and replacement.

The leaf nodes concerned with this issue were classified under the 'MIS/MIS Implmntn. / Maint. & Migration Procs.' subject node.

(Table A7.3.4 shows the associated node counts and the journals the articles occurred in).

Systems Security, Availability, etc.

It was surprising, to the author, that systems security issues received such scant coverage in the journal articles. Only ten (or less than ½. % of all) articles addressed

topics related to systems security, availability, or backup issues. Just one article addressed the invasive software (virus) control issue.

The period 1995 – 2001 saw massive growth in the number of private and corporate connections to public network (particularly the Internet). Both businesses and individuals became plagued with computer virus attacks spread over the networks. Major corporate sites and ISPs were paralysed by denial of service attacks. The Carnegie Mellon SEI set up the first major CERT (Computer Emergency Readiness Team) coordination centre in 1988. Today, there are more than 250 organisations worldwide that use the name 'CERT' or a similar name and deal with cyber security response (US-CERT, 2004). Many of these operate at a national or international level. The British Standard BS 7799-1 (Code of Practice for Information Security Management) was first issued in 1995. This standard formed the basis of ISO/IEC 17799 'Code of Practice for Information Security Management' which was fast-tracked by the ISO and subsequently published in 2002. During the mid- to late-1990s telcos and vendors responded to the increasing public network security by offering private IP network services and VPN services.

The key management issue surveys of the 1990s also paid little attention to the security issue. 'Security and Control' and 'Disaster Recovery' were the two lowest ranked issues in the 1990 SIM key issues survey. Both these issues were subsequently dropped from the 1994 SIM survey (Brancheau et al., 1996). 'Protecting and Securing Information Systems' was not included in the CSC surveys until 2001 (Computer-Sciences-Corporation, 2002). Upon its introduction into the surveys in 2001 it was ranked the second most important issue in the US. In Europe it was ranked considerably less important at 13th. out of 22.

The leaf nodes concerned with this issue were classified under the 'MIS/MIS Mngt. /Systems Control/MMCS: Sec., Availability, etc.', 'TEC/Ntwks. & Coms. /Networks - General/TNGS: Network Security', and 'TEC/Hardware/Data Storage Technology/THSB: Backup & Recovery' topic nodes. (Table A7.3.5 shows the counts associated with these nodes).

IT Strategy Formulation and Building a Responsive 'IT Infrastructure'

Building a responsive IT infrastructure was the fourth highest ranked issue in the 1990 SIM survey and the highest ranked issue in the 1994 SIM survey. One might have expected that this issue would have received a little more attention in the journals. 18 (or less than 1 ½. % of all) articles addressed various aspects of IT Strategy formulation. The leaf nodes concerned with IT Strategy formulation (including planning IT infrastructure) were classified under the 'MIS/MIS Mngt./MMT: IT Strat. Formulation' subject topic.

(Table A7.3.6 shows the counts associated with these nodes).

Component-based Development (CBD)

Another area, related to IT architecture that received very scant coverage in the journals was component-based development and web services.

In the early and mid-1990s the emerging distributed technologies increasingly relied upon object-based and component-based technologies. Common Object Request Broker Architecture (CORBA), and the Distributed Computing Environment (DCE) specifications were published by the Object Management Group (OMG). Microsoft released its 'competitor' to CORBA - the Component Object Model (COM) and the DCOM remote object protocol. Driven by the fact that the Web was proving to be one of the most successful distributed architectures ever designers tried to utilise the increasingly wide-spread Internet standards (particularly XML) for distributed computing applications and the location and distribution of components.

By 1999 Web Distributed Data Exchange (WDDX) and SOAP standards had been published. The XML/EDI and eb/XML initiatives were well underway. By 2000 the first UDDI specification had been published and Microsoft had released its first major .NET product (BizTalk Server 2000).

There were only 5 (or less than ½. % of all) articles that addressed the issue of component-based development. No articles made any references to web services or service-oriented architectures.

It could be argued that topics such as IT infrastructure, component-based development and web services are rather too technical in nature to be of interest to IS academics. However, general management practitioner journals, such as McKinsey Quarterly, do give quite good coverage to such issues (Brown, Durschlag, & Hagel III, 2002; Hacki & Lighton, 2001; Hagel III, 2002; Ismail, Patil, & Saigal, 2002; Laartz, Sonderegger, & Vinckier, 2000; Vinckier, 1996). (Table A7.3.7 shows the associated node counts for component-based development and web services).

Missing (or scantily covered) TEC Topics

The 'general paucity of TEC classifications' has already been discussed in the previous sub-section of that name. In this sub-section we briefly discuss just one group of technology topics whose absence from the journal articles seemed somewhat surprising.

Cellular Phones, Wireless, and Mobile Computing

It would have been very difficult for anyone (living in a relatively advanced economy) not to have noticed the growth in cellular phone or Internet usage during the 1990s. Industry realised (or grossly overestimated!) the potential of merging these two technologies. In 1997 the WAP Forum was founded. In 1999, NTT Do Como launched its i-Mode mobile phone service providing continuous Internet access. In 2000 i-Mode had 21 million subscribers and the UK's five major telcos paid more than USD 35 billion for UMTS (3G) spectrum licenses (CNNMoney, 2000).

The Bluetooth SIG was formed in 1998 and the first Bluetooth specification released in 1999. According to Allied Business Intelligence, (quoted in Mobile_Business, 2001), annual shipments of Bluetooth-enabled devices had reached 56 million by 2001 and were expected to reach to 1.4 billion by 2005.

In 1997 the IEEE published its 802.11 wireless LAN standard. In 2002 worldwide wireless LAN equipment sales exceeded USD \$1 billion and IBM, HP, Earthlink and BT (and many others) were providing Hot Spot/Public Access services (Alexander_Resources, 2002).

In 2003 Peter Gray (editor of Communications of the Association for Information Systems (CAIS)) stated in his editorial to CAIS's special issue on the 'Core of the Information Systems Field':

"Phenomena come and go. Consider three technologies: twenty five years ago, personal computing was a blip; a decade ago, wireless computing was a blip; today, wearable and immersion computing are blips. Yet, in my opinion, the social, organizational, international, and societal aspects of these technologies are or will be legitimate areas for IS research. Limiting approvable research to what is in the mainstream currently, in an era when it typically takes three years from the start of a project to its publication, risks making our work a study of IS history, not IS future; a position we should not be in as a field."

(Gray, 2003)

Yet, during the period between the beginning of 1995 and the end of 2001, the seven leading IS journals had published only two articles on wireless and mobile computing technology and applications. The single article on cellular phones used dramaturgical analysis to illustrate the impact of cell phones on the social organisation of police work in the early 1990s (Manning, 1996).

(Table A7.3.8 shows the associated node counts for cellular phones, wireless, and mobile computing).

INTRODUCTION TO THE FINAL ANALYSIS

Version of the Taxonomy used for the Final Analysis

The previous (Initial Analysis) part of this chapter was primarily concerned with identifying and reporting on the topics, contained in the full taxonomy¹, that received little or no coverage by the journal articles included in the survey.

In the remaining parts of this chapter we are primarily concerned with analysing what topics the journal articles did cover (as opposed to what they did not cover) and how the journal articles covered them. To do this we will be using journal article classification data that is based upon the final taxonomy¹. As stated earlier, the purpose of the development of the final taxonomy was to make the analysis of the topics that actually had been covered by the journal articles easier and clearer.

Overall Node Score Distribution

There were 349 nodes in the final taxonomy of which 262 had non-zero values. The 87 zero value nodes were consisted of group level nodes (i.e. Class, Area, Subject, or Topic nodes) or '00' (Miscellaneous) Leaf nodes. The distribution of the non-zero node scores is shown overleaf in Fig. 7.5.

Fig. 7.5 shows that the distribution of non-zero node scores was heavily skewed with a relatively few nodes (the 'popular' nodes) contributing a relatively high proportion of the total node score. Table 7.2, also overleaf, shows this in tabular form.

¹ The footnote on the last page of the 'Introduction' to Chapter 6 explained the creation of, and differences between, the 'initial', 'full', and 'final' taxonomies.

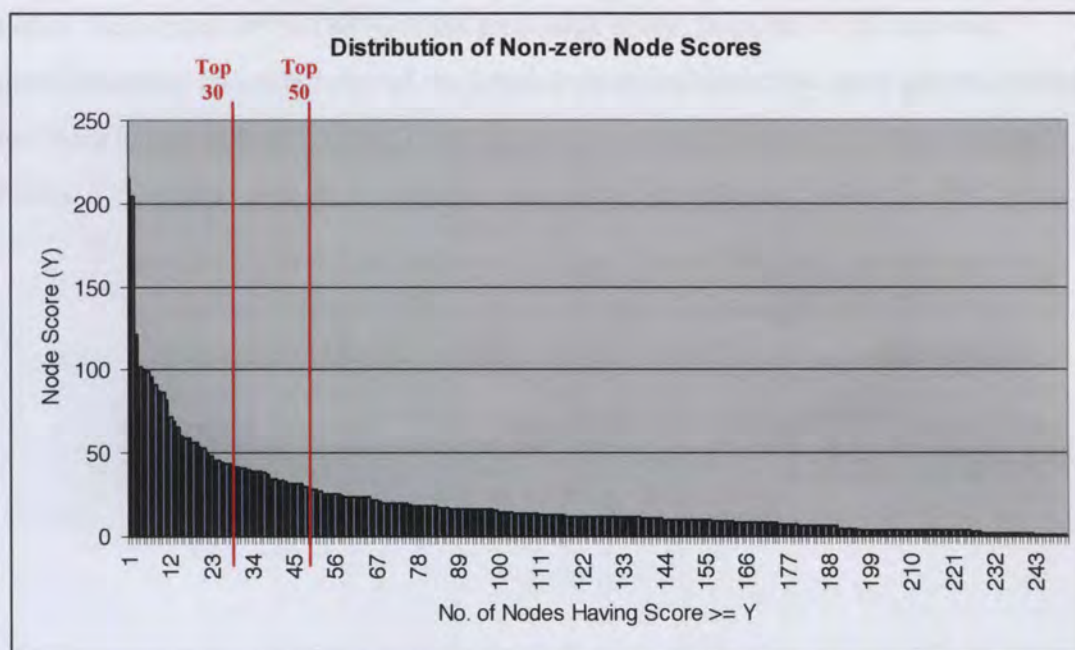


Figure 7.4: Distribution of Non-zero Node Scores

Table 7.2: Contributions to Total Node Score (Non-zero Nodes)

Node Group	Sum of Node Scores	Percentage of Total Node Score
Top 10	1207	22
Top 20	1858	34
Top 30	2337	42
Top 40	2731	50
Top 50	3064	56
Bottom 201	2436	44

Table 7.2 shows that the top 10 most popular nodes accounted for 22% of the total node score for all of the 262 (non-zero) nodes. The top 30 nodes accounted for 42% of the total node score.

In summary, the distribution of node scores was heavily skewed. A relatively small number of nodes (the 'popular' nodes) accounted for a relatively high proportion of the total node score. For example, the Top 50 nodes accounted for about 56% of the total

node score (derived from all article classifications) whereas the least popular 200 nodes¹ accounted for just 44% of the total node score. Because of this skewed distribution the characteristics of the articles classified under the more popular nodes has been analysed in more detail than the articles classified under the less popular nodes.

¹ The least popular 200 nodes had an average node value of about 10. A node value of 10 means that less than three articles (with Topic Weights of 4) have been classified under that node. The Top 50 nodes had an average node value of about 60. A node value of 60 means that about 15 articles (with Topic Weights of 4) had been classified under that node.

TOP 30 NODES ANALYSIS

Introduction to this Part

The first section in this part ('The 11 Most Popular Nodes - Drill-down Analysis') provides a drill-down analysis of some of the articles classified under the eleven¹ most popular nodes and makes some observations on the non-'IT Artefact' focus of these articles. The section also shows the contribution these articles made to the overall total value for each of the journals.

The second section provides a drill-down and content analysis of the articles that were classified under the 12th to 30th most popular nodes.

The third section first puts forward an information systems research topic 'Conceptual Net'² and then goes on to summarise the coverage of the Conceptual Net components by the Top 30 node articles.

The last section analyses how the articles, in each of the different journals, contributed to the Top 30 node classifications.

¹ The 11 (instead of the 10) most popular nodes were chosen for the first drill-down because there was a 10 point difference (82 to 72) in the 'Value' of the 11th. and 12th. most popular nodes whereas there was only a 5 point difference between the 10th. and 11th. nodes

² The conceptual net developed later in this chapter is a loose adaptation of Benbasat & Zmud's "IT Artefact and its Immediate Nomological Net" (Benbasat & Zmud, 2003) which was reproduced earlier in this chapter as Fig. 7.3.

The 11 Most Popular Nodes – Drill-down Analysis

Just 11 (4%) of the 251 non-zero nodes accounted for more than 23% (1285) of the total score value (5500). The 11 most popular nodes are shown below in Table 7.3.

Table 7. 3: The Eleven Most Popular Nodes

Rnk Ordr	Node ID	Node String/Name	Val
01	MSRM08	MIS Scholarship /MIS Research (General)/Methods/Approaches/ MSRM08: Devt., Tstng., & Vldtn. of Constructs/Instruments	215
02	MRAC25	MIS Scholarship /Major Res. Areas/CSCCS (C. S. Coop. Comms. Sys. (GDSS)) Res/ MRAC25: Social Psych. Expmnts. & Models (inc. AST)	204
03	MIPS60	MIS Implmntn. /Apps. Procurement Procs./Sys. Dev. Approaches/Methodologies/ MIPS60: Models of ISD Process/Team Variables & Outcomes	121
04	MMSE03	MIS Mngt. /Sys. Ops & Management/Systems Evaln. / MMSE03: Ret.on (IS) Invstmnt (inc. Prod. Paradox)	102
05	MRAC20	MIS Scholarship/ Major Res. Areas/CSCCS (C. S. Coop. Comms. Sys. (GDSS)) Res/ MRAC20: Process (& Cog. Proc.)\Outcome Expmnts. & Models	100
06	MSRM05	MIS Scholarship /MIS Research (General)/Methods/Approaches/ MSRM05: Descs. of Res. Approaches/Techniques	99
07	ODDM05	Org. Dynamics /Org. Decision Making/Decision/Learning Models/ ODDM05: Ind\Cogntv. Factors & Media Richness	96
08	MRAD15	MIS Scholarship/ Major Res. Areas/Decsn., Expt., & Exec. Suppt. Sys.(DEESS) Res/ MRAD15: Human Cognition Models\variables\experiments	91
09	MMOO05	MIS Mngt. /Gov., Res. & Org. /Outsourcing/ MMOO05: Reasons, Success Factors, & Models for Outsourcing	88
10	MRAS05	MIS Scholarship/ Major Res. Areas/SUPA (User Sat. Usg Perf & Acptnce) Res/ MRAS05: TAM Experiments\surveys & Proposed Extensions	87
11	MMIC30	MIS Mngt. /Management/Change Management/ MMIC30: Tech. Adoption/Transfer Issues & Success Factors	82
			1285

CSCCS = Computer Supported Cooperative Communication Systems

DEESS = Decsn., Expt., & Exec. Suppt. Sys.

SUPA = User Satisfaction, Usage, Performance & Acceptance

Note on non-‘IT Artefact’ nature of popular nodes

Earlier in this chapter we referred to the Orlikowski and Iacono claim that “*the largest cluster of articles engage with information technology minimally or not at all*”

(Orlikowski & Iacono, 2001) and Benbasat and Zmud’s concern over of the lack of IT coverage in IS research papers (Benbasat & Zmud, 2003).

It is interesting to note that seven of the eleven most popular topics have either a research methods/approaches or sociological/psychological emphasis. These seven topics/nodes are:

MSRM08 & MSRM05 (Research methods & approaches)	Val = 314
MRAC25, MIPS60 ¹ & MRAC20 (Group psychology & Sociology)	Val = 425
ODDM05 & MRAD15 (Psychological)	Val = 187

These seven nodes account for about 17% (926/5500) of the total value of all the articles classified. The articles classified under these nodes nearly always make no reference, or just a brief nominal reference, to any specific type of IS/IT system or application (or IT 'artefact').

Those that did make nominal references to an IT artefact generally treated it as a 'black-box' or 'the system' and concentrated on its second or third order effects. That is to say the primary focus of the research is on concepts and constructs that lie toward the edges of, or outside of, Benbasat and Zmud's nomological net (Benbasat & Zmud, 2003).

It was (mistakenly) assumed that it was likely that a significant proportion of the articles classified under the other four nodes² in the top 11 would involve research into the first order effects and phenomena of specific IS/IT artefacts. That is, it was expected that some of them would explain or describe the architecture or characteristics of the particular IT artefact whose effects/acceptance/etc. were being investigated.

Consequently, a drill-down exercise was conducted on the articles classified under these four nodes to determine if the assumption was correct.

¹ It originally was expected that some of the 32 articles classified under the MIPS60 (Models of ISD Process\Team Variables & Outcomes) node might have had an 'IT Artefact' focus. However, only 3 articles were concerned with processes involving software re-use and rapid incremental development. 16 were to do with group dynamics, conflict, goal setting, cognitive aspects etc. of ISD processes and the remaining 13 addressed the general project management issue of the interplay between risk, uncertainty, complexity, quality and the need for coordination.

² The other four nodes were: 'MMSE03: Ret.on (IS) Invstmnt (inc. Prod. Paradox)', 'MMOO05: Reasons, Success Factors, & Models for Outsourcing', 'MRAS05: TAM Experiments\surveys & Proposed Extensions', and 'MMIC30: Tech. Adoption\Transfer Issues & Success Factors'

The results of the drill-down exercise are given in Appendix 7.5, 'MSE05/MMOO05/MRAS05/MMIC30 Drill-Down'. The appendix gives a summary of the results as well as an explanation of how the drill-down samples were selected and the detailed results of the articles analyses. The drill-down exercise involved a detailed examination of a 50% sample of the abstracts classified under the above four nodes.

About 90% of the articles sampled (61 out of the 67) in the drill-down either made no reference, or just a brief nominal reference, to any specific type of IS/IT system or application (IT 'artefact'). Those articles that did make nominal references to an IT artefact generally treated it as a 'black-box' and concentrated on the second or third order effects of its adoption or usage (i.e. toward the edges of ,or outside of, Benbasat and Zmud's nomological net (Benbasat & Zmud, 2003)).

If the 50% sample was representative of the rest of the articles classified under those four nodes then we can assume that only about 3% (10% of 28%) of the topic coverage of the articles classified under the 11 most popular nodes was directly related to the IT artefact.

In summary, the top 11 (4%) of the 251 non-zero nodes accounted for more than 23% (1285) of the total score value (5500). However, only about 3% of the articles classified under these 11 most popular nodes addressed research issues that were directly related to the IT artefact or its first order effects.

11 most popular nodes by journal

Table 7.4, overleaf, shows the percentage contribution that the articles classified under the 11 most popular nodes made to the overall total value (Tot Value by Journal) for each of the journals.

Table 7.4: Percentage Contribution to Top 11 by Journal

	DSI %	EJI %	HBR %	IFM %	ISJ %	ISR %	JMI %	MIS %	SMR %
Tot Value by -> Journal	296	604	412	1332	336	616	964	608	332
01 MSRM08	10.8	0.0	0.0	4.8	2.4	7.8	1.5	8.1	0.0
02 MRAC25	5.1	2.0	1.0	4.2	6.0	4.9	5.3	2.6	0.0
03 MIPS60	0.0	0.0	0.0	0.6	3.0	5.2	3.2	5.3	2.4
04 MMSE03	1.3	1.3	0.0	1.2	0.0	3.2	4.1	2.3	0.0
05 MRAC20	0.0	0.7	0.0	1.1	0.0	3.9	4.4	2.6	0.0
06 MSRM05	1.0	3.3	0.0	0.0	6.2	1.8	0.2	6.9	0.0
07 ODDM05	2.7	1.8	0.0	1.7	1.2	4.1	0.2	3.9	0.0
08 MRAD15	7.1	1.3	0.0	0.3	0.0	3.9	1.9	2.6	0.0
09 MMOO05	1.3	3.0	1.0	1.4	2.4	0.6	1.7	1.3	2.4
10 MRAS05	5.4	1.0	0.0	1.7	1.2	0.6	2.5	1.6	0.0
11 MMIC30	2.0	1.8	0.5	2.1	0.0	3.7	0.8	0.3	0.6
	36.8	16.2	2.4	19.0	22.3	39.8	25.8	37.7	5.4

Table 7.4 shows that approximately 40% of the total value of the following journals came from articles that were classified under the 11 most popular nodes.

DSI	Decision Sciences International	37%
ISR	Information Systems Research	40%
MIS	MIS Quarterly	38%

This also indicates that at least 40% of the total value contributed by these journals comes from articles that either make no reference to, or just a make a brief nominal reference to, any specific type of IS/IT system or application (IT 'artefact').

The 12th. To 30th. Most Popular Nodes – Drill-down Analysis

Contribution to the overall node values

The 12th. to 30th. most popular nodes represent less than 8% of the 251 non-zero nodes but account for about 20% (1043) of the total score value (5500). These 19 nodes are listed in Appendix 7.9 in Table A7.9.1, 'The Top 50 Nodes' in rank order (Rnk Ordrr) positions 12 to 30.

The Top 12th . to 30th . nodes drill-down and content analysis

In order to obtain a more detailed picture of the content of the articles classified under these nodes a sample of the abstracts classified under each node was examined in more detail.

Prior to the drill-down exercise it was expected that some of the nodes would contain articles that did directly address a specific IS/IT artefact or its determinants/ effects. It was also expected that some of the nodes would not contain such articles. For example, consider the following two nodes:

- MMSE01: Multi-facet Evaln. of a Particular System
- MMSE20: Cost Benefit & Value Models

Both of these nodes fall under the ‘MIS Mngt. /Sys. Ops & Management/Systems Evaluation’ topic. It was not expected that the articles classified under the MMSE20 node would directly address specific IS/IT artefact as the node is concerned with the use of ‘Cost Benefit & Value Models’ for systems evaluation. The actual drill-down analysis confirmed that these articles were generally concerned with the development/ testing of IT investment decision making models/frameworks. They were not primarily concerned with the evaluation of particular systems, applications, or projects. Although some (4) of the articles made a nominal mention of particular systems or projects the system or project was not the focus of the article. Article 1188 “*Options analysis of software platform decisions: A case study*” provides a good example of this. An extract of the abstract of article 1188 follows.

“...Thus, the investor is faced with the problem of valuing implementation opportunities. Different valuation techniques for this task are compared and their respective advantages and drawbacks are discussed. The practical advantages of employing such models are demonstrated by describing a real-life case study where option pricing models were used for deciding whether to continue employing SAP R/2 or to switch to SAP R/3.”

However, it was expected that some (or most) of the articles classified under the node MMSE01 (Multi-facet Evaln. of a Particular System) would describe an IT/IS artefact (the system under evaluation) – as opposed to just making a nominal mention of the artefact.

Therefore, in cases where a node covered a topic that might be expected to have an IT/IS content the drill-down analysis included determining the number and percentage of articles that made an explicit (as opposed to just nominal) reference to the IT/IS artefact or its determinants/effects.

Appendix 7.6, 'Top 12-30 Drill-Down Analysis', contains both a summary, and the detailed results, of the drill-down analysis. It also explains how the drill-down samples were selected and how the samples were analysed. Table A7.6.1 in the appendix contains a 'Summary of Top 12th. to 30th. Nodes Drill-down Analysis'. The table distinguish between the nodes that covered topics that might be expected to focus on a specific IT/IS artefacts (or its first order determinants /effects) and the nodes that were not expected to have such a focus. If the node was expected to contain (at least some) articles that were likely to have a specific IT/IS artefact focus then the number of articles in the sample that actually had such a focus is given in the 'IS/IT focus' column. If the node was not expected to contain articles with an IT/IS artefact/role focus then NA (not applicable) is entered in the 'IS/IT focus' column.

The drill-down analysis examined 227 abstracts under the top 12th. to 30th. nodes. Ten of these nineteen nodes (shown with non-italicised 'Node IDs' in table A7.6.1) were expected to contain at least some articles that focused on a specific IT/IS artefact or its first order determinants/effects. The drill-down analysis revealed that only 40% (48/119) of the articles classified under these ten nodes did have an IT/IS artefact (or first order effect) focus.

Top 30 Nodes' IS Conceptual Net Component Coverage

The IS (Information Systems) conceptual net

In order to summarise the conceptual coverage of the articles classified under the Top 30 nodes we first put forward the 'IS Conceptual Net' in fig. 7.5 below.

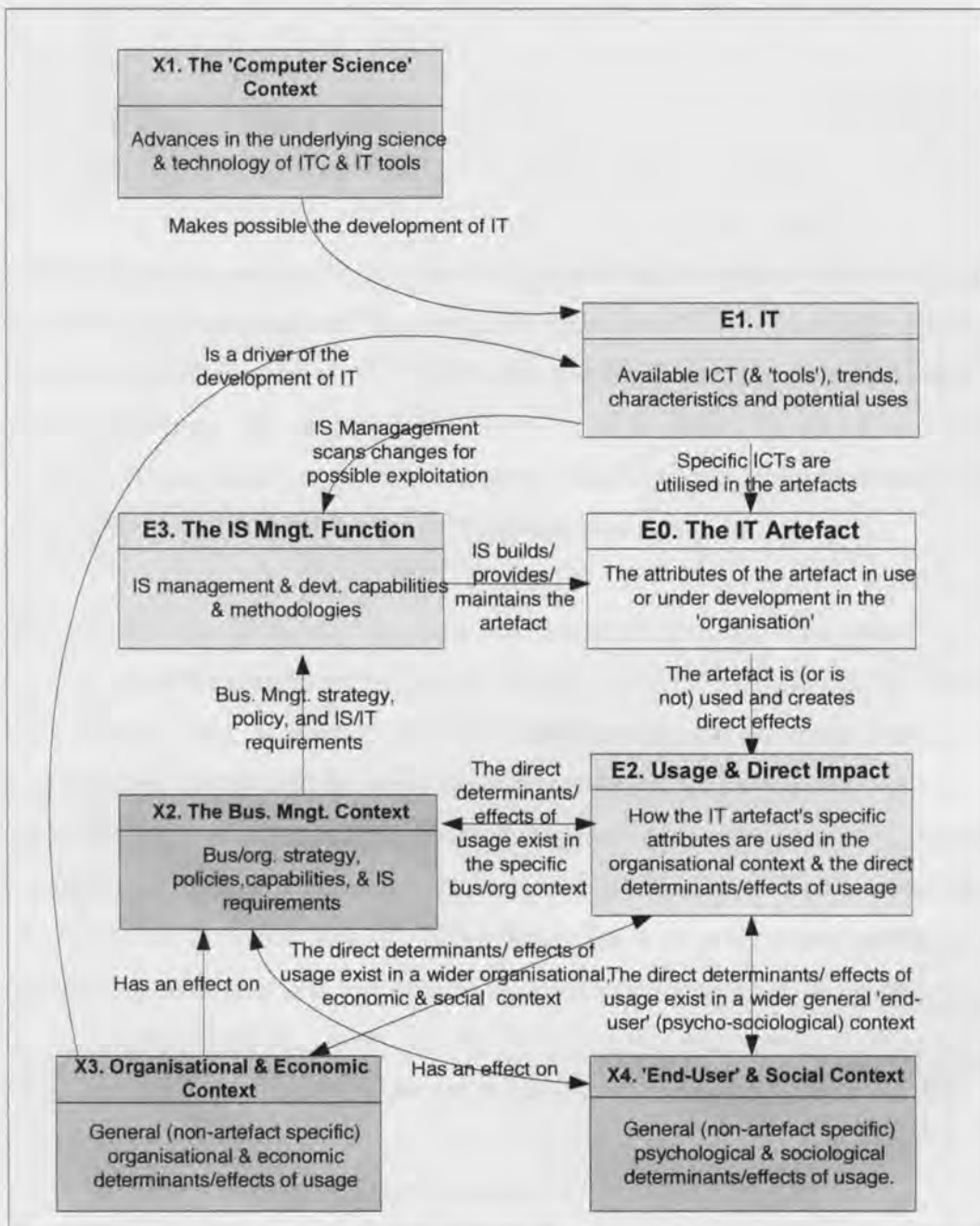


Figure 7.5: Information Systems Conceptual Net

Adapted from Benbasat & Zmud's "IT Artefact and its Immediate Nomological Net" (Benbasat & Zmud, 2003)

The conceptual net, given above, is a loose adaptation of Benbasat & Zmud's "IT Artefact and its Immediate Nomological Net" (reproduced earlier in this chapter as Fig. 7.3).

The following components of our conceptual net roughly map to Benbasat & Zmud's 'immediate' nomological net:

- E0. The IT Artefact
- E2. Usage & Direct Impact
- E3. The IS Mngt. Function

We have also included an 'IT (Information Technology)' component in our conceptual net. This component refers to 'knowledge/concepts/constructs' concerned with current trends in, and availability of, ICT (and tools) and the characteristics and potential uses of that technology. We have included this in our 'immediate' conceptual net because we believe it can be an important antecedent to the purposive deployment and utilisation of the technology (as the 'IT Artefact') in the organisational setting.

Brief explanations of the other concepts and constructs included in the other components of the conceptual net are given in Fig. 7.6. For example, the 'E2. Usage & Direct Impact' concept refers to how the IT artefact's specific attributes are used in the organisational context and the direct determinants/effects of the specific artefact's usage. These direct determinants/effects of usage exist in a number of wider general contexts. One of these is the wider psycho-sociological context which we have labelled 'X4. 'End-User & Social Context''. This refers to the more general (non-artefact specific) psychological and sociological determinants/effects of IT/IS usage.

Also included in our conceptual net are the following 'contextual' components:

- X1. The 'Computer Science' Context
- X2. The Bus. Mngt. Context
- X3. Organisational & Economic Context
- X4. 'End-User' & Social Context

These contextual components refer to constructs/concepts that lie outside Benbasat and Zmud's 'immediate' nomological net. For example, advances in science and technology (such as semi-conductor technology and microprocessor design) make the future development and manufacture of specific IT products and services possible. These specific IT products and services may subsequently be utilised as 'IT artefacts' in an organisational setting. However, semi-conductor technology by itself is not a direct antecedent (or effect) of 'the attributes of the artefact in use in the organisation'.

The contextual components in our conceptual net can be regarded as the second order determinants/effects of the central 'IT Artefact' concept. The 'E' components ('E1. IT', 'E2. Usage & Direct Impact', and 'E3. The IS Mngt. Function') can be regarded as first order determinants/effects of the central 'IT Artefact' concept. Concepts/constructs such as 'IS research approach' and 'IS research instrument validity', although not shown on our conceptual net, can be regarded as third order determinants/effects of the central 'IT Artefact' concept.

Conceptual net component coverage of articles classified under the top 30 nodes

Appendix 7.7 'Conceptual Net Component Coverage' shows how the values of the articles classified under the Top 30 nodes are distributed over the various components of the conceptual net. The actual distribution of the article values is based upon the material already presented in the '11 Most Popular Nodes' and 'The 12th. to 30th. Most Popular Nodes' sections of this part of Chapter 6 and their related appendices¹.

Table 7.5, shown overleaf, provides a short summary of the material found in the appendix.

¹ The 'related appendices' were: Appendix 7.5, 'MSE05/MMOO05/MRAS05/MMIC30 Drill-Down' and 'Appendix 7.6, 'Top 12-30 Drill-Down Analysis'.

Table 7.5: Summary of Top 30 Nodes' Conceptual Net Component Coverage

Total Coverage by Net Component		2297	305	228	390	227	833	314
% age Coverage by Net Component			13	10	17	10	36	14
Net Component Identifier		All	E2	E3	X2	X3	X4	3
1	2	3	4	5	6	7	8	9

The table given above consists of the last three rows of Table A7.7.1 that appears in Appendix 7.7

In the full table there is also one row for each of the Top 30 nodes that shows: the node's rank order (in terms of value) in column 1, the node's taxonomy string and name in column 2, the node's total value in column 3. Columns 4, 5, 6, 7, 8, and 9 show how the nodes total value was distributed between the various IS conceptual net components.

The 'Net Component Identifiers' shown in column Table 7.5 above refer to the following components of the conceptual net (as shown in Fig. 7.6 above).

- E2 Usage & Direct Impact (of the specific IT artefact)
- E3 The IS Mngt. Function
- X2 The Bus. Mngt. Context
- X3 Organisational & Economic Context
- X4 End-User & Social Context
- 3 Third order determinants/effects (e.g. IS research approach research)

We can see from Table 7.5 that about one quarter (10% + 13%) of the articles analysed refer primarily to concepts and research model constructs that lie within the first order components (E2 and E3 in the above table) of our IS conceptual net. About three-quarters of the content of the articles analysed refer primarily to concepts and research model constructs that lie outside (X2, X3, X4, and 3 in the above table) the first order components of our IS conceptual net. These findings are rather different to Benbasat and Zmud's findings that about one-third of the articles they examined focused on concepts/ constructs that were outside their immediate nomological net.

"Based on an examination of the research articles published in MIS Quarterly and Information Systems Research over the last two years (2001 and 2002), we believe that about one-third offer and/or examine research models that include neither the IT artifact nor at least one of the elements associated with its immediate nomological net...."

A possible explanation for the big difference between Benbasat and Zmud's findings and our findings may be the way in which we have classified, after drill-down, the content of the articles analysed. The drill-down classification of the articles under the MAE15 (Conventional EDI) node provides an illustration.

The MAE15 node is one of the topic nodes under the more general 'MIS/Applications/Extended Enterprise Apps. /Inter-Org & Supply Chain Systems/' subject node. As MAE15 is an 'MIS Applications' node one might have expected some of the articles classified under it to focus on explaining the attributes and characteristics of the particular EDI artefact (e.g. EDI system or package) under study.

However, the drill-down analysis (13 out of 26 articles) revealed that none of the articles appeared to focus on the type of EDI systems being used (or their direct management or implementation issues). For example, none of the articles appeared to mention the specific problems of proliferation of messaging standards, different VAN protocols, etc. Similarly, none appeared to mention (or 'predict') how the use of the Internet/IP VPNs (as opposed to the more expensive traditional VANs) and web-enabled spoke EDI modules (as opposed to the more expensive and traditional EDI packages) have been lowering the cost and complexity of EDI for spoke SME's since about 1997. The articles sampled appeared to treat the EDI artefact as though it was an unchanging 'black box' whose characteristics, costs, complexity/ease of use, implementation methods, etc., were intuitively known and eternally fixed.

Most (76%) of the articles sampled (6, 168, 484, 1005, 108, 347, 644, 762, 896, and 1085) were concerned with the more general socio-political and organisational aspects of EDI adoption/impact/success/failure or with the more general economic (efficiency, effectiveness, financial) aspects of EDI adoption/impact/success/failure. This group of articles appear to be based upon what Orlikowski and Iacono refer to as the "Proxy View" of IT. Two articles (16%) used simulation techniques to model the cost/benefit (511) and control (580) aspects of EDI - this group of articles appear to be based upon Orlikowski and Iacono's "Tool view". One article (8%) did a case study comparison of the pre-implementation benefit expectations with post-implementation perceptions of realised benefits.

Consequently, after drill-down, the content of the all the articles under the MAES node were classified as covering second order concepts/constructs in terms of our conceptual net. It is possible that Benbasat and Zmud may have judged that the content of such articles fell within their immediate nomological net.

If we compare our analysis with Orlikowski and Iacono's analysis the two sets of results show more similarity.

As mentioned earlier in this chapter two of Orlikowski and Iacono's technology "views" were:

The **Nominal** view of technology: *"...articles in this group invoke technology in name only, but not in fact. Typically, the terms "information technology," "information system," or "computer" are used a few times in the articles, but these references to technology are either incidental or used as background information.*

Technology as **Model** view: *"...attempts to represent social, economic, and informational phenomena (e.g., processes, structures, events, knowledge, etc.) through the methodology of data modelling or simulation.... "*

Another of their views (referred to above) was:

Proxy view of technology: based on *"...the assumption that that the critical aspects of information technology can be captured through some set of surrogate (usually quantitative) measures-such as individual perceptions, diffusion rates, or dollars spent"*

Yet another of their views is the:

Tool view of technology: *"...view "black box" technologies and assumes that they are stable, settled artefacts that can be passed from hand to hand and used as is, by anyone, anytime, and anywhere. George et al. (1990), in a study that investigates the impacts of GDSS on group decision making, provide an example of this view".*

We argue that articles that adopt these views of IT (and several other of Orlikowski and Iacono's 'views' of IT) are dealing with the contextual components in our conceptual net. For example, if an article treats the IT artefact under study as just a named black

box, without mentioning its specific attributes (or development attributes), and focuses on the secondary determinants/effects of the artefact (e.g. alterations to the group dynamics of group decision making) then the article will not be judged to be dealing with first order effects. We would judge such 'tool view' research/articles to be dealing with the second order determinants/ effects of the central 'IT Artefact' concept. .

Orlikowski and Iacono's survey of ISR articles found that 25% used the "nominal" view, 20% used the technology as "model" view, 18% used the "tool" view, and 12% used the "proxy" view. This indicates that about 75% of the articles they surveyed would be deemed to be addressing second order determinants/ effects by the criteria used in this research. This is very similar as the results of our Top 30 analysis, given in Table 7.5 above, where 73% of the sampled articles were judged to be dealing with second or third order determinants/effects.

Top 30 Node Contribution by Journal

Contribution to Top 30 by journal

Table 7.6, below, shows the contribution of each of the journals to the total value of the top 30 nodes (the 'Contrib. to Top 30' row). The table also shows the total value contributed to all nodes by each journal (the 'Total Val of all articles in Jrnl. (J)' row) and the percentage of each journal's total value that was allocated to the top 30 nodes (the '% of J allocated to Top 30' row).

Table 7.6: Contribution to Top 30 by Journal

Journal	DSI	EJI	HBR	IFM	ISJ	ISR	JMI	MIS	SMR	Tots
Contrib. to Top 30	131	254	62	509	142	296	450	318	135	2297
Total Val of all articles in Jrnl. (J)	296	604	412	1332	336	616	964	608	332	5500
% of J allocated to Top 30	44	42	15	38	42	48	47	52	41	42

The table shows that all the journals (except HBR¹) contributed a similar proportion (between 38% and 52%) of their overall values to the Top 30 nodes.

¹ HBR's two highest scoring nodes were MAEB12: Internet\Web Bus. Models\ Opportunities (Value = 24) and MAEB20: Internet\Web Cust. Retention Strategy & Methods (Value = 26). Neither of these nodes was in the Top 30. However, if they had been coded as MAEB00: eB & EC (Misc.), which is in the Top 30, then HBR's percentage allocated to the Top 30 would rise to 33%.

Journals' contribution to Top 30 as a percentage of node value

Appendix 7.8, 'The Journals' Contribution to the Top 30 Nodes', shows the details of the contribution that each of the target journals made to the overall values of each of the Top 30 nodes in the taxonomy.

Table A7.9.1 shows the percentage of each of the Top 30 overall node values that were contributed by each journal (and the total value contributed by each journal to all nodes). The table shows that a substantial proportion of the coverage of many of the individual Top 30 nodes came from just a few of the journals. The paragraphs below point out where one journal contributed more than 40% of a node's value or where two or three journals contributed more than about 75% of the node's value.

MSRM08: Devt., Testing, & Vldtn. of Research Constructs\Instruments

Approximately 75% of the total node value was contributed by three journals (IFM, ISR & MIS).

MIPS60: Models of IS Development Process\Team Variables & Outcomes

More than 75% of the total node value was contributed by three journals (ISR, JMI & MIS)

MMSE03: Return on IS Investment (including Productivity Paradox)

Approximately 40% of the total node value was contributed by a single journal (JMI)

MRAC20: CSCCS/GDSS Research: Process (& Cog. Proc.)\Outcome Expmnts. & Models

More than 40% of the total node value was contributed by a single journal (JMI)

MSRM05: Descriptions of Research Approaches\Techniques

More than 80% of the total node value was contributed by three journals (EJI, ISJ & MIS). MIS contributed more than 40% and the two European journals (EJI & ISJ) contributed nearly 40%.

ODII00: Information Processing & Systems Models\Theory (Misc.)

More than 60% of the total node value was contributed by a single journal (JMI)

MAEB00: eB & EC (Misc.)

80% of the total node value was contributed by a single practitioner journal (SMR)

MRAD10: Decsn., Expt., & Exec. Suppt. Sys.(DEESS) Surveys

Approximately 50% of the total node value was contributed by a single journal (IFM)

MRAS25: Other SUPA (User Sat. Usg Perf & Accptnce) Expmnts.\survs.\models

Nearly 60% of the total node value was contributed by a single journal (IFM).

MMSE01: Multi-facet Evaluation of a Particular System

More than 80% of the total node value was contributed by three journals (EJI, IFM & ISR).

MAEB15: Internet\Web Bus. Strategy

More than 90% of the total node value was contributed by the two practitioner journals (HBR & SMR).

MRAD05: Decsn., Expt., & Exec. Suppt. Sys.(DEESS) Case Studies

More than 55% of the total node value was contributed by a single journal (IFM)

MMSE25: Systems Evaluation: IS Success\Failure Factors & Frmwks

Nearly 50% of the total node value was contributed by a single journal (IFM)

MMOS15: IS Staffing & Org: IS Training, Development & Motivation

Approximately 75% of the total node value was contributed by two journals (IFM & JMI)

MMSE: Sys. Ops & Management/Systems Evaluation (TOPIC node)

Nearly 60% of the total node value was contributed by a single journal (IFM).

Journals' contribution to Top 30 as a percentage of journal Tot. Value

Table A7.8.2, in Appendix 7.8, shows the journals/nodes where a particular journal's contribution to a Top 30 node was more than 7.5% of the journal's total contribution to all nodes.

In summary, more than a twelfth (about 9%) of the value of all the articles from DSI, ISR and MIS were devoted to the development, testing, and validation of research constructs/ instruments (MSRM08). Nearly a quarter of the value of all the articles from SMR were devoted to miscellaneous (MAEB00 - 15.4%) or strategic (MAEB15 7.7%) aspects of electronic commerce/business applications.

TOP 50 NODES ANALYSIS

Introduction to this Part

All the Top 50 nodes are listed, in descending sequence of node score value (Val), in Table A7.9.1 'The Top 50 Nodes' that appears in Appendix 7.9. Although these nodes account for less than 20% of the overall number of nodes they account for nearly 55% (2998 out of 5500) of the overall total node value.

This part of the chapter provides a summary analysis of how the journal articles covered the Top 50 taxonomy nodes (and Top 12 topic groups). The summary data presented is base upon the detailed analyses that appear in Appendix 7.9, 'Detailed Analysis of Journal Article Coverage of the Top 50 Taxonomy Nodes'.

The next section in this part, 'Top 50 Node Subject Groupings and Trend Analysis', first shows how the Top 50 scoring leaf nodes were distributed amongst the higher level subject groups in the taxonomy. It also reports on the (very few) trends, that were detected, in the yearly values of the subject groups (and their member nodes).

The final section summarises the commonality, or lack of commonality, of the coverage of the top 50 leaf nodes and top 12 topic groups by journal 'category'. The journal categories include US published, European published, academic, and practitioner journals.

Top 50 Node Subject Groupings and Trend Analysis

Top 50 node contributions by subject

Table 7.7, overleaf, shows how the Top 50 scoring leaf nodes were distributed amongst the higher level subject groups in the taxonomy. The various columns in the table contain the following data (shown directly overleaf).

1	Subject Group	Taxonomy subject group name
2	No. of Lvs. in T50	The number of Top 50 leaves that occur in the subject group.
3	% of Tot'	The percentage contribution made by the article classified under the Top 50 leaves in that subject group to the overall score of all articles on the database.
4	Table in Appx. 7.9	The identification of the table appearing in Appendix 7.9 that contains the detailed data
5	Note	Cross reference to explanatory notes given directly below the table.

Table 7.7: Top 50 Node Contributions By Subject

1	2	3	4	5
Subject Group	No. of Lvs. in T50	% of Tot	Table in Appx. 7.9	Note
MIS Scholarship /Major Research Areas	12	15	A7.9.2	
MIS Implementation /Apps. Procurement Procs.	6	6	A7.9.4	
MIS Scholarship /MIS Research/Methods	2	6	A7.9.5	1
MIS Mngt. /Sys. Ops & Management/Systems Evaln	5	6	A7.9.6	
MIS Mngt. /Governance, Resourcing & Org.	4	4	A7.9.7	
MIS/Applications/Extended Enterprise Applications	4	3	A7.9.8	
Org. Dynamics /Org. Trans./	4	3	A7.9.10	
MIS Mngt./ Imp. Management/ Change Management	3	3	A7.9.12	
MIS Mgt. /SISP & SITP/ISP Aprchs, Meths, & Theories	3	2	A7.9.13	
Software Tech/ExSys. & AI/ExSys & AI Techniques	2	1	A7.9.14	2
Miscellaneous nodes	5	5	A7.9.15	3

Notes.

1. One of the MIS Scholarship /MIS Research/Methods leaf nodes (MSRM08: Devt., Tstng., & Vldtn. of Constructs\Instruments) was the highest ranked of the Top 50 nodes. MSRM08 had a score of 215 which accounts for about 4% of all articles on the database.
2. The 'Software Tech/ExSys. & AI/ExSys & AI Techniques' is a single topic grouping which is part of the 'TSX: Expert Sys. & AI' subject group.
3. The 'Miscellaneous nodes' were in variety of different subject areas in the taxonomy. These five leaf nodes were - OESS30: Teleworking, ODSE25: Inter-org Systems\Structures\Models, ODDM05: Ind\Cogntv. Factors & Media Richness, ODII00: InfoProc & Systems Models\Theory (Misc.), MAUS00: Usage Surveys (Misc.).

The 'MIS Scholarship /Major Research Areas' subject group contains three topic groups. These are the SUPA (User Satisfaction, Usage, Performance & Acceptance), CSCCS (Computer Supported Cooperative Communication Systems), and DEESS (Decsn., Expt., & Exec. Suppt. Sys.) research areas. Just twelve of the leaves from these research areas and the 'MSRM08: Devt., Tstng., & Vldtn. of Constructs\Instruments' leaf node account for nearly 20% of the score of all articles on the database.

Trend analysis

Only three of the subject groups showed any discernible trends in the yearly values of the group or their member nodes. None of the other subject groups, or their member nodes, showed any discernible trends. The few trends that were detected are summarised below. The table references given in square brackets refer to the relevant supporting tables contained in Appendix 7.9, 'Detailed Analysis of Journal Article Coverage of the Top 50 Taxonomy Nodes' .

MIS Scholarship /Major Research Areas' subject group trends

Only MRAD10: DEESS Surveys showed a continuous trend – a decrease in value over the entire survey period. [Table A7.9.3]

MIS/Applications/ Extended Enterprise Applications' subject group trends

Three of the nodes in the 'MIS/Applications/Extended Enterprise Apps.' subject group had very low or zero values in the first five years of the survey period. However, all three then both rapidly increased in value over the last two years of the period (2000 and 2001). These three nodes (MAEB00: eB & EC (Misc.), MAEB15: Internet\Web Bus. Strategy, and MAEB20: Internet\Web Cust. Retention Strtgy\Mthds.) belonged to the 'eB & EC General' topic. [Table A7.9.9]

Org. Dynamics /Org. Trans./ Organisational Transformation

The annual values of ODTP10 (BPR) decreased (from 22 to 8) throughout the survey period whereas the values of ODTP25 (Knowledge Management) increased (from 0 to 25) [Table A7.9.11].

Top 50 Leaf Nodes and Top 12 Topic Groups: Commonality by Journal Category

Appendix 7.9 contains a section titled as above. This section in the appendix contains a detailed analysis of how the various journal categories covered both the Top 50 leaf nodes and the Top 12 topics groups. Because leaf nodes are at the lowest level in the taxonomic hierarchy the leaf node level analysis is at a finer level of granularity than the topic group level analysis.

The journal categories used in both levels of analyses are:

- “U” US published ‘academic’ journals (DSI, IFM, ISR, JMI, & MIS)
- “E” European published ‘academic’ journals (EJI & ISJ)
- “P” Practitioner journals (HBR & SMR)
- “U&E” US (“U”) and European (“E”) academic journals combined.

Summaries of the two levels of analysis are given in the next two sub-sections.

Summary of Top 50 leaf node commonality by journal category

Table A7.9.16 in Appendix 7.9 shows that the most popular US journal article classification nodes are very similar to the most popular European journal article classification nodes. Nine of the Top 10 US nodes occur in the European Top 50. Nearly 70% of the Top 40 US nodes occur in the European Top 50.

However, there is very little commonality between the most popular academic article classification nodes and the most popular practitioner article classification nodes. Only one of the academic journal Top 10 nodes occurs in the practitioner journal Top 50. Also, only just over 10% of the academic journal Top 40 nodes occur in the practitioner journal Top 50.

Top 12 topic group commonality by journal category

Table A7.9.19, ‘Highest Value Topics By Journal Category’ in Appendix 7.9 shows the twelve most popular US academic journal and the twelve most popular European

academic journal topics. It also shows the ten most popular practitioner journal (“P”) topics. Although the complete final taxonomy contains 82 different topic level nodes the ten to twelve most popular topics account for the majority of the article classifications. That is they account for:

- 63% of the value of all the US articles was classified under the leaves of the top 12 US topics.
- 72% of the value of all the European articles was classified under the leaves of the top 12 European topics.
- 63% of the value of all the practitioner articles was classified under the leaves of the top 10 “P” topics.

Inspection of Table A7.9.19 also shows that the most popular topics appearing in the US and European ‘academic’ journals are quite similar. Eleven of the US top twelve topics also occur in the European top twelve.

However, there is very little commonality between the practitioner journal topic rankings and the US and European topic rankings. Six of the practitioner journals’ ten highest ranked topics do not occur in either the US or European journals’ top twelve. Only three of the practitioner journals’ lower top ten rankings (10th., 9th., and 7th.) occur in both the US and the European journals’ top twelve.

ANALYSIS & OBSERVATIONS ON JOURNAL ARTICLE COVERAGE OF THE IMPORTANT TAXONOMY NODES

In the earlier Top 30 part of the chapter we adopted a ‘bottom-down’ approach and first identified the most popular Leaf nodes (the lowest level in the taxonomic hierarchy) and then conducted a drill-down and content analysis on the articles that were classified under those Leaf nodes. In the Top 50 part of the chapter we adopted a ‘bottom-up’ approach and placed the Top 50 scoring Leaf nodes into their parent Topic and Subject groups prior to analysis.

In this part of the chapter we examine the coverage the journal articles provide for the whole taxonomy. To do this we adopt a more ‘top-down’ approach. The top level of analysis involved identifying which of three top-level (i.e. the Class level) taxonomic nodes have the highest level of coverage by the journal articles. This top-level analysis revealed that the MIS class has the highest level of coverage accounting for about 80% of the value of all the article classifications. The next level of analysis involved drilling down to identify which of the MIS class’s Area nodes had obtained the highest levels of coverage by the journal articles. This level of analysis revealed that the articles classified under the ‘MIS Scholarship’ and ‘MIS Management’ areas accounted for 68% of all the MIS class article classifications (and 54% of all article classification values). The next level of analysis involved identifying which of the ‘MIS Scholarship’ and ‘MIS Management’ areas’ Subject nodes (the next highest level in the taxonomic hierarchy) obtained the highest levels of coverage by the journal articles. The bottom two levels of the analysis involved identifying the best covered Topic (and Leaf) node that made up the highest scoring Subjects.

Figure 7.6, overleaf, provides a graphical ‘skeleton’ representation of the top-down analysis of the journal articles' coverage of the taxonomy.

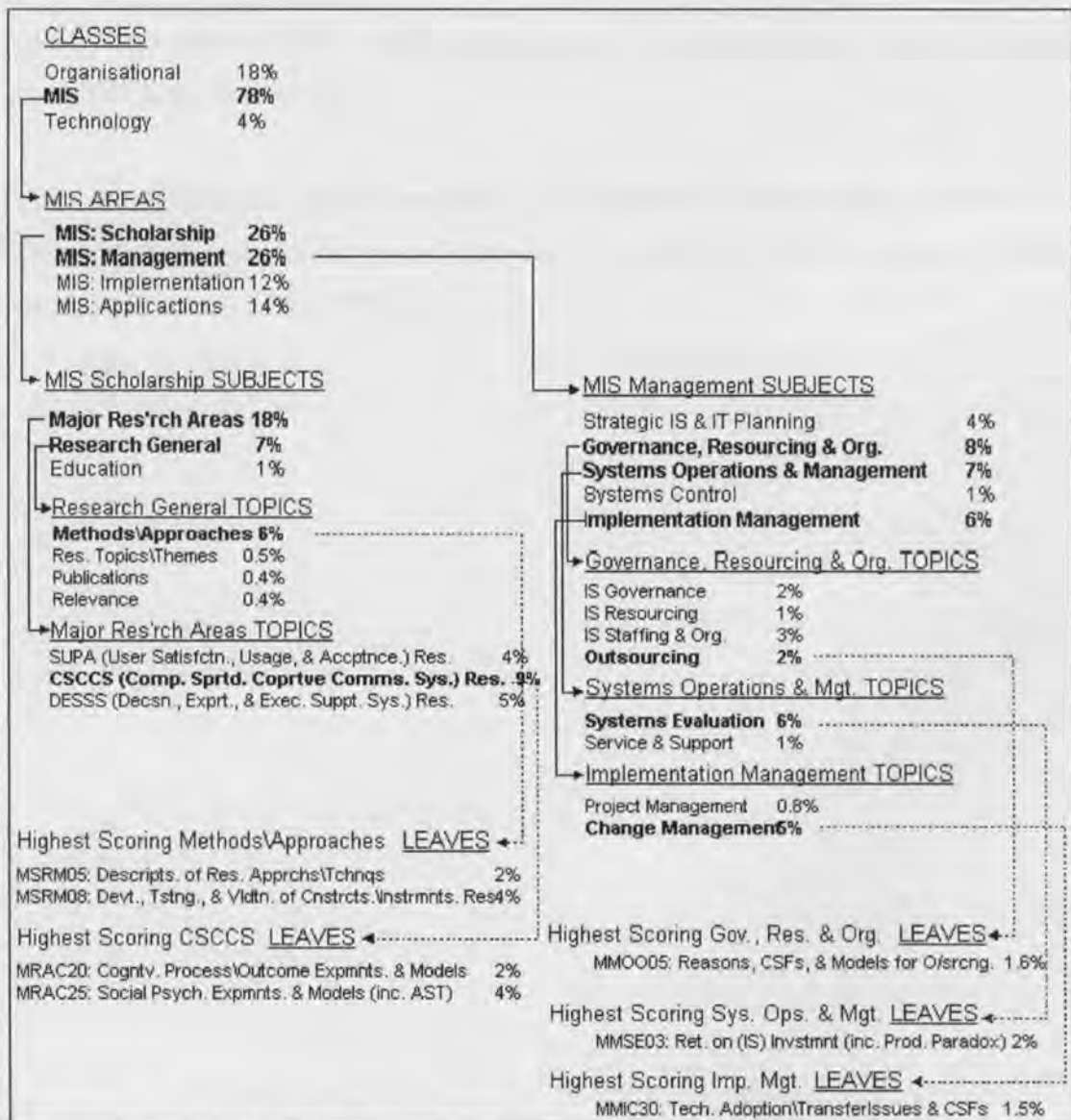


Figure 7.6: Skeleton Top-down Analysis of the J. Articles' Coverage of the Taxonomy

Note. The percentages given in the above figure show what proportion of all the journal article values were classified under that taxonomy node. E.g. 78% (top left of Fig.) of all article values were classified under taxonomy nodes that belonged to the 'MIS' Class and 4% (bottom left of Fig.) of all article values were classified under the 'MRAC25: Social Psychology Experiments & Models (including AST)' Leaf node. MRAC25 is a child node of the MIS/MIS Scholarship/Major Research Areas/CSCCS taxonomic CASTL (Class/Area/Subject/Topic/Leaf) string.

The full results of this top-down analysis are presented in Appendix 7.10, 'Journal Article Coverage of all the (Important) Taxonomy Nodes'. The term 'Important' is included in the appendix title because only the 'well covered' parts of the taxonomy are included in the analysis. For example, there is no analyses of the coverage of the

Organisational and Technology Classes in the taxonomy because they are relatively poorly covered by the journal articles. As can be seen from the top left of Fig. 7.6 those two Classes obtained 18% and 4% (respectively) of the overall article scores – whereas the MIS Class obtained 78%.

The various levels of analysis presented in the appendix include analyses of article values by year, journal, and journal category – in addition to tabular versions of the type of analysis shown in Fig. 7.6 above.

ANALYSIS SUMMARY

Introduction to this Part

This final part of the chapter contains a summary of the findings presented in the earlier parts.

Summary of ‘Initial Analysis & Observations on Missing Topics’

The first sections in this part analysed which parts of the full taxonomy were covered by the articles classified. MIS classifications accounted for more than 70% of the overall topic values and the ORG classifications accounted for a significant minority (25%) of the overall topic values. The TEC classifications accounted for such a very small proportion (less than 5%) of the overall topic values.

‘IT-related nodes’ (as defined in Appendix 7.4, ‘Initial Analysis: IT-Related Node Values’) contributed only about 30% of the overall value of the journal article classifications.

The last section (‘Missing Topics: Specific’) in this part identified a number of specific topics, from each of the main taxonomy Classes, that had either not been covered at all by the articles or just received very scant coverage. These included the following.

- ORG: Internet Start-ups, and Electronic Trading Laws & Issues
- MIS: System Maintenance & Migration Processes (inc. Y2K), Systems Security, Availability, etc. (inc. virus controls), IT Strategy Formulation and Building a Responsive IT Infrastructure, and Component-based Development (CBD)
- TEC: Cellular Phones, Wireless, and Mobile Computing

Summary of ‘Introduction to the Final Analysis’

This (and subsequent) parts of the chapter were primarily concerned with analysing what topics the journal articles did cover and how they covered them. The journal

article classification data used in this part (and subsequent parts) was based upon the final taxonomy.

The 'Introduction to the Final Analysis' showed how the distribution of node scores was heavily skewed with a relatively small number of nodes (the 'popular' nodes) accounting for a relatively high proportion of the total node score. The Top 50 nodes accounted for about 55% of the total node score whereas the least popular 200 nodes accounted for just 45% of the total node score.

Summary of 'Top 30 Nodes Analysis'

This part used a 'bottom-down' approach and first identified the most popular Leaf nodes (the lowest level in the taxonomic hierarchy) and then conducted a drill-down and content analysis on a sample of the articles that were classified under those Leaf nodes.

The section on 'Top 30 Nodes' IS Conceptual Net Component Coverage' showed that about three-quarters of the content of the articles analysed (from the top 30 nodes) referred primarily to concepts and research model constructs that lay outside the first order components of the IS 'conceptual net'.

The last section on the 'Top 30 Node Contribution By Journal' showed that all the journals (except HBR) contributed a similar proportion (between 38% and 52%) of their overall values to the Top 30 nodes. However, there was considerable variation in the values the different journals contributed toward the individual Top 30 nodes. For example, approximately 80% of the MSRM05 (Descriptions of Research Approaches\ Techniques) node value was contributed by three journals (EJI, ISJ & MIS) – with MIS contributing more than 40%. Also, more than 90% of the total node value for MAEB15 (Internet\Web Bus. Strategy) was contributed by the two practitioner journals (HBR & SMR).

Summary of 'Top 50 Nodes Analysis'

The first section of this part explained that the Top 50 nodes were listed in Table A7.9.1, 'The Top 50 Nodes' of Appendix 7.9 in descending sequence of node score

value. Although these nodes accounted for less than 20% of the overall number of nodes they accounted for about 55% (3064 out of 5500) of the overall total node value. in Appendix 7.9 in Table A7.9.1, 'The Top 50 Nodes'

The second section, 'Top 50 Node Subject Groupings and Trend Analysis', used a 'bottom-up' approach and placed the Top 50 leaf nodes into their various parent taxonomic topic or subject groups and provided a topic group and subject level summary of the Top 50 nodes. Only three, out of the eleven, groups showed any discernible trends in the yearly values of the group or their member nodes. The most noticeable of these was the rapid increase in values over the last two years of the survey demonstrated by two of the nodes in the 'MIS/Applications/Extended Enterprise Apps.' subject group. These three nodes were MAEB00: eB & EC (Misc.), MAEB15: Internet\Web Bus. Strategy, and MAEB20: Internet\Web Cust. Retention Strtgy\Mthds. – all of which belonged to the 'eB & EC General' topic group.

The ranking of the subject/topic groups, in terms of the numeric value of the Top 50 node article classifications they contained, was as follows.

- MIS Scholarship /Major Research Areas subject group nodes (16%)
- MIS Implementation /Apps. Procurement Procs subject group (6½ %)
- MIS Scholarship /MIS Research/Methods topic group (6%)
- MIS Mngt. /Sys. Ops & Management/Systems Evaluation topic group (6%)
- MIS Mngt. /Governance, Resourcing & Org. subject group (4%)
- MIS/Applications/Extended Enterprise Applications' subject group (3½ %)
- Org. Dynamics /Org. Trans./' subject group (3 ½ %)
- MIS Mngt./ Imp. Management/ Change Management' topic group (3%)
- The 'MIS Mgt. /SISP & SITP/ISP Aprchs, Meths, & Theories' topic group (2%)
- Software Technology/ExSys. & AI/ExpSys & AI Techniques topic group (>1%)
- Miscellaneous

The final section, 'Top 50 Leaf Nodes and Top 12 Topic Groups: Commonality by Journal Category', showed that the most popular US journal article classification nodes are very similar to the most popular European journal article classification nodes.

However, there was little commonality between the most popular academic article classification nodes and the most popular practitioner article classification nodes. The topic level comparison showed similar findings.

Summary of 'Analysis & Observations on Journal Article Coverage of all the Taxonomy Nodes'

This part adopted a more 'top-down' approach and started by providing an analysis of node scores by taxonomy Class which revealed that the MIS class was the biggest contributor accounting for about 80% of the value of all the article classifications. We then drilled down to analyse the two most important Areas within the MIS class. These two areas were 'MIS Scholarship' and 'MIS Management' which between them accounted for 68% of all the MIS classifications (and 54% of all article classification values).

We then presented a value analysis of the Subjects included in each of these Areas followed by an analysis of the Topic (and Leaf) values that made up those Subjects. The analyses included node type values by year, journal, and journal category.

Chapter 8:

ANALYSIS OF RELATIONSHIPS BETWEEN JOURNAL ARTICLE & KEY ISSUE DATA

CHAPTER INTRODUCTION

Chapter purpose

The primary question this research is attempting to answer is:

“Are the topics published in IS journal articles related to the key issue topics reported to be of concern to IS managers?”

Chapter 5 ‘Analysis of Managers’ Key Issues Data’ provided an analysis and summary of the ‘Top IS Management Issues’ reported in the Computer Sciences Corporation (CSC) Surveys over the period 1993 to 2001. The previous chapter (Chapter 7: Analysis of Journal Article Classification Data) presented an analysis of the data obtained during the journal article classification exercise. That analysis revealed the degree to which the various taxonomy topics were covered (or not covered) by the target journal articles.

The purpose of this chapter is to identify which journal articles (or the taxonomy nodes under which the articles have been classified) relate to the particular management issues and the degree to which the various management issues are covered (or not covered) by the related journal articles.

Chapter contents

The remainder of this chapter consists of the following four parts.

1. The Issues to Taxonomy/Article Mapping Process
2. The Detailed Issue to Taxonomy/Article Mappings
3. Analysis of Relationships Between Management Issues & Article Topics
4. Chapter Summary

The first part, 'The Issues to Taxonomy/Article Mapping Process' outlines the principles and processes and that were used to map each management issue to the particular journal articles (or the taxonomy nodes under which the articles have been classified) that related to that issue. This part also explains how some of the obstacles to the mapping process, such as the semantic overlap between the different management issues, were dealt with.

The second part, 'The Detailed Issue to Taxonomy/Article Mappings', explains how the detailed mappings for each of the twenty-five management issues are presented in Appendix 8.1 'Management Issue to Taxonomy Node Mappings'.

The third, and main, part of the chapter presents an analysis of how well the various management issues are covered, or not covered, by the related journal articles and their journals. The first section in this part examines all the issue-related articles (as a single group) and shows how their values are distributed between the different journals and publication years. The second section examines how well the issue-related articles cover the individual management issues. The third section determines if there is any relationship between the rank order of the values of the various groups of issue-related articles and the rank order of the management issues to which they relate. The last section first determines if there are any noticeable relationships between the annual changes in the ranking of the particular issues and the annual changes in the values of the articles that relate to those particular issues. The section then goes on to analyse how well each category of journal (US-published academic, European-published academic, and Practitioner) covers each of the management issues.

The last part, the 'Chapter Summary', provides a brief summary of the content of the chapter and a summary of the detailed analysis results.

THE ISSUES TO TAXONOMY/ARTICLE MAPPING PROCESS

Outline of the Process

The mapping process involved identifying the taxonomy nodes and individual articles that are 'related' to the particular management issues. The twenty-five management issues were previously described and listed (in Table 5.34) in Chapter 5. They are listed again later in this chapter in Table 8.4.

The meaning of 'Related'

If the subject matter, construct, or concept covered by an article (or node) is semantically related to the subject matter, construct, or concept covered by the management issue then the two (article/node and issue) are deemed to be related. In summary an article, or taxonomy node, is deemed to be related to a particular issue if there is a semantic connection between the two.

For example, there is a strong semantic connection between the management issue 'Using IT for Competitive Breakthroughs' and the strategic information systems planning taxonomy leaf node 'MMPI30: Obtaining Competitive\Strategic Advantage'. Because of this strong connection all the articles classified under the leaf node MMPI30 were judged, without re-examination, to be related to the 'Using IT for Competitive Breakthroughs' management issue.

Taxonomy nodes that are related to specific management issues are referred to as 'issue-related' nodes.

Dealing with the semantic overlap between management issues

There are some overlaps and relationships between the various management key issues. For example, one of the management issues is 'Instituting Cross-Functional Information Systems' (Issue 16) which is concerned with integrating business processes, information systems, and data across functions or departments for improved business coordination.

Another, very similar, issue is 'Optimising Enterprise-wide IS Services' (Issue 12) which is concerned with delivering integrated, coordinated technology services

throughout the geographically dispersed organisation. Clearly, these issues are closely related in that the issue of instituting cross-functional systems could be regarded as being just a sub-set of the optimising enterprise-wide IS services issue. The only major difference between the two is that Issue 12 includes integration of applications across geographically separate departments as well as organisationally separate departments.

Another example is provided by the issues of 'Updating Obsolete systems', 'Creating an Information Architecture', 'Instituting Cross-functional Information Systems' and, 'Organising and Utilising Data'. In practice, these are usually closely inter-related. Legacy ('obsolete') systems often require updating because they exist as islands of automation or information 'silos'. Such systems are unintegrated from both data and business process viewpoints. The purpose of updating (re-engineering or replacing) such systems is to arrive at a situation where business processes, the applications that support them, and the data maintained/used by the applications, are fully integrated and coordinated across the enterprise. One of the first major steps in migrating from the islands of automation scenario to the fully integrated enterprise-wide 'cross-functional information system' scenario is to create an 'information architecture'. The information architecture provides the high-level map of the organisation's information requirements that, when implemented, becomes the shared database that is the foundation for the development and deployment of the organisation's integrated applications. The fact that all the applications update the central database in real time means that all the corporate data can be immediately available to everyone in the organisation that is authorised to access it.

In summary, the 'information architecture' makes possible the implementation of fully integrated 'cross-functional information systems' which in turn maintain and make available the organisation's enterprise-wide data resources ('organising and utilising data').

Palvia, and others, have also pointed out the overlap issue with respect to the SIM key issue studies. Palvia stated:

"Many issues reported in past studies appear to represent items of a higher order dimension. In other words, specific issues may not individually represent unique

constructs, but as a group are more likely to be indicators or measures of higher order constructs...the authors of key issue studies themselves have made remarks about possible overlaps and relationships between the issues (Brancheau & Wetherbe, 1996; Niederman et al., 1991). For example, in the Niederman et al. study, the issues "improving the quality of software development" and "planning and using CASE technology" are representative of software development process, as a higher order construct. In the same vein, "improving information security and control" and "establishing effective disaster recovery capabilities" are issues of IS control." (Palvia, 1999)

It is not our intention to develop these 'higher-order constructs' but rather to acknowledge that they may exist. Because of the overlap between issues some taxonomy topics, and the articles they contain, can be associated with more than one issue. For example, articles classified under the 'MAMI: Information Management (Data Warehousing)' topic node could be associated with both the 'Cross-Functional Information Systems' issue and the 'Organising and Utilising Data' issue. The purpose of a data warehouse is to organise and store data from a number of different applications and/or operational databases and make that data readily available to the users. Consequently, a data warehouse is both a 'cross-functional information system' and a means of 'organising and utilising data'.

Although we allow a single taxonomy topic to be related to multiple issues we take this into account when deriving what proportion of all article values are related to any management issue. If a particular taxonomy node (of value x) is related to n different issues we use the single x value (as opposed to x times n) when deriving the overall value of all article values that are related to any of the issues.

Types of Issue to Taxonomy Node Mappings

Direct and full mappings

Some management issues mapped directly, and fully, to one (or a few) specific issue-related nodes. For example, the 'Improving the IS Human Resource' issue maps directly, and fully, to six of the leaf nodes under the 'MMOS: IS Staffing & Organisation' topic node. That is to say, those MMOS nodes were expected to fully

contain (i.e. contain all) the articles that are directly related to the ‘Improving the IS Human Resource’ issue.

Direct and partial mappings

Other management issues had direct but incomplete, or partial, mappings to specific issue-related nodes. For example, all the articles classified under the ‘MMPI30: Obtaining Competitive\Strategic Advantage’ leaf node were judged, without re-examination, to be related to the ‘Using IT for Competitive Breakthroughs’ management issue. However, as the MMPI leaf node is concerned with planning to obtain competitive advantage it is possible that articles dealing with other aspects of competitive advantage (e.g. measuring it, or analysing cases where it was achieved or not achieved) may have been classified under other nodes. That is to say, although the MMPI30 node directly relates to the issue it only partially covers the issue.

Figure 8.1 below illustrates the difference between full and partial mappings.

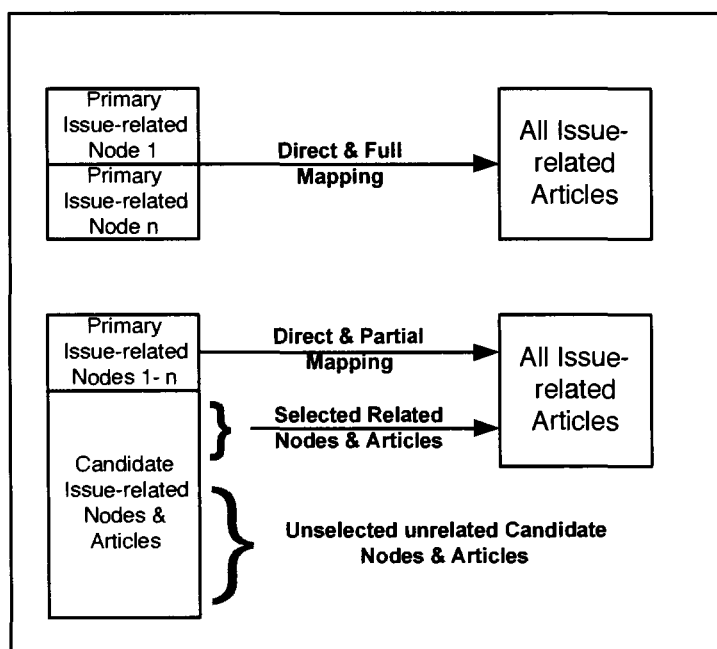


Figure 8.1: Full and Partial Node to Issue Mappings

Types of Issue-related Taxonomy Nodes

'Primary' issue-related taxonomy nodes

The taxonomy nodes that are wholly and directly related to a particular management issue (such as MMPPI30 described above) are referred to as the 'primary' issue-related nodes for that issue. However, as explained above, some management issues were only partially covered by their primary taxonomy nodes. In these cases 'candidate' issue-related nodes were also identified.

'Candidate' issue-related taxonomy nodes

A candidate node is a taxonomy node that may contain some articles related to the management issue. In particular, this possibility arises with the '00: Misc.' container nodes. Because not all the articles classified under a candidate node will be related to the issue all the articles classified under candidate nodes needed to be re-examined to see which of them, if any, were associated with the management issue.

'Candidate' articles and their identification

In some cases the primary issue-related nodes, and candidate nodes if applicable, provided only partial coverage of the issue. In these cases key word searches were carried out on all the abstracts on the database to identify other candidate articles. A candidate article is an article that may be related to a particular issue. For example, key word searches were used to identify candidate articles that may have been related to the 'Using IT for Competitive Breakthroughs' issue. This was necessary because the primary node (MMPPI30) for this issue only provided partial coverage of the issue as explained above. In order to identify any remaining candidate articles the database was searched using the key words 'competitive advantage', 'competitive breakthrough(s)', and strategic advantage(s)'. The twenty-seven candidate articles identified by the key word search were then re-examined to see if they were related to the issue. The seventeen articles that were related to the issue were then classed as issue-related articles and their values were added to the overall issue-related value.

The use of key word searches sometimes identified articles that had been classified under taxonomy nodes that initially seemed unrelated to the management issue. For example, one of the articles identified, when searching for articles containing the key

word 'competitive advantage', was article 36 "An instrument for assessing the organisational benefits of IS projects". This article was classified under the 'MSRM08: Development, Testing & Validation of Constructs\Instruments' leaf node. The article was concerned with the development and testing of a research instrument to measure "items under 3 separate sub-dimensions of strategic benefits: competitive advantage, alignment, and customer relations". Although the taxonomic classification of this article is not directly related to the actual processes of finding and implementing ways to use IT to create competitive advantage the article's content is closely related to the construct of competitive advantages arising from the use of IT. Consequently the article was judged to be related to the 'Using IT for Competitive Breakthroughs' issue. (None of the fifty-six other MSRM08 articles were judged to be strongly related to this issue).

THE DETAILED ISSUE TO TAXONOMY/ARTICLE MAPPINGS

Appendix 8.1, 'Management Issue to Taxonomy Node Mappings' contains details of the taxonomy node/journal article to management issue mappings. The first section of the appendix explains the content, format, and presentation sequence of the detailed mapping sections that make up the body of the appendix. This is followed by a separate section for each of the twenty-five management issues.

ANALYSIS OF RELATIONSHIPS BETWEEN MANAGEMENT ISSUES & ARTICLE TOPICS

Introduction to this Part

Appendix 8.2, 'Summary of Issue-Related Node Scores by Management Issue' shows how the scores of the articles classified under each of the issue-related taxonomy nodes contributed to each management issue. Appendix 8.3, 'Listing of all Articles Relating to the Management Issues' provides a detailed listing of all the article classification codings that were mapped (i.e. related) to the management issues. The list shows the details of each article that was deemed to be related to a management issue. These details include the particular issue(s) the article was related to and what proportion (or weight) of the article was related to the issue(s).

This part of the chapter uses the data presented in Appendix 8.3 to provide an analysis of how well the various management issues are covered (or not covered) by the related journal articles and their journals. The analysis is presented in the following four sections.

- **All Related Article Values By Journal and Year**

This section examines all the issue-related articles as a single group and shows how their values are distributed between the different journals and publication years.

- **Related Article Values By Issue (All Journals)**

This section examines how well the issue-related articles cover the individual management issues and classifies the individual issues into high-scoring, medium-scoring, low-scoring, and very low-scoring groups. The high-scoring issues are

provided with good coverage by the articles whereas the very low scoring issues are provided with very little coverage.

- **Correspondence Between Rankings of Issues and Issue-Related Article Scores**

The section analyses the relationship between the rank order of the values of the various groups of issue-related articles and the rank order of the management issues to which they relate.

- **Related Article Values By Issue, Journal, and Year**

This final section first presents an analysis of the relationship between the annual changes in the ranking of the particular issues and the annual changes in the values of the articles that relate to those particular issues. The section goes on to analyse how well each category of journal (US-published academic, European-published academic, and Practitioner) covers each of the management issues.

All Related Article Values By Journal and Year

All related article values compared with all article values

About 60% (828 out of 1376) of the articles stored on the database were found to be related to one or more of management issues. About 55% (3042 out of 5500) of the value (i.e. sum of the weights) of the articles stored on the database was found to be related to one or more of the management issues.

Related article values by journal

Tables 8.2 below shows how the values of the issue-related articles were distributed across the target journals. It shows the journal code and the total value of all the articles in that journal in columns one and two (1 and 2). Column three (3) shows the total value of the issue-related articles that appeared in each journal. Column four (4) shows each journal's percentage contribution to the overall value of the issue-related articles.

Column five (5) shows each journal's issue-related article value as a percentage of the journal's total article value. The journals in are listed in the table in descending order of the percentages of issue-related articles (as a percentage of the value of all articles in the journal) they contained.

Table 8.2: Value of All Related Articles by Journal (Sorted by % of Journal's Total Value)

1 Journal Code	2 Total Value of All Articles	3 Value of Related Articles	4 % of Total Related Value	5 % of Journal's Total Value
SMR	332	276	9	83
HBR	412	308	10	75
EJI	604	422	14	70
ISJ	336	214	7	64
JMI	964	513	17	53
IFM	1332	680	22	51
MIS	608	257	8	42
ISR	616	256	8	42
DSI	296	117	4	40
Totals	5500	3042	100	55

The article 'values' are the sum of the weights that were allocated to the articles during the abstract classification exercise as explained in Chapters 6 and 7.

Column three (3) shows that IFM, JMI, and EJI are the three largest contributors of issue-related articles. They contribute more than 50% of the overall total (or 22%, 17%, and 14% respectively).

However, when we examine column five (5) we see that in terms of the journals' percentage total values the situation is quite different. About 80% of the two practitioner journals' articles are issue-related. The two European journals come next with EJI having 70% of its articles issue-related and ISJ having nearly two-thirds of its articles issue-related. The US academic journals come at the bottom of the list with MIS, ISR, and DSI all having less than half of their articles issue-related.

Related article values by journal and year

Table 8.3 shows the values of the issue-related articles by journal and year. There are no obvious time-based trends. However, the 2001 values for IFM and SMR appear considerably higher than in previous years.

Table 8.3: Value of All Related Articles by Journal and Year

1	2	3	4	5	6	7	8	9	10
Jrnl. Code	1995	1996	1997	1998	1999	2000	2001		Jrnl. Total
DSI	12	12	14	12	49	12	6		117
EJI	41	64	65	65	67	58	62		422
HBR	47	33	39	33	40	72	44		308
IFM	116	94	72	69	104	98	127		680
ISJ	0*	12	36	43	40	48	35		214
ISR	20	35	48	40	28	32	53		256
JMI	70	88	68	58	77	96	56		513
MIS	36	42	32	42	38	46	21		257
SMR	24	30	22	32	20	40	108		276
Annual Total	366	410	396	394	463	502	512		3042

* There were no 1995 ISJ articles on the database.

Related Article Values By Issue (All Journals)

Table 8.4, overleaf, shows the total values of the issue-related articles that occurred (in all journals) for each of the issues. The entries in the table are presented in descending order of issue-related article total (the 'Issue Total' value in column 6).

Table 8.4: Issue-related Article Values by Issue

1	2	3	4	5	6
Row id	Issue id	Issue Name	Type	Issue Rank	Issue Total
1	11	Improving the Sys. Application Process	E	15=	643
2	17	Optimising Orgl. Effectiveness	N	1	611
3	24	Determining the Value of IS	O	20=	349
4	3	Connecting to Custs., Suppliers, and/or Partners Electronically	E	7	305
5	9	Implementing Bus. Trans. Initiatives	E	10	289
6	14	Managing Complex Organisational. Changes	N	20=	265
7	7	Developing an E-Business Strategy	N	9	221
8	1	Aligning IS and Corporate Goals	E	2=	180
9	12	Instituting Cross-Functional Info. Systems	E	5	166
10	16	Optimising Enterprise-wide IS Services	N	2=	164
11	15	Managing Knowledge Assets	N	20=	148
12	18	Organising and Utilising Data	E	2=	146
13	20	Restructuring the IS Function	E	18	140
14	10	Improving the IS Human Resource	E	13=	128
15	5	Cutting IS Costs	E	8	96
16	2	Capitalising on Advances in IT	E	12	94
17	22	Using IT for Competitive Breakthroughs	E	16	70
18	4	Creating an Information Architecture	E	15=	56
19	21	Updating Obsolete Systems	E	13=	50
20	19	Protecting and Securing Info. Systems	N	6	31
21	8	Educating Management on IT	E	17	30
22	6	Designing the Mobile Workplace	N	20=	12
23	23	Changing Technology Platforms	O	19	10
24	25	Managing Dispersed Computing	O	20=	10
25	13	Integrating Systems with the Internet	E	11	4
Total					4218

Note. The overall total of issue-related article values (4218 shown at the foot of the table) is higher than the total value of the related articles shown at the foot of column 3 in Table 8.2. This is because the values of articles related to multiple issues are counted multiple times in the above table whereas in Table 8.2 each article's value (regardless of how many issues it is related to) is only counted once.

Figure 8.2, overleaf, also shows the total values of the issue-related articles that occurred (in all journals) for each of the issues. However, this time the figure presents the data in descending order of management issue importance (represented by the relative heights of the grey columns shown in the figure).

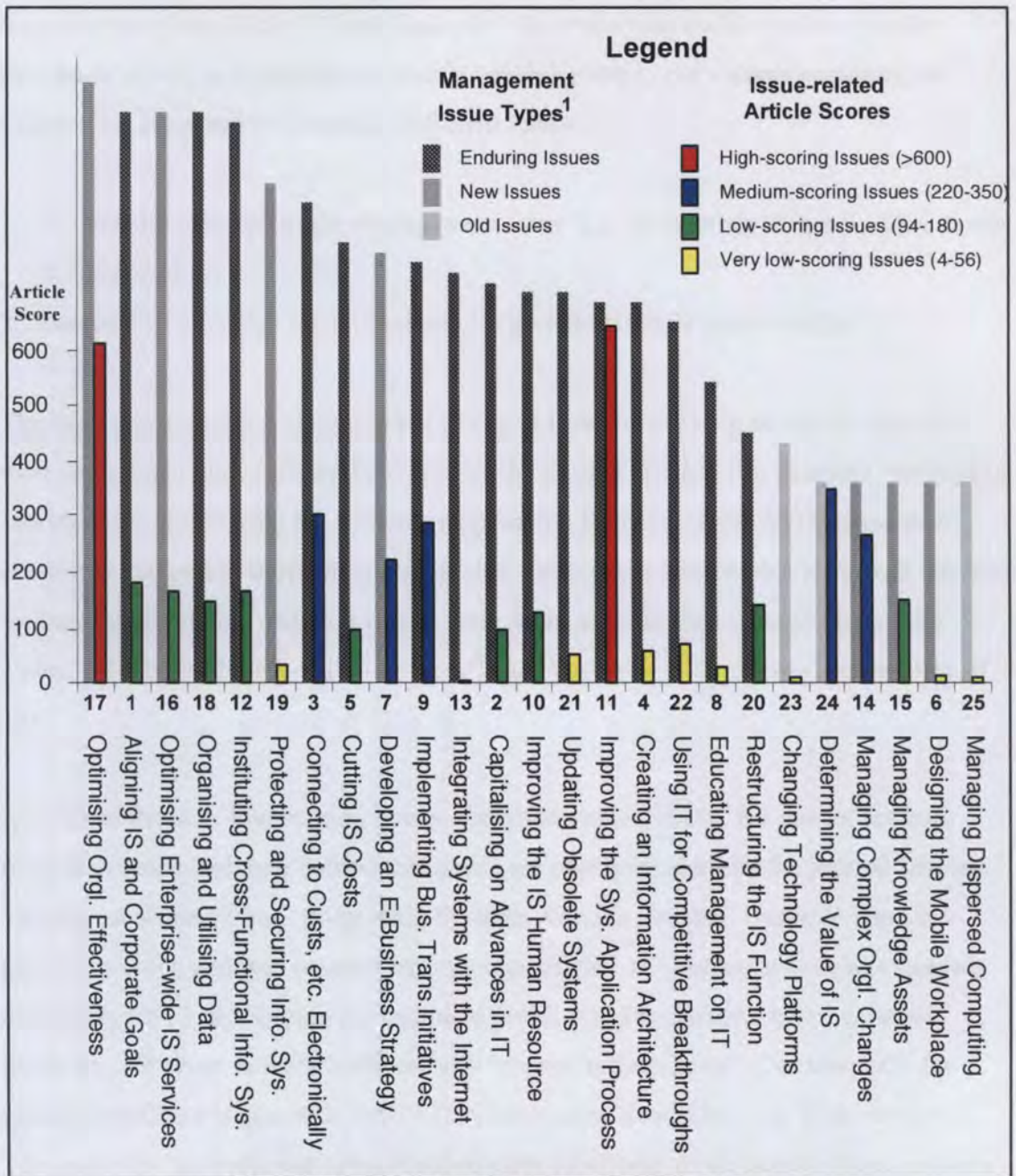


Figure 8.2: Issue-related Article Values by Issue

1

Issue Importance: As explained in Ch. 5 (underneath Table 5.34) an issue's general importance value indicates its relative (to other issues') importance in terms of how frequently the issue had occurred in the upper, middle, and lower thirds of the rankings. It is an ordinal value - not a continuous quantitative value.

Issue Type: As also explained in Ch. 5 the management issues were classified as belonging to one of three types based upon how long and when they appeared in the surveys. The issue type classifications used were as follows: 'Enduring' (E) issues occurred in 6 or more of the 9 surveys including the most recent (2001); 'New' (N) issues occurred in between 1 and 4 of most recent (2001-1998) surveys; 'Old' (O) issues were withdrawn before the most recent (2001) survey.

It can be seen from Table 8.4 and Figure 8.1 that there was a wide variation in the amount of coverage (issue-related article values) given to the various management issues. This is caused by two quite different factors:

1. the breadth of scope of the management issue (i.e. the number of issue-related nodes it is mapped to)
2. the level of coverage the journal articles give that issue's related nodes.

The high-scoring issues, shown in red in Fig. 8.1 above, are both broad in scope and their component nodes are well covered by the journal articles. For example, the highest scoring issue 'Improving the Systems Application Process' (score 643) was wide in scope and mapped to thirty taxonomy nodes. On average these nodes were well covered by the journal articles with an average node score of more than twenty. One of the nodes, 'MIPS60: Models of ISD Process/Team Variables & Outcomes' had a score of 121.

In contrast the very low-scoring issues, shown in yellow in Fig. 8.1 above, are both narrow in scope and their component nodes are poorly covered by the journal articles. The lowest scoring issue 'Integrating Systems with the Internet' (score 4) was very narrow in scope and was covered by only one article. This particular issue was narrowly defined (by CSC) as "Solving the technical problems of integrating heterogeneous hardware, software, and applications with Internet technologies". Consequently the issue mapped to a single node 'MIPS35: Component-based Devt. (& Web services)'. The score for this node was zero. A subsequent candidate article search found just one paper that was related to the issue – classified under 'MIPS00: Sys. Dev. Approaches/Methodologies (Misc.)'.

As mentioned earlier, Appendix 8.1 'Management Issue to Taxonomy Node Mappings' contains full details of the mappings for each issue. Table A8.2.1 'Summary of Issue-Related Node Scores by Management Issue' (in appendix 8.2) shows both the number of taxonomy nodes that were mapped to each issue (scope) and the total score of all the articles mapped to each issue (coverage).

The remainder of this section provides a brief analysis of the scope and coverage of the management issues. The analysis is presented by issue score order (high-scoring issues to very low-scoring issues).

The high-scoring issues

The following two issues had total issue-related article values of more than 600.

- Improving the Sys. Application Process (643)
- Optimising Organisational Effectiveness (611)

About 11% (600/5500) of the value of all articles on the database was related to each of these issues.

Improving the Sys. Application Process

All of the child topic group and leaf nodes of the single 'MIS/MIS Implementation/ MIP: Applications Procurement Processes' subject node were mapped to this issue. The MIP topic group nodes in this subject were:

- MIPS: Systems Development Approaches\Methodologies
- MIPT: Systems Development Tools
- MIPQ: Systems Development Techniques
- MIPP : Package Implementation Processes

These four topic groups were well covered by the journals and accounted for over 90% of the overall value for this issue.

Optimising Organisational Effectiveness

This issue was concerned with having effective governance of the IS function, joint planning of IS/IT strategy, and the implementation of systems that can bring about major (i.e. transformational) business process improvements. Consequently, it was mapped to the following three primary subject group nodes.

- ORG/Org. Dynamics/ODT: Org. Transformation (268)
- MIS/MIS Mngt. /MMP: Strategic IS & IT Planning (238)
- MIS/MIS Mngt. /Gov., Res. & Org. /MMOG: IS Governance (104).

Each of three subject groups that were mapped to this issue were relatively well covered by the journals - the subject group scores are shown in parentheses in the above list. The fact that this issue was wide in scope and therefore covers three subject groups helps account for its high score.

The medium-scoring issues

The following issues had scores ranging between 221 and 350.

- Determining the Value of IS (349)
- Connecting to Custs., Suppliers, and/or Partners Electronically (305)
- Implementing Bus. Trans. Initiatives (289)
- Managing Complex Organisational. Changes (265)
- Developing an E-Business Strategy (221)

More than 4% (220/5500) of the value of all articles on the database was related to each of these issues.

Determining the Value of IS

This issue was mapped to single topic group node 'MMSE: Systems Evaluation' (one of the topic groups in the 'MIS/MIS Mngt./MMS: Sys. Ops & Management' subject group). However, this particular topic group was very well covered by the journals with a topic group score of 349.

The other medium-scoring issue

The mapping for the other medium-scoring issues can be found in Appendix 8.1, 'Management Issue to Taxonomy Node Mappings'.

The low-scoring issues

The following issues had scores ranging between 94 and 180.

- Aligning IS and Corporate Goals (180)
- Instituting Cross-Functional Info. Systems (166)
- Optimising Enterprise-wide IS Services (164)
- Managing Knowledge Assets (148)
- Organising and Utilising Data (146)
- Restructuring the IS Function (140)
- Improving the IS Human Resource (128)
- Cutting IS Costs (96)
- Capitalising on Advances in IT (94)
- Using IT for Competitive Breakthroughs (70)

Between 1.3% and 3.6% of the value of all articles on the database was related to each of these issues. The mappings for these issues can be found in Appendix 8.1, 'Management Issue to Taxonomy Node Mappings'.

The very low-scoring issues

The following issues had scores ranging between 4 and 56.

- Creating an Information Architecture (56)
- Updating Obsolete Systems (50)
- Protecting and Securing Info. Systems (31)
- Educating Management on IT (30)
- Designing the Mobile Workplace (12)
- Changing Technology Platforms (10)
- Managing Dispersed Computing (10)
- Integrating Systems with the Internet (4)

Less than about 1% of the value of all articles on the database was related to each of these issues. For the bottom four issues the value is less than ¼ %. The mappings for these issues can be found in Appendix 8.1, 'Management Issue to Taxonomy Node Mappings'.

Correspondence Between Rankings of Issues and Issue-related Article Scores

Inspection of Table 8.4, above, shows that there is no obvious correlation between the rank orders of the issues (the 'Issue Rank' column) and the rank order of the 'Issue Total' values (column 1, 'Row id', contains the rank of the Issue Totals). However, Table 8.5, below, shows that there is some limited correspondence between the two sets of rankings – as outline directly below.

- Four of the top ten management issues (issues 17, 3, 7, and 9 – shown in ***bold italics***) are in the top seven issue-related article groups. These issues get fairly good coverage from the journal articles. Each of these issues is covered by between 4% and 11% of the value of all articles.
- Seven of the top ten management issues are in the top ten issue-related article groups. Each of these issues is covered by between 2% and 11% of the value of all articles.
- Eleven of the top fifteen management issues are in the top fifteen issue-related article groups. Each of these issues is covered by between 2% and 12% of the value of all articles.

Table 8.5: Correspondence Between Issue Rankings and Article Value Rankings

1	2	3	4	5	6	7
Issue id	Issue Name	Type	Iss. Rnk	Total Rnk	Issue Total	%
<i>17</i>	<i>Optimising Orgl. Effectiveness</i>	<i>N</i>	<i>1</i>	<i>2</i>	<i>611</i>	<i>11</i>
1	Aligning IS and Corporate Goals	E	2=	8	180	3
16	Optimising Enterprise-wide IS Services	N	2=	10	164	3
18	Organising and Utilising Data	E	2=	12	146	3
12	Instituting Cross-Functional Info. Systems	E	5	9	166	3
<i>3</i>	<i>Connecting to Custs., Supps., and/or Prtnrs. Electronically</i>	<i>E</i>	<i>7</i>	<i>4</i>	<i>305</i>	<i>6</i>
5	Cutting IS Costs	E	8	15	96	2
<i>7</i>	<i>Developing an E-Business Strategy</i>	<i>N</i>	<i>9</i>	<i>7</i>	<i>221</i>	<i>4</i>
<i>9</i>	<i>Implementing Bus. Trans. Initiatives</i>	<i>E</i>	<i>10</i>	<i>5</i>	<i>289</i>	<i>5</i>
10	Improving the IS Human Resource	E	13=	14	128	2
11	Improving the Sys. Application Process	E	15=	1	643	12

However, four of the top fifteen management issues are in the bottom eight (out of twenty-five) of the issue-related article groups. These issues get very little coverage from the journals – as shown in Table 8.6 below.

Table 8.6: Top Fifteen Issues Receiving Very Little Journal Coverage

1	2	3	4	5	6	7
Issue id	Issue Name	Type	Iss. Rank	Total Rnk	Issue Total	%
19	Protecting and Securing Info. Systems	N	6	20	31	0.6
13	Integrating Systems with the Internet	E	11	25	4	0.1
21	Updating Obsolete Systems	E	13=	19	50	0.9
4	Creating an Information Architecture	E	15=	18	56	1.0

Related Article Values By Issue, Journal, and Year

A note on issues exclude from the analysis

In this section, and subsequent sections, we will exclude the ‘very low-scoring issues’ from the analysis. The highest scoring issue in this bottom group had a value of 56 – which represents about fourteen journal articles. The lowest scoring issue had a value of 4 – which represents just one journal article. Because the number of articles that cover these issues is so small it is not worthwhile carrying out a more detailed analysis.

To recap the very low-scoring issues (the issue-related article scores are given in parentheses at the end of each line) were:

- Issue 4 (ranked 15=): Creating an Information Architecture (56)
- Issue 21 (ranked 13=): Updating Obsolete Systems (50)
- Issue 19 (ranked 6): Protecting and Securing Info. Systems (31)
- Issue 8 (ranked 17): Educating Management on IT (30)
- Issue 6 (ranked 20=): Designing the Mobile Workplace (12)
- Issue 23 (ranked 19): Changing Technology Platforms (10)
- Issue 25 (ranked 20=): Managing Dispersed Computing (10)
- Issue 13 (ranked 11): Integrating Systems with the Internet (4)

Values by issue and year

Table 8.7, below, shows the distribution of the issue-related article scores by issue and year.

Table 8.7: Value of Articles by Issue and Year (Sorted by Total Issue-related Article Score 'Issue Total')

Issue	1995	1996	1997	1998	1999	2000	2001	Issue Total
11	112	68	89	75	122	104	73	643
17	79	113	130	47	86	80	76	611
24	38	56	23	64	47	75	46	349
3	16	40	43	37	46	61	62	305
1	28	28	34	16	45	8	21	180
14	21	46	41	53	40	31	33	265
7	12	16	4	11	36	64	78	221
9	48	49	53	27	27	40	45	289
18	44	11	17	16	22	14	22	146
12	24	8	10	24	20	31	49	166
16	28	4	10	24	20	27	51	164
10	16	12	10	16	16	22	36	128
15	16	13	11	16	16	21	55	148
5	14	16	17	15	12	12	10	96
20	26	26	10	34	12	12	20	140
22	12	14	8	4	8	8	16	70
2	8	11	26	21	7	11	10	94
Annual Totals	578	563	572	520	610	641	735	4218

There are no obvious time-based trends in the scores for any of the issues except for the following two issues.

- Issue 3: Connecting to Customers, Suppliers, and/or Partners Electronically
- Issue 7: Developing an E-Business Strategy

Both of these issues' scores showed a continuous increase over the last four survey years (1998 – 2001).

Time-based trends in issue rankings and article scores

Chapter 5 showed that there were no major time-base trends in the management issue rankings other than for the following five issues.

Table 8.8: Management Issues Having Time-Based Major Trends

id	IS Management Issues	Dur/ Type	NA Imp Ind	EU Imp Ind	NA/EU Ranking Positions	Apparent Trends
3	Connecting to Customers, etc.	9/E	2.60	2.20	Very similar	Significant increase in importance over the period until 00. Dropped significantly in importance in 01.
9	Implementing Bus. Transform. Initiatives	9/E	1.90	2.30	Fairly similar	Rankings appear to rise until 95/96 then drop until 98 and then both rise again in 00/01.
13	Integrating Systems with the Internet	9/E	2.30	1.80	Quite similar	Significant increase in importance over the period until 00. Dropped significantly in importance in 01 (particularly in EU).
21	Updating Obsolete Systems	9/E	1.90	2.00	Very similar	Rankings increase over the period. EU rankings show a steeper increase than the NA rankings
7	Developing an Electronic Business Strategy	4/N	2.3	2.0	Very similar	(This new issue has only been in the surveys since 1998). This issue rose rapidly for the first three years to reach ranks 4 of (NA) and 2 (EU) in 2000. Then, in 2001, dropped to 13 and 11 in NA and EU respectively.

Note: The above table is extracted from Table 5.33 'Summary of Important Enduring (E) Issues' that appears in Chapter 5.

Chapter 5 pointed out that issues 3, 13, and 7 could be regarded as 'Internet' related issues. It also pointed out that a possible reason for the rise in ranking to 2000 followed by the sudden drop in ranking in 2001 may have been the Internet 'hype' of the late 1990s followed by the bursting of the Internet 'bubble' in Q1 of 2000.

We will now examine the relationship between the time-based trends in the rankings of these issues and the time-based trends in the issue-related article scores to see if there appears to be any correspondence between the two. Issues 9 'Integrating Systems with the Internet' and 21 'Updating Obsolete Systems' are omitted from the analysis because their total issue-related article scores were too low to allow any meaningful analysis. (Issue 9 was covered by only one article and issue 21 was covered by only about 12 articles). We will first present the analysis for the two remaining 'Internet' related issues ('Connecting to Customers, etc.' and 'Developing an Electronic Business Strategy') followed by the 'Implementing Bus. Transformation Initiatives' issue.

For each of the three issues we present the following yearly data in both tabular and graphical form.

- NA:** the North American ranking of that management issue (high values represent higher importance rankings)
- EU:** the European ranking of that management issue
- IssSc:** the value of all the articles (in all journals) related to that issue

Note that we are looking for similarities in the trends of the issue ranking and issue score values. The actual values themselves are drawn from quite different ranges. (The issue rankings range from 1 to 23 whereas the issue scores range from 11 to 78).

Issue 3: Connecting to Customers, Suppliers, and/or Partners Electronically

Table 8.9: Management Issue Rankings and Issue-related Article Scores for Issue 3.

Year	1995	1996	1997	1998	1999	2000	2001
NA	10	12	14	16	20	22	17
EU	3	8	14	19	19	22	19
IssSc	16	40	43	37	46	61	62

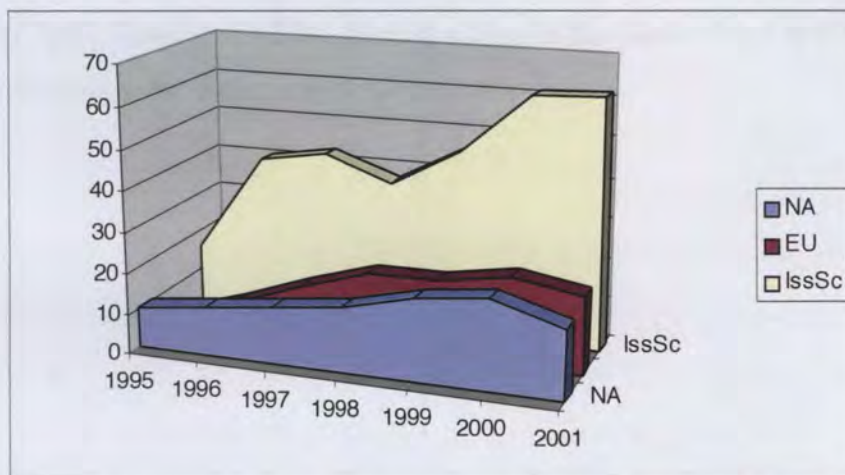


Figure 8.3: Management Issue Rankings and Issue-related Article Scores for Issue 3

Both the issue rankings and issue-related article scores show a general rise over the period. However, the issue rankings show a slight drop at the end of the period which is not reflected in the issue-related article scores .

Issue 7: Developing an E-Business Strategy (New Issue)

Table 8.10: Management Issue Rankings and Issue-related Article Scores for Issue 7

Yr	1998	1999	2000	2001
NA	4	17	19	10
EU	4	14	21	12
IssSc	11	36	64	78

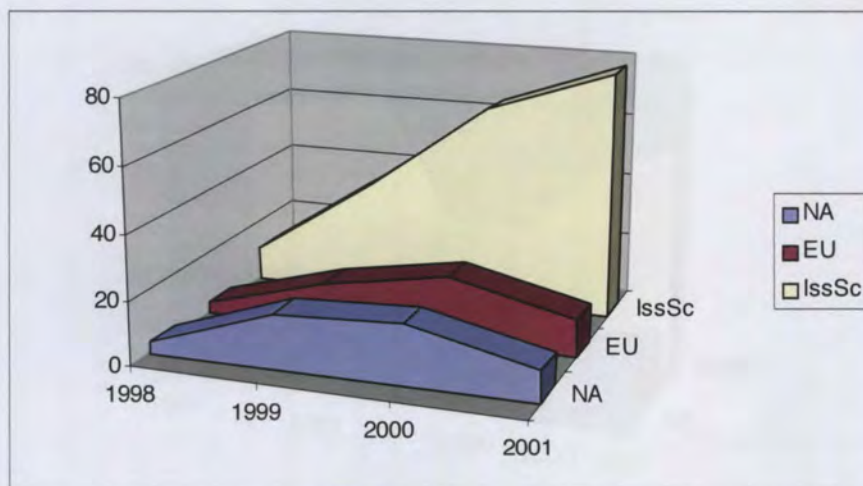


Figure 8.4: Management Issue Rankings and Issue-related Article Scores for Issue 7

Both the issue rankings and issue-related article scores show a rise over the period 1998 to 2000. However, in 2001 there is a drop in the issue-related article scores which is not reflected in the issue rankings.

Issue 9: Implementing Bus. Transformation Initiatives

Table 8.11: Management Issue Rankings and Issue-related Article Scores for Issue 9

Yr	1995	1996	1997	1998	1999	2000	2001
NA	12	9	5	7	3	5	15
EU	13	17	12	11	4	9	11
IssSc	48	49	53	27	27	40	45

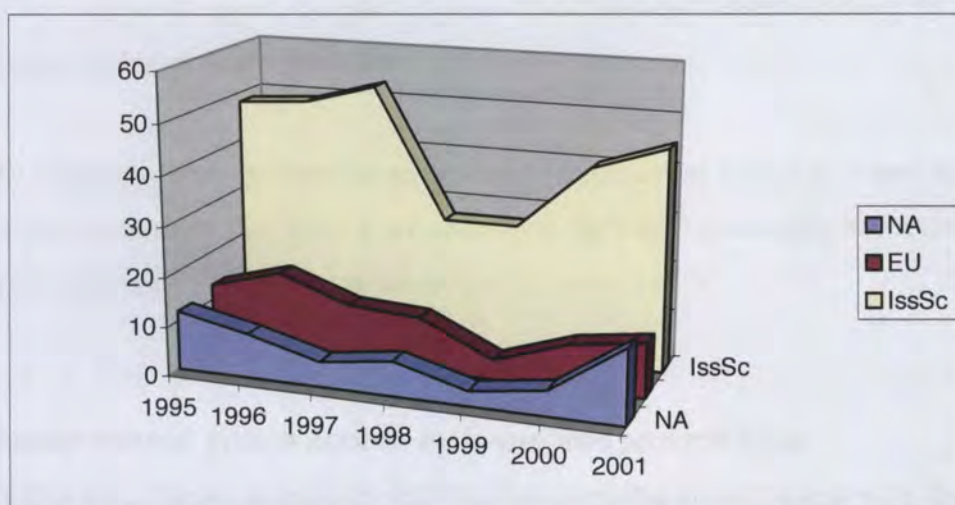


Figure 8.5: Management Issue Rankings and Issue-related Article Scores for Issue 9

Both the issue rankings and issue-related article scores show a general fall over the period 1996 to 1999. They then both rise over the period 2000 to 2001.

Summary of time-based trends in issue rankings and article scores

In Chapter 5 major time-base trends in the management issue rankings were only detected for five issues. Two of these issues received such scant coverage from the journal articles that were omitted from the analysis.

Of the remaining three issues two were 'Internet' related. For both of these issues (Issue 3 'Connecting to Customers, etc.' and Issue 7 'Developing an Electronic Business Strategy') the issue ranking and issue score trends were similar – except for the fact that the drop in rankings that took place in 2001 was not reflected in the issue scores.

The last issue in the analysis was Issue 9 ‘Implementing Business Transformation Initiatives’. Both the issue rankings and issue-related article values showed very similar trends.

Appendix 8.4 ‘Trend Analysis of Management Issue Rankings and Issue-related Article Scores’ shows annual issue rankings and issue-related article scores for the other twelve issues. (The eight issues with the lowest issue-related article scores have been omitted from the analysis as have the two new issues for which there is only one year’s data). There does not appear to be any clear correspondence between the two for any of the issues included in the appendix.

In summary, with the possible exception of three issues (issues 3, 7, and 9), there is no evidence to show that there is any direct (or lag/lead) relationship between the issue ranking trends and the issue-related article score trends.

Issue-related article scores by issue and journal type

Table 8.12, below, shows how the total issue-related article values were distributed between the three different types of journal. In addition to the ‘Management Issue’ the table contains the following columns.

US% this contains the percentage of the total issue-related article values, for this issue, that was contributed by the five US published academic journals (DSI, IFM, ISR, JMI, and MIS).

EU% this contains the percentage of the total issue-related article values, for this issue, that was contributed by the two European published academic journals (EJI and ISJ).

Pr% this contains the percentage of the total issue-related article values, for this issue, that was contributed by the two practitioner (HBR and SMR).

Tot this contains the total issue-related article value, for this issue, that was contributed by all journals

Table 8.12: Issue-related Article Scores by Issue and Journal Type

Management Issue	US %	EU %	Pr %	Tot
01. Aligning IS and Corporate Goals	67	26	7	180
02. Capitalising on Advances in IT	81	15	4	94
03. Connecting to Customers, Suppliers, and/or Partners Electronically	63	10	27	305
05. Cutting IS Costs	86	5	8	96
07. Developing an E-Business Strategy	14	7	79	221
09. Implementing Bus. Trans. Initiatives	47	14	38	289
10. Improving the IS Human Resource	69	22	9	128
11. Improving the Sys. Application Process	66	29	5	643
12. Instituting Cross-Functional Info. Systems	55	14	31	166
14. Managing Complex Organisational. Changes	62	32	7	265
15. Managing Knowledge Assets	45	25	30	148
16. Optimising Enterprise-wide IS Services	56	13	31	164
17. Optimising Orgl. Effectiveness	56	18	26	611
18. Organising and Utilising Data	73	13	14	146
20. Restructuring the IS Function	44	31	24	140
22. Using IT for Competitive Breakthroughs	54	6	40	70
24. Determining the Value of IS	75	23	2	349
				4218

Note. As explained earlier the seven lowest scoring issues (4, 6, 8, 13, 19, 21, and 23) are excluded from further analysis because the number of articles that cover these issues too small it to allow meaningful analysis.

The US academic journals account for about 70% (3816/5500) of the value of all articles on the database. Whereas the European academic journals and the practitioner journals account for about 17% (940/5500) and the 13% (744/5500) respectively. Consequently, it is not surprising to find that the US journals are the biggest contributors to nearly all the issues. However, there is one issue where the practitioner journals are the biggest contributor. This is Issue 07 'Developing an E-Business Strategy' where the practitioner journals contribute nearly 80% of the overall value.

Table 8.13, below, takes into account the fact that the different categories of journal make quite different contributions to the overall value of all the articles on the database. Table 8.13 shows the percentage of each journal category's total article value that was

allocated to each of the management issues. In other words, the table shows how much of its total article contribution each journal category contributed to each of the issues.

The 'Journal Category Total Article Value' cells in the table show the total value of all the articles in each journal category. The 'Iss. Rnk' column shows the both the type of issue (E = Enduring, O = Old, and N = New) and the importance ranking of the issue where "1" was the most important issue. (These terms are explained more fully in the explanation of 'Table 5.34: Overall Issue Importance Rankings' in Chapter 5).

Table 8.13: Issue-related Article Scores as a Percentage of Journal Type Total Article Value (Ordered by Total Issue-related Article Score 'Tot')

Management Issue	Iss. Rnk.	US%	EU%	Pr%	Tot
Journal Category Total Article Value ->		3816	940	744	
11. Improving the Sys. Application Process	E15=	<i>11.1</i>	<i>19.8</i>	4.3	643
17. Optimising Orgl. Effectiveness	N1	9.0	<i>11.7</i>	<i>21.4</i>	611
24. Determining the Value of IS	O20=	6.9	8.5	0.9	349
03. Connecting to Custs., Supps. &/or Prtnrs. Electronically	E7	5.0	3.2	<i>11.1</i>	305
09. Implementing Bus. Trans. Initiatives	E10	3.6	4.3	<i>14.8</i>	289
14. Managing Complex Organisational. Changes	N20=	4.3	9.0	2.5	265
07. Developing an E-Business Strategy	N9	0.8	1.6	<i>23.5</i>	221
01. Aligning IS and Corporate Goals	E2=	3.2	5.0	1.7	180
12. Instituting Cross-Functional Info. Systems	E5	2.4	2.5	6.9	166
16. Optimising Enterprise-wide IS Services	N2=	2.4	2.3	6.8	164
15. Managing Knowledge Assets	N20=	1.7	3.9	6.0	148
18. Organising and Utilising Data	E2=	2.8	2.0	2.7	146
20. Restructuring the IS Function	E18	1.6	4.6	4.5	140
10. Improving the IS Human Resource	E13=	2.3	3.0	1.5	128
05. Cutting IS Costs	E8	2.2	0.5	1.0	96
02. Capitalising on Advances in IT	E12	2.0	1.5	0.5	94
22. Using IT for Competitive Breakthroughs	E16	1.0	0.4	3.8	70

Let us say that a category of journal gives 'good' coverage of an issue if 10% or more of its total article score is related to that particular issue. Using this, admittedly rather arbitrary, definition we can see that the different journal categories give good coverage

of different issues. We can see from the above table (in the cells shown in ***bold italics***) that the following journal categories give good coverage of the following issues.

The practitioner journals give good coverage of:

- Issue 3 (rank E7): Connecting to Cust., Supps. etc. Electronically (11%)
- Issue 7 (rank N9): Developing an E-Business Strategy (24%)
- Issue 9 (rank E10): Implementing Bus. Trans. Initiatives (15%)
- Issue 17 (rank N1): Optimising Orgl. Effectiveness (21%)

In summary, the practitioner journals give good coverage of four of the top-ten management issues.

The European academic journals good coverage of:

- Issue 11 (rank E15): Improving the Sys. Application Process (20%)
- Issue 17 (rank N1): Optimising Orgl. Effectiveness (12%)

In summary, the European academic journals give good coverage of one of the top-ten management issues and another one of the top-twenty issues.

The US academic journals good coverage to:

- Issue 11 (rank E15): Improving the Sys. Application Process (11%).

In summary, the US academic journals give good coverage of one of the top-twenty issues.

SUMMARY

Chapter Summary

The purpose of this chapter was to identify which taxonomy nodes and journal articles related to the particular management issues and the degree to which the various management issues were covered by the related journal articles.

The first part of the chapter, 'The Issues to Taxonomy/Article Mapping Process' outlined the process and principles that were used to map the management issues to their related taxonomy nodes and journal articles. The second part referred the reader to Appendix 8.1 'Management Issue to Taxonomy Node Mappings' where the detailed mappings for each of the twenty-five management issues are presented. The third, and main, part of the chapter presented the analysis of how well the various management issues were covered by the related journal articles and their journals. The analysis included:

- how the values of the issue-related articles were distributed between the different journals and publication years.
- the relationship between the rank order of the values of the various groups of issue-related articles and the rank order of the management issues
- the (lack of) direct and lag or lead relationships between the annual changes in the ranking of the issues and the annual changes in the values of their related articles
- the degree of coverage of each issue that was provided by the different categories of journal.

A summary of the detailed analysis results is given in the next section.

Summary of Analysis Results

All related article values compared with all article values

About 60% (828 out of 1376) of the number of articles stored on the database were found to be related to one or more of (the twenty-five) management issues. Similarly

about 55% (3042 out of 5500) of the value (i.e. sum of the weights) of the articles stored on the database was found to be related to one or more of the management issues.

IFM, JMI, and EJI were the three largest contributors of issue-related articles. They contributed more than 50% of the overall total (or 22%, 17%, and 14% respectively).

However, in terms of the journals' percentage of their total article values that were related to the issues the situation is quite different. About 80% of the two practitioner journals' articles were issue-related. The two European journals came next with EJI having 70% of its articles issue-related and ISJ having nearly two-thirds of its articles issue-related. The US academic journals came at the bottom of the list with MIS, ISR, and DSI all having less than half of their articles issue-related.

High, medium, low, and very low-scoring issues

There were two high-scoring issues that had total issue-related article values of more than 600. About 11% (600/5500) of the value of all the articles on the database was related to each of these issues. These two issues were:

- Issue 11 (rank E/15=): Improving the Sys. Application Process (score 643)
- Issue 1 (rank N/1): Optimising Organisational Effectiveness (score 611)

There were five medium-scoring issues that had total issue-related article values ranging between 220 and 350. More than 4% (220/5500) of the value of all articles on the database was related to each one of these issues. These five issues were:

- Issue 24 (rank O/20=): Determining the Value of IS (score 349)
- Issue 3 (rank E/7): Connecting to Custs., Supps, etc. Electronically (score 305)
- Issue 9 (rank E/10): Implementing Bus. Trans. Initiatives (score 289)
- Issue 14 (rank N/20=): Managing Complex Organisational. Changes (score 265)
- Issue 7 (rank N/9): Developing an E-Business Strategy (score 221)

The remaining eighteen issues only obtained low or very low issue-related article scores. The ten low-scoring issues had issue-related article scores of between 94 (about 1.7% of the total) and 180 (about 3.3% of the total).

All the eight very low-scoring issues had issue-related article scores of less than 57 (about 1% of the total). The bottom four issues had scores of less than 13 (less than ¼ % of the total).

Correspondence between rankings of issues and issue-related article scores

There was no obvious correlation between the rank orders of the management issues and the issue-related article scores. However, there was a limited correspondence between the two sets of rankings. For example, the top ten issue-related article scores included seven of the top ten management issues. (Each of those seven issues was covered by between 2% and 11% of the value of all the articles).

Time-based trends in issue rankings and article scores

With the possible exception of three issues (issues 3, 7, and 9), there was no evidence to show that there was any direct (or lag or lead) relationship between the issue ranking trends and the issue-related article score trends.

Issue-related article scores by issue and journal type

The US academic journals were the biggest contributors to nearly all the issues except for Issue 07 'Developing an E-Business Strategy' where the practitioner journals contributed nearly 80% of the overall value. The fact that the US journals were the biggest contributors was not surprising as there were more of them and accounted for about 70% (3816/5500) of the value of all articles on the database.

However, when the data was analysed to show how much of each journal category's total article contribution was contributed to each of the issues the results were quite different. This analysis revealed that the different journal categories provided 'good coverage' of the issues as follows.

- The practitioner journals gave good coverage of four of the top-ten management issues.
- The European academic journals gave good coverage of one of the top-ten management issues and another of the top-twenty issues.
- The US academic journals gave good coverage of none of the top-ten management issues and of just one the top-twenty issues.

Note. A journal category was defined as giving 'good coverage' of an issue if 10% or more of its total article score was related to that particular issue.

Chapter 9

CRITICAL REVIEW OF RESEARCH METHOD ADOPTED

CHAPTER INTRODUCTION

This chapter contains the following parts:

1. Scope Limitations
2. Critical Review of Research Method

The first part discusses the limitations on the scope of the research and the non-generalisability of the research findings.

The second part critically appraises some of the methodological aspects of the research. These include the use of article abstracts to classify article content and the nature of the classification taxonomy and the use of multiple classification codes for each article. This part of the chapter also looks at some of the methodological weaknesses in the areas of reliability of the classification coding process and data triangulation of the research results. The final two sections in this part briefly discuss the validity and replicability of the research.

SCOPE LIMITATIONS

Limited Facets of Relevance

Benbasat and Zmud identified four dimensions of the relevance of academic journal articles to practitioners: interest, applicability, currency, and accessibility – as described in table 9.1 below.

Table 9.1: Benbasat and Zmud's Dimensions of Relevance

Category	Dimensions of Relevance	Description
Article's Content	Interesting	Does IS research address the problems or challenges that are of concern to IS professionals?
	Applicable	Does IS research produce the knowledge and offer prescriptions that can be utilized by practitioners?
	Current	Does IS research focus on current, <i>at the time of publication</i> , technologies and business issues?
Article's Style	Accessible	Are IS research articles able to be understood (in terms of tone, style structure, and semantics) by IS professionals? Are they written in a style that professionals would enjoy reading?

(Benbasat & Zmud, 1999)

Although this thesis is titled “The Relevance of Information Systems Research Publications to IS Practitioners' Key Concerns” the research has only investigated facets of two of these dimensions – interest and currency. The research has also assumed that the CSC ‘Top IS Management Issues’ surveys provide an accurate indication of the problems or challenges that are of concern to IS practitioners.

Choice of Journals

As explained in Chapter 4 one of the reasons for the choice of journals used in this study was that they are ‘highly regarded in MIS’. Highly regarded journals are highly regarded because the majority of IS academics consider them to be the most prestigious outlets for publishing their research (particularly for academic promotion purposes). Specialist journals do not make the highly regarded journal lists because they are not aimed at the majority of IS academics.

The findings of this research apply only to the journals (and publication periods) examined. The findings cannot be generalised to all IS journals – particularly those aimed at different audiences and more specialised topics. A good example of the former is MIS Quarterly Executive (MISQE) which is affiliated with MISQ (and the SIM). MISQE specifically aims to publish academic research in a format targeted at senior managers. It also aims to disseminate research results “in a manner that makes its relevance and utility readily apparent” (MISQE, 2005). Good examples of the latter include Elsevier’s “Computers & Security” journal that has been published for more than twenty years and the Information Resources Management Association’s “International Journal of Web Services Research” which has been in publication since 2004.

Although this research has found, for example, that component based development/web services and security were very poorly covered by the target journals it does not mean that these topics are poorly covered by all IS journals.

CRITICAL REVIEW OF RESEARCH METHOD

Classification of Articles on the Basis of the Article Abstract

This study classified the content of the journal articles on the basis of the content of their abstracts as opposed to the contents of the whole of the articles. There were a number of reasons for adopting this approach including the following.

1. All (except for one) of the related and similar studies referred to in Ch. 3 ‘Literature Review’ used abstracts as opposed to the full text of the article. The only series of studies that classified the journal article on their full text as opposed to their abstracts were the Vessey, Glass and Ramesh multiple criteria studies (Glass et al., 2002; Ramesh et al., 2002; Vessey et al., 2001b). Vessey et al also cited a number of other studies that also just used abstracts, keywords etc. as opposed to the full article.
2. The process of downloading (usually from the ProQuest on-line journal database) and reading just the articles’ abstract and keyword details in order to classify its

content required less time than would have been required if the whole article had been used.

3. Some of the target journals did not provide full text articles for all the target years on the ProQuest database.

Despite these 'reasons' it is likely that some of the article abstracts did not contain sufficient information, or the researcher mis-interpreted the information, resulting in an 'inaccurate' content classification. One particular example of this springs to mind. Article 1332 was titled 'The Brave New World of development in the internet network computing architecture (InterNCA): or how distributed computing platforms will change systems development' (Lyytinen, Rose, & Welke, 1998). The abstract of this article did not mention either component-based development or web services and it was therefore classified under the 'MIPS00 Sys. Dev. Approaches\Methodologies (Misc.)' leaf node. During a later drill-down exercise the article itself was examined. This examination revealed that the body of this very forward looking article acknowledged the increasing importance of component-based development and was suggesting that the Internet could be used as a means of distributing the components. Although the article did not specifically mention the term 'web service' its suggestion that components could be described and wrapped using XML and then transported over the web shows that the article, that was probably written before 1998, was addressing the topic that we refer to today as web services. This particular article should have been classified under the 'MIPS35 Component-based Devt. (& Web services)' leaf node.

With hindsight the (demonstration of the) reliability of the use of abstracts could have been improved by re-classifying a sample of the target journal articles by reference to the full article and then comparing the re-classifications to the original classifications. It could have been further improved if the re-classification had also been done by independent reviewers.

Nature of the Taxonomy and the Classification Codes

Nature of the taxonomy

The basic purpose of the research was to see how the topics covered in the target journal articles related to the key issues of the practitioners. Palvia et al's similar study (Palvia, 1999) used a much simpler taxonomy than was used in this study. Their classification scheme consisted of twenty of the twenty-five management issues listed in the Niederman key issues study (Niederman, 1991) plus two more 'issues' (artificial intelligence and expert systems) that they added to accommodate a large group of articles that did not fit any of Niederman's issues. Their results show that every paper they examined related directly to between one and three of the twenty key management issues (and/or their artificial intelligence and expert systems categories).

Whilst Palvia et al's taxonomy has clarity and simplicity it is hard to understand how one could expect all IS research articles to map neatly to those particular issues (plus AI and expert systems). After classifying the journal articles according to a classification scheme that was based upon the managers' key issues the Palvia study went on to conclude "It seems that the literature can identify at least half of the issues reported in the Niederman study". One could argue that the logic behind their conclusion is a little circular.

In order to avoid this type of circularity this study started with an initial taxonomy that was basically designed to reflect the IS discipline and then modified to arrive at final taxonomy which was primarily designed to reflect the topics covered by the target journals (as explained in Chapter 6). Consequently, it was then necessary to map the final taxonomy nodes to the practitioners' key issues in order investigate the relationship between the two.

Although this approach was more complex, and resulted in a more complex taxonomy, it did avoid the circularity problem.

The number of classifiers allowed per article

In this research each article was allocated between one and three topic classification codes. The Palvia study did likewise. However, Vessey et al argue that if the contents of

the entire article, instead of just the abstract, are examined it possible to “*reliably* identify the single topic that is the key focus of the article” (Vessey et al., 2001b).

We return to the important reliability issue in the next section. However, at this stage we argue that the granularity and formality of the classification method may also have a bearing on the most appropriate number of classification codes to use to classify an article. As Vessey et al point out many authors and classifiers choose to use several keywords to classify an article as opposed to just one. Each of the major existing IS article classification systems (the ISRL system used by MISQ, and the CCS used by the ACM journals) have very many keywords and low-level classification nodes. The 1998 version of the CCS has more than 1000 level four nodes. Some papers cover more than one low-level topic and therefore get classified using more than one classifier or keyword.

The taxonomy used in this research had several hundred low-level nodes and it seemed appropriate to allow the use of more than a single classification code to describe the topics covered by an article. Admittedly the choice of between one and three classifiers – instead of four or five, etc. - was rather arbitrary!

Reliability of Classification Coding

If this research had been based on a formal axiomatised keyword taxonomy and the article classification had been carried out by program then the classification process would have been reliable. That is the program would always classify an article in exactly the same way.

However, the taxonomy actually used was based on a very light-weight ontology and the taxonomy was only loosely described. The terms used in the description were not formally defined. The actual classification coding was carried out by just the researcher.

It is very likely that if the researcher were to re-classify all the articles some of the 1376 resultant topic codings would be different to the original codings. Although it would have required considerable resources to do this it would have been possible to re-code at least a sample of the articles to obtain a measure of coding consistency.

Even if the researcher's coding could have been shown to be consistent it is quite possible that 'someone like the researcher' would have coded some of the articles differently and arrived at quite different conclusions. People with similar backgrounds have their own unique 'world views' which often come into play when making judgements – including classification judgements.

Although the taxonomy has not been formally defined it was originally intended to coach two independent judges (with IS backgrounds similar to that of the researcher) in the use of the taxonomy and then get them to classify 10% of the articles. This would have given a measure of the reliability of the coding process when carried out by 'someone like the researcher'. However, due to lack of volunteers and running out of time this was not done and is a major weakness of the research.

It is interesting to note that the two similar studies mentioned earlier (Palvia et al and Vessey et al) used different methods to achieve reliability between coders. Both studies used several coders. In the Palvia study each abstract was reviewed by "at least one" coder and "When there was some doubt, others in the research team were consulted to arrive at a consensus". In the Vessey study two separate independent researchers coded each article and inter-rater reliabilities were then calculated (presumably before disagreements were resolved).

Result Triangulation

Some attempts have been made to relate the results of this investigation to the results of other investigations. For example, in Ch. 7 we compared our 'IT-related node' coverage and the conceptual net component coverage results with Orlikowski and Iacono's results (Orlikowski & Iacono, 2001) and Benbasat and Zmud's results (Benbasat & Zmud, 2003).

Another attempt (not written up in the thesis) was made to compare the topic classification results obtained by Vessey et al with the results obtained in this study. Both studies had some common target journals and both studies had some common target years. Additionally, some of the Vessey et al's topic classification areas initially appeared to map quite closely to classification areas used in this study. For example, their Topic 8 'Disciplinary Issues' contained two sub-topics 'Computing Research' and

'Computing Curriculum/Teaching' which appeared to map to our 'MSR: MIS Research (General)' and 'MSE: MIS Education' subject nodes. However, when the common journals' and common years' percentage contributions to these areas were compared the results from this study were more than twice those of the Vessey et al study. One of several possible reason for this difference is that this research classified articles that dealt with the development of research constructs and instruments under the 'MSRM08: Devt., Tstng., & Vldtn. of Constructs \Instruments' leaf node which is a grand-child of the 'MSR: MIS Research (General)' subject node. The Vessey at al study may have classified articles that dealt with the testing of say TAM instruments within the GDSS domain under their '4.2 Information systems (incl. decision support, group support systems, expert systems)', '6.5 Technology transfer (incl. innovation, acceptance, adoption, diffusion)', '6.8 IT usage/operation', or a number of other nodes.

In the absence of very detailed explanations of different classification systems and the raw data (i.e. coded articles or abstracts) it is very difficult to meaningfully compare the results of arising from the use of these different classification systems.

Validity of the Research

Most of this research has been descriptive in nature. The research has not put forward theoretical constructs (other than the IS conceptual net) or instruments that it uses to measure those constructs. Consequently the issues of construct validity and criterion related validity do not arise. The issue of content validity has been partially covered in the earlier section on the 'Limited Facets of Relevance' where it was explained that this research did not address all facets of relevance.

Hopefully, the research does exhibit face validity in that it has used an appropriate method (subject to the reliability issue) to answer the research questions and that the results presented are what they are claimed to be.

Replicability of the Research

Whilst it is not expected that the research will be replicated it should be possible to replicate most of it. The raw data is available and the research procedures and research findings have been presented in considerable detail. The part of the Research that would

not easily be replicable is the actual classification and coding of the abstracts for the reasons explained earlier in the section on 'Reliability of Classification Coding'.

Chapter 10

SUMMARY & DISCUSSION OF MAJOR FINDINGS

CHAPTER INTRODUCTION

This chapter contains the following parts:

1. Consolidated Research Questions and Answers
2. Summary of Research Findings
3. Discussion & Implications of Findings and Further Research

The purpose of the first part is to remind the reader of the primary research question and its four component groups of questions. This part then directs the reader to Appendix 10.1 where each of the fifteen detailed research questions are re-listed and the consolidated answers are provided.

The purpose of the second part is to provide a summary of the main research findings related back to the aims of the research.

The purpose of the first section in the final part is to provide a brief discussion on the significance of the contribution of this research. The purpose of the second section is to provide a discussion of the possible implications, for the IS research community, of the main findings of this research. The third, and final, section outlines some of the scope limitations of the research and goes on to identify three groups of further research questions that arise from the scope limitations.

CONSOLIDATED RESEARCH QUESTIONS AND ANSWERS

Chapter 2 explained that the primary research question was:

“Are the topics published in IS journal articles related to the key issues reported to be of concern to IS managers and, if so, how are they related?”

It also explained that the primary research question was to be decomposed into the following three groups of component research questions and one group of secondary research questions (number 3 in the list below).

1. The identification and analysis of the management issues group (three questions answered in Chapter 5).
2. The IS topic taxonomy, article classification, and topic score analysis group (four questions answered in Chapters 6 and 7).
3. The IS conceptual net coverage group (two questions answered in Chapter 7).
4. The issue to topic mapping and relationship analysis group (six questions answered in Chapter 8).

Each of these four groups was further decomposed into a number of individual research questions. Answers to each of these research questions has been given in the preceding chapters of this thesis – as shown in parentheses in the above list.

Appendix 10.1 ‘Consolidated Research Questions and Answers’ re-lists each of the fifteen detailed research questions. Each of the questions is followed by a summary of the answers that were given in the earlier chapters.

SUMMARY OF RESEARCH FINDINGS

Primary Aim Findings

The primary aim of this research was to determine if, and if so how, the topics published in IS journal articles are related to the key issues reported to be of concern to IS managers.

Coverage of the management issues by the journal articles

The research has found that about 60% of the number (and 55% of the value) of articles stored on the database were found to be related to one or more of the (twenty-five) management issues. Some of the issues were very well covered by the journal articles. The two highest scoring were Issue 11 (Improving the Systems Application Process) and Issue 17 (Optimising Organisational Effectiveness). About 11% of the value of all articles on the database was related to each of these issues. In contrast the eight lowest scoring issues were very poorly covered by the journal articles. Less than about 1% of the value of all articles on the database was related to each of these issues. For the bottom four lowest-scoring issues the value was less than ¼ %.

Relationships between issue rankings and article scores (issue coverage)

There was no significant relationship between the managers' rankings of the issues and the rankings of the issue-related article scores that related to those issues. For example, Issue 11 was the highest scoring issue but was ranked 15th. in terms of its importance to IS managers. (Spearman's rho for the two sets of rankings is 0.3880 which is not significant at the 0.05 level).

Similarly, there was very little evidence that there was any general direct (or lag/lead) relationship between the yearly issue ranking trends and the yearly issue-related article score trends. However, three (Issues 3, 7, and 9) out of the twenty-five issues did appear to show some evidence of a direct (not lag or lead) relationship.

In the case of Issue 3 (Connecting to Customers, Suppliers, and/or Partners Electronically) both the issue rankings and issue-related article scores showed a general

rise over the period. However, the issue rankings showed a slight drop at the end of the period which is not reflected in the issue scores. In the case of Issue 7 (Developing an E-Business Strategy (New Issue)) both the issue rankings and issue-related article scores showed a rise over the period 1998 to 2000. However, in 2001 there was a drop in the issue rankings in which was not reflected in the issue-related article scores. In the case of Issue 9 (Implementing Business Transformation Initiatives) both the issue rankings and issue-related article scores showed a general fall over the period 1996 to 1999. They then both rose over the period 2000 to 2001.

Issue 9 (Implementing Business Transformation Initiatives) and Issue 7 (Developing an E-Business Strategy) exhibit opposite issue ranking trends. Whilst Issue 9 was decreasing in importance Issue 7 was increasing in importance and vice versa. Maybe, interest in BPR etc. was replaced by interest in e-business between 1996 and 2000. After the Internet bubble burst in Q1 2000 interest maybe shifted from e-business back to BPR etc.

It is also interesting to note that although the two practitioner journals contributed only 13% of the total article value they contributed 80% of the Issue 7 value and 37% of the Issue 9 value. The practitioner journals' articles were the major contributor to the Issue 7 trend and a very significant contributor to the Issue 9 trend.

Related article contributions by journal category

The US academic journals were the biggest contributors to all the issues (except for Issue 7 as explained directly above). This is not surprising as they account for about 70% of the value of all articles on the database whereas the European academic journals and the practitioner journals accounted for about 17% and the 13% respectively.

When the contribution data was normalised to take account of the number of articles published by each category of journal quite a different picture emerged. The US academic journals came at the bottom of the list with MIS, ISR, and DSI all having less than half of their articles issue-related. The two European journals (EJI and ISJ) came next having over two-thirds of their articles issue-related. The two practitioner journals were at the top with about 80% of their articles being issue-related.

Secondary Aim Findings

The secondary aim was to determine what proportions of the target journal articles were investigating closely and distantly IT-related phenomena.

Proportion of articles classified under IT-related nodes

The first analysis of IT relatedness was based on finding out the value of the articles classified under 'IT-related nodes'. The IT-related nodes are those that are concerned with specific IT artefacts. They include all the Technology nodes and all the MIS Applications nodes (because applications are software artefacts) and a number of other topic groups such as MIS/MI:MIS Implmntn/MIPT:Systems Dev. Tools. The full list of the IT-related nodes was given in Appendix 7.4.

This first analysis revealed that the articles classified under the IT-related nodes contributed only about 30% of the overall value of all the journal article classifications.

Proportion of articles addressing the IT artefact or its first order antecedents/effects

The Top 30 node drill-down exercise (described in Ch. 7) revealed that many articles that had been classified under IT-related nodes did not focus on explaining the attributes, characteristics, or first order antecedents/effects of the particular IT artefact. Instead many were more concerned with the more general socio-political and organisational second order antecedents/effects of the IT artefact. Chapter 7 referred to the drill-down to the articles (13 out of 26 articles) classified under the EDI node (an 'MIS Applications' node) to demonstrate this point. The EDI drill-down analysis revealed that none of the articles appeared to focus on the type of EDI systems being used or their direct management or implementation issues. Most (76%) of the articles sampled were concerned with the more general socio-political and organisational aspects of EDI adoption or with the more general economic aspects of EDI adoption. The articles sampled appeared to treat the EDI artefact as though it was an unchanging 'black box' whose characteristics, costs, complexity/ease of use, implementation methods, etc., were intuitively known and fixed. In short, the articles appeared to be based upon what Orlikowski and Iacono refer to as the "Proxy View" of IT (Orlikowski & Iacono, 2001).

Consequently the second analysis put forward an 'Information systems conceptual net' (in Chapter 7) in order to summarise the 'IT-relatedness' of the articles classified under the Top 30 nodes. The components of the net included both first order and second order components. Components such as 'E2. Usage & Direct Impact' were the first order determinants/effects of the central 'IT Artefact' concept. Contextual components such as the wider psycho-sociological context in which usage takes place were regarded as second order determinants/effects of the central 'IT Artefact' concept. The drill-down to the articles classified under the Top 30 nodes allowed the articles to be allocated to the different components of the conceptual net.

The results of this analysis (Table 7.5) showed that about a quarter of the articles analysed referred primarily to concepts and research model constructs that lay within the first order components of the IS conceptual net (i.e. they addressed topics that were directly related to the IT artefact). The remaining three-quarters of the articles addressed topics that lay within the second and third order components (i.e. they addressed topics that were only indirectly related to the IT artefact).

Other Main Findings

Topics that were poorly covered by the journal articles

The initial analysis revealed that MIS topic classifications (in the full taxonomy) accounted for more than 70% of the overall value and the Organisational (ORG) classifications accounted for a significant minority (25%) of the overall topic values. However, the Technology (TEC) classifications accounted for a very small proportion (less than 5%) of the overall topic values. 'IT-related nodes' (which covers all Technology nodes, all MIS Applications nodes, and a number of other nodes as defined and listed in Appendix 7.4) contributed only about 30% of the overall value of the journal article classifications.

The initial analysis also identified a number of specific topics, from each of the main taxonomy Classes, that had either not been covered at all by the articles or just received very scant coverage. These included:

- ORG: Internet Start-ups, and Electronic Trading Laws & Issues
- MIS: System Maintenance & Migration Processes (inc. Y2K), Systems Security, Availability, etc. (inc. virus controls), IT Strategy Formulation and Building a Responsive IT Infrastructure, and Component-based Development (CBD)
- TEC: Cellular Phones, Wireless, and Mobile Computing

Topics that were very well covered by the journal articles

Figure 7.6 (in Ch. 7) summarised the journal articles' coverage of the highest scoring nodes at the various levels of the taxonomy. Table 10.1 below shows the five highest scoring Topic nodes. The figure in the % column indicates the proportion of all article values that were classified under that taxonomy node.

Table 10.1: Highest Scoring Topic Nodes

Topic Node String/Name	%
MIS/MIS Scholarship/Major Research Areas/MRAC: CSCCS (GDSS) Research	9
MIS/MIS Scholarship /MIS Research (General)/MSRM: Methods\Approaches	6
MIS/MIS Mngt. /Sys. Ops & Management/MMSE: Systems Evaluation	6
MIS/MIS Scholarship /Major Research Areas/MRAD: DEESS (DSS) Research	5
MIS: MIS Mngt./Imp. Management/MMIC: Change Management	5
Total %	31

CSCCS = Computer Supported Cooperative Communication Systems Research

DEESS = Decision., Expert, & Executive Support Systems Research

SUPA = User Satisfaction, Usage, Performance & Acceptance Research

Chapter 7 also reported that 11 (4%) of the 251 non-zero nodes accounted for more than 23% of the total article score value. The 11 most popular leaf nodes and their article scores were given Table 7.3.

Seven of the eight most popular leaf nodes had a research methods & approaches (RMA), or sociological (SOC), or psychological (PSY) emphasis. These leaf nodes are listed together with their emphasis (Emph) and article scores (Score) in Table 10.2 below.

Table 10.2: Seven of the Eight Most Popular Leaf Nodes

Emph	Rnk Ordr	Node String/Name	Score
RMA	01	MIS Scholarship /MIS Research (General)/Methods/Approaches/ MSRM08: Devt., Tstng., & Vldtn. of Constructs\Instruments	215
SOC	02	MIS Scholarship /Major Res. Areas/CSCCS (GDSS)) Res/ MRAC25: Social Psych. Expmnts. & Models	204
SOC	03	MIS Implmntn. /Apps. Procurement Procs./Sys. Dev. Approaches/Methodologies/ MIPS60¹: Models of ISD Process\Team Variables & Outcomes	121
SOC	05	MIS Scholarship/ Major Res. Areas/CSCCS (GDSS)) Res/ MRAC20: Process (& Cog. Proc.)\Outcome Expmnts. & Models	100
RMA	06	MIS Scholarship /MIS Research (General)/Methods/Approaches/ MSRM05: Descs. of Res. Approaches\Techniques	99
PSY	07	Org. Dynamics /Org. Decision Making/Decision/Learning Models/ ODDM05: Ind\Cogntv. Factors & Media Richness	96
PSY	08	MIS Scholarship/ Major Res. Areas/DEESS (DSS) Res/ MRAD15: Human Cognition Models\variables\experiments	91
			926

CSCCS = Computer Supported Cooperative Communication Systems Research

DEESS = Decision., Expert, & Executive Support Systems Research

SUPA = User Satisfaction, Usage, Performance & Acceptance Research

These seven nodes account for about 17% (926/5500) of the total value of all the articles classified. Most of the articles classified under these nodes made either no reference, or just a brief nominal reference, to any specific type of IS/IT system or application (or IT 'artefact'). Those that did make nominal references to an IT artefact generally treated it as a 'black-box' or 'the system' and concentrated on its second or third order effects.

¹ It originally was expected that some of the 32 articles classified under the MIPS60 (Models of ISD Process\Team Variables & Outcomes) node might have had an 'IT Artefact' focus. However, only 3 articles were concerned with processes involving software re-use and rapid incremental development. 16 were to do with group dynamics, conflict, goal setting, cognitive aspects etc. of ISD processes and the remaining 13 addressed the general project management issue of the interplay between risk, uncertainty, complexity, quality and the need for coordination

DISCUSSION & IMPLICATIONS OF FINDINGS AND FURTHER RESEARCH

Discussion of Findings

As reported in Chapter 2 Benbasat and Zmud asserted, in their 1999 MISQ paper, that most contemporary IS academic research lacks relevance to practice (Benbasat & Zmud, 1999). This assertion quickly received a number of responses from leading IS researchers including the then Editor-in Chief of MISQ, Allen Lee, who replied as follows.

“... consider Benbasat and Zmud's statement, ‘one tends today to observe a lack of relevance to practice in IS research’; my reaction is that:

a survey, field study, documentary analysis, or other rigorous empirical study must be done to procure evidence for this statement (where, of course, the result of the empirical study could even be that IS research is relevant to IS practice). However, until these empirical studies are done, the extent to which IS research is relevant to IS practice remains, objectively speaking, unknown”.

(Lee, 1999b)

This statement of Lee's was one of the primary motivations for this research.

This research has made a significant contribution to the debate on the relevance of IS research publications to IS practice by showing what topics were published in the target IS journals and what degree of coverage they gave to specific practitioner issues and concerns. The research has also contributed to the ‘IS Field Core Properties’ debate by identifying what IS phenomena actually are researched and to what level they are researched - as well as identifying some phenomena that are not researched. In addition the research developed the Information Systems Conceptual net and used it to analyse the phenomena that actually were researched in terms of their ‘IT-relatedness’.

The limitations on the scope and validity of these findings were outlined in Chapter 9 ‘Critical Review of Methodology Adopted’.

Implications of Findings for the IS Research Community

The apparent disconnect between IS research and IS practitioner concerns

Although about 55% of the value of articles stored on the database were found to be related to one or more of the (twenty-five) management issues many of the management issues were poorly covered. Table 10.3, below, shows that about 50% (12 of the 25) of the management issues received only about 10% of the total article score.

Table 10.3: Worst Covered 12 Management Issues

Issue id	Issue Name	Score	% of Total	
13	Integrating Systems with the Internet	4	0.1	1
25	Managing Dispersed Computing	10	0.2	2
23	Changing Technology Platforms	10	0.2	3
6	Designing the Mobile Workplace	12	0.2	4
8	Educating Management on IT	30	0.5	5
19	Protecting and Securing Info. Systems	31	0.6	6
21	Updating Obsolete Systems	50	0.9	7
4	Creating an Information Architecture	56	1.0	8
22	Using IT for Competitive Breakthroughs	70	1.3	9
2	Capitalising on Advances in IT	94	1.7	10
5	Cutting IS Costs	96	1.7	11
10	Improving the IS Human Resource	128	2.3	12
	Total	591	10.7	

It is interesting to note that seven of the twelve worst covered management issues have an “IT artefact” focus. These seven issues (4, 6, 13, 19, 21, 23, and 25) account for about 25% of the management issue General Importance Indicator values (given in Table 5.34: Overall Issue Importance Rankings) but receive only 3.2% of the journal articles’ Total Article Value. By way of comparison the two most popular detailed leaf nodes (MSRM08: ‘Dev’t., Testing, & Validation of Research Constructs and Instruments’ and MRAC25: ‘GDSS Social Psychology Experiments & Models’) had 3.9% and 3.7% of the total article scores respectively (as shown in Table 10.2 above). Each of these most popular research topics had more journal article coverage than the combined total of all seven of the “IT artefact” focus management issues referred to above.

Also, as mentioned earlier in this chapter, the normalised contribution data shows that less than half of the articles in the major US academic journals (MIS, ISR, and DSI) were issue-related whereas about 80% of the articles in the two practitioner journals were issue-related. In addition, there was no significant (direct, lead, or lag relationship) between the managers' rankings of the issues and the rankings of the issue-related article scores that related to those issues.

These findings indicate that, in general, IS academic research (particularly in the US journals) is not closely connected to the key concerns of practitioners. One could argue that the findings lead one to the conclusion that the converse is more likely – i.e. there is a state of disconnection between the two. Put very simply the findings indicate that, in general, IS researchers are not researching into a significant proportion of the areas that concern the practitioners.

The apparent disconnect between IS research publication topics and IS curricula

As explained in Chapter 6 the initial taxonomy was based upon the “IS 2002: Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems” (published jointly by the ACM, AIS, AITP) and the contents of nine leading MIS textbooks. In short, the initial taxonomy contained the topics that one would expect to be covered in a university undergraduate IS programme or the MIS component of a taught MBA. Chapter 7 showed that the technology topics that were present in the initial taxonomy were very poorly covered by the journal articles. The articles classified under the Technology classifications accounted for less than 5% of the overall topic values.

In contrast Table 10.1 above shows that the MRAC topics (GDSS Research) and MRAD (DSS Research) account for 14% of the content of all the journal papers classified. In short, nearly three times as much research coverage is given to these two popular research topics as is given to all the other technology topics in the initial taxonomy. We also pointed out, earlier in this chapter, that seven of the eight most popular leaf nodes had a research methods & approaches, or sociological, or psychological emphasis. Our findings indicate that IS researchers appear to be devoting much more attention to the sociological and psychological aspects of GDSS, DSS, etc.

than they are to many of the more contemporary areas of IT (e.g. component-based development, etc.).

In short, most of the technology subjects that appear in IS curricula receive scant attention from IS researchers whilst several more traditional and established (for IS research) subjects (such as GDSS, DSS, and the TAM) receive much more attention than they do in contemporary IS curricula and textbooks. Additionally, much of the research in these areas is into their second and third order antecedents and effects – particularly those of psychological and/or sociological nature. Even the research publications classified under MIPS60 (Models of ISD Process\Team Variables & Outcomes) were predominantly concerned with the psycho-sociological and organisational aspects of the ISD process. Only three out of the thirty-two papers classified under this topic had an ‘IT Artefact’ focus that dealt with first order process variables such as software re-use and rapid incremental development.

Possible reasons for the apparent disconnect between IS research and practitioners’ concerns and IS curricula

Explaining the reasons for these apparent disconnects requires a knowledge of how and why IS researchers (and journal editors) choose their research topics. These questions are outside the scope of this research but finding out answers to them is suggested as an avenue of further research in the final section of this chapter.

One could speculate that the primary motivation of some IS researchers is to publish in “A” class journals (such as the academic journals used in this study) so as to improve their record of IS academic publications and thereby improve their academic credentials for tenure and promotion purposes. If this is the case, and the “A” class journal editorial boards are willing to accept rigorously researched topics that have little relevance to practice or to the IS curriculum, then this could be a possible reason for the disconnects.

It was pointed out, in Chapter 3, that only three of the more than 280 editorial board members listed on the academic journals’ web sites (in March 2005) appeared to have affiliations to specific non-academic enterprises. Four others gave no affiliation and the remainder (about 98%) were affiliated to academic institutions – predominantly

universities. Therefore, one could speculate that nearly all these editorial board members were senior academics. It is possible that some of the senior academics that make up the editorial boards and supervise their own doctoral students believe that it is important for other IS academics, including themselves and their own graduate students, to publish rigorous research in “A” class journals even if it has little relevance to practice or to the IS curriculum. However, all this is pure speculation and, as pointed out at the start of this sub-section, further research is required to determine how and why IS researchers (and journal editors) choose their research topics (and select papers for publication).

Despite the somewhat ‘critical’ tone of the above speculation it is fully acknowledged that all IS academic journal editorial board members take on an onerous editorial workload that provides great benefit to the whole of the IS academic community. It is also recognised that many of the editorial board members of the “A” class academic journals are also the chief protagonists (as well as editorial board members) of several of the practitioner focused journals such as “MIS Quarterly Executive”.

Possible implications of the practitioner concerns disconnect for the IS academic community

This issue was considered in the earlier chapters of this thesis – in particular in Chapter 2 ‘Research Justification’ and Chapter 3 ‘Literature Review’. In this chapter we will recap on some of the key points.

Many in the IS research community have been of the opinion that much of the published IS research was not relevant to the needs or concerns of those outside the academic community. Furthermore, they have opined that more published IS research needs to be relevant to those outside the academic community. In the mid-1990s Galliers succinctly expressed this view as follows.

“It does appear that we Information Systems researchers are pursuing somewhat different agendas than those of our colleagues in practice” and argued that “in an applied discipline, such as IS it is important that we undertake research that is seen to relevant by our colleagues in industry, government and commerce as well as sufficiently scholarly by our colleagues in academia.”

(Galliers, 1994a)

Amaravadi summed up the wider implications of the IS relevance disconnect when he stated:

“The problem of relevance exists in the perceptions of the larger community and echoed in the comments of numerous participants of the debate and beyond (Benbasat and Zmud, 1999; Lee, 1999). The stakes are high regardless of the degree of the problem since public perception can eventually turn into public policy and, indirectly, affect research funding and teaching loads.”

(Amaravadi, 2001)

The concern about the lack of relevance of university research (not just IS research) in Australia was pointed out in the Kemp report when he stated that Australia has lagged significantly in turning the findings of its publicly funded basic research into economic advantage. One of the recommendations, made by Kemp, was to expand the current ‘peer’ review process that was used to determine the allocation of competitive research grants to include a ‘user’ assessment (or relevance) element. (Kemp, 1999) (Ch. 17).

In Australia, in 2001, the National Competitive Grants Program (which relied heavily on peer review) was replaced by the ‘Discovery’ and ‘Linkage’ programs. The primary purpose of the Linkage program was to support collaborative research projects between higher education researchers and industry. All Linkage research grant proposals must now contain an industry contribution. Furthermore, interaction with actual or potential users of research outcomes is seen by the Australian Research Council (ARC) to be the critical element in Linkage projects.

In the Australian context Amaravadi’s prediction that “... the public perception can eventually turn into public policy and, indirectly, affect research funding...” proved correct at about the same time his paper was published (2001).

In Chapter 2 ‘Research Justification’ we referred to the Association for Information Systems (AIS) “The State of the IS Academic Discipline” study (AIS, 2005). The initial results of that study showed that many IS researchers themselves continue to believe that the relevance of IS research and its relationship with practice are two of the major issues they face.

It is possible that the disconnect between academic IS research and the concerns of practitioners, together with other aspects of research relevance, may lead to an increasing lack of credibility in academic IS research by the practitioners and other non-academic stakeholders. In Chapter 3 ‘Literature Review’ we pointed out that Davenport and Markus saw the goal of research relevance as critical to the long-term survival and success of the academic field of IS (Davenport & Markus, 1999).

Another implication of the apparent disconnect between research publications and practitioners’ concerns is that the claims made by the academic journals (used in this thesis) may be false. In Chapter 3 we pointed out that the content of the mission statements and/or instructions to authors of all the academic journals used in this study state clearly that the articles they publish should address the concerns of managers and/or practitioners. None of the journals state that the articles they publish are to be only read by, or only contributed to, by ‘academics’.

Possible implications of the lack of central identity of the IS discipline

In Chapter 3 ‘Literature Review’ we referred to academic debate about the role of IT in IS research which was probably initiated by Orlikowski and Iacono’s paper “Desperately seeking ‘IT’ in IT research - A call to theorizing the IT artefact” (Orlikowski & Iacono, 2001). We also referred to Benbasat and Zmud paper “The Identity Crisis within the IS Discipline: Defining and Communicating the Discipline’s Core Properties” paper where they wrote:

“... the IS research community is making the discipline’s central identity even more ambiguous by, all too frequently, under-investigating phenomena intimately associated with IT-based systems and over-investigating phenomena distantly associated with IT-based systems.”

(Benbasat & Zmud, 2003, p.184)

In Chapter 7 ‘Analysis of Journal Article Classification Data’ we also gave Peter Gray’s (editor of Communications of the Association for Information Systems (CAIS)) view of the (lack of) need for IS researchers to focus on phenomena intimately associated with IT-based systems. In his editorial to CAIS’s special issue on the ‘Core of the Information Systems Field’ Gray stated:

“Phenomena come and go. Consider three technologies: twenty five years ago, personal computing was a blip; a decade ago, wireless computing was a blip; today, wearable and immersion computing are blips. Yet, in my opinion, the social, organizational, international, and societal aspects of these technologies are or will be legitimate areas for IS research. Limiting approvable research to what is in the mainstream currently, in an era when it typically takes three years from the start of a project to its publication, risks making our work a study of IS history, not IS future; a position we should not be in as a field.”

(Gray, 2003)

The research findings of this thesis generally support Benbasat and Zmud’s claim about the under investigation of first order antecedents/effects and the ‘over’ investigation of second and third order antecedents/effects. The findings also indicate that Gray’s view that “the social, organizational, international, and societal aspects of these technologies are ... legitimate areas for IS research” appears to be the predominant view of the IS academic community.

A possible result of this lack of a clear academic identity and the desire of many IS researchers to concentrate upon the social, organisational, international, and societal aspects of IT, as opposed to the first order antecedents/effects of the technologies themselves, is that IS research may be seen to lack focus and credibility by other academic disciplines.

The initial results of the AIS “The State of the IS Academic Discipline” study (AIS, 2005) show that IS researchers are concerned with the low level of recognition that those outside the IS domain place on IS research. It is beyond the scope of this research to report on what views academics from other disciplines have of IS research.

Nevertheless, it is possible to speculate. It could be the case that academics from the fields of organisational studies, sociology, etc. are puzzled by IS researchers’ desire to concentrate their research into the general organisational and sociological aspects of IT as opposed to the first order antecedents/effects of specific technologies. Academics from the social science disciplines may also wonder if the IS academics, who have no formal training in the social sciences, are capable of conducting credible and rigorous

research in the social sciences. But, such suppositions are pure speculation. It could be the case that the majority of IS researchers, who choose to research and publish on the second and third order aspects of IT, actually do have backgrounds and training in the appropriate reference disciplines as opposed to backgrounds in IS.

However, it is the author's personal opinion that one of the key factors that differentiates the field of IS from the social sciences is that IS must be concerned with the application of IT and specific IT artefacts. If so-called IS research makes no real reference to IT then it may be better labelled by its reference discipline - sociological, organisational, or whatever, research.

The author also finds it very difficult to agree with the apparent implication behind Gray's view that "*Limiting approvable research to what is in the mainstream currently, in an era when it typically takes three years from the start of a project to its publication, risks making our work a study of IS history, not IS future; a position we should not be in as a field.*" As far as the author is aware no one in the IS academic community has suggested that all IS research must be limited to mainstream current technology nor has anyone suggested that all IS research should be relevant to the immediate concerns of practitioners. What has been suggested is that IS research should be more concerned with investigating phenomena that are closely associated with IT-based systems and less concerned with investigating the more general second and third order effects of the IT-based systems (e.g. general sociological and organisational aspects). It has also been suggested that more academic IS research should be relevant to the current concerns of practitioners.

The implication behind Gray's statement appears to be that it is rather pointless researching into contemporary specific IT-related issues because the technology changes very rapidly and because it typically takes three years to get a research project published. Instead, Gray appears to advocate concentrating more upon the enduring underlying sociological and organisational issues that surround the application of IT (or any technology).

As explained a little earlier the author believes that IS research should be concerned with the application of IT and specific IT artefacts in order to differentiate the field of IS

from the other social sciences. The author also believes that another important distinguishing feature of IS is that the technology that lies at the core of the discipline continues to evolve and change at a dramatic pace. It seems somewhat imprudent to suggest that the very essence of the discipline of IS (the first order antecedents/effects/ and functions of very rapidly changing specific IT artefacts) should not be a major focus of research. It also seems imprudent to suggest that the more enduring and general second and third order sociological and organisational antecedents/effects of the technology are more worthy of study than the first order effects. Whilst the author has considerable sympathy with Gray's observation that it takes a long time to get a paper published in a reputable academic IS journal the author does not believe that this should be a major determinant of what IS researchers choose to research nor should it be a determinant of what the IS discipline is or will become. Maybe, the introduction of the more rapidly reviewed on-line journals, such as MISQ Discovery, will help alleviate the publication delay problem.

Possible implications of the apparent disconnect between IS research and IS curricula

The research findings presented in this thesis indicate that many of the technology subjects that appear in IS curricula receive scant attention from IS researchers whilst several more traditional and established IS research subjects (such as GDSS, DSS, and the TAM) receive much more attention than they do in contemporary IS curricula and textbooks.

If one assumes that most IS researchers publishing in the academic journals are academic staff in tertiary education institutions then it follows that most of them will have also have teaching and/or research student supervision duties. One might also assume that the knowledge and capabilities that academic staff develop during their research activities feeds into and supports their teaching activities. If these assumptions are correct then it is likely that, in general, the teaching of the parts of the curricula that include the popular research topics will be of better 'quality' than the teaching of those parts of the curricula that receive very little research attention.

If this is the case then it is possible that the technology topics in undergraduate IS courses and the IS technology modules in MBA courses may not be taught as well as those parts of the curricula that include the more popular research topics such as research methods, GDSS, DSS, and the TAM.

In short, it is possible that over concentration on the more non-technological research topics may result in academic staff, with teaching duties, failing to keep up to date with important technological curriculum areas. Of course, academics can and do keep up to date in subject areas that are not included in their own research or in the academic journals. One of the 'Further Research' questions included in the next section of this chapter is "What information sources, in addition to academic journal articles, do IS researchers use to keep abreast of their field?"

Further Research

IS practitioners views of IS research publications

As explained in Chapter 4 'Research Method' this research has mainly been concerned with answering "what" questions. In particular it has attempted to describe what was published in the target journals (and target years) and how the coverage of the topics that were published related to the management issues that were reported in the CSC surveys.

This research has shown that over half the articles published in the target journals cover topics that are related to the published key concerns of practitioners. However, it has not shown that these articles are actually read and used by practitioners. Answers to another group of "what" questions would help shed light on the practitioners' views of the relevance and utility (to them) of published IS research.

This group of further research questions could include the following.

- Which IS academic journals do practitioners subscribe to and/or read?
- What are the practitioners' views on the relevance and utility of the journal articles they do read?

- What other IS publications and information sources do IS practitioners consult to keep abreast of their field?
- What are the practitioners' views on the relevance and utility of these sources?

IS researchers choice of research topics

As also explained in Chapter 4 'Research Method' this research did not pose, nor attempt to answer, any major 'why' questions. In order to explain the reasons for the results described in this thesis a number of questions relating to how and why IS researchers (and journal editors) choose their research topics need to be answered.

These include the following.

- Why are the popular research topics (Research Methods\Approaches, GDSS and DSS) so popular – or how do researchers go about choosing their research topics?
- Why are the less popular topics (Technology) so unpopular?
- Why is the study of the second and third order effects of IT (particularly research methods & approaches, sociological, and psychological phenomena) more popular than the study of IT or its first order antecedents/effects.

IS researchers' views of IS research and the need for relevance

Many journal articles have already been published on the IS 'Rigour versus Relevance' and 'IS Core Discipline (including the role of the IT artefact)' debates. However, most of these articles, and particularly the ones cited earlier in this thesis, provide the views of individual leading IS academics – many of whom hold, or have held, senior editorial positions with the target journals used in this research. As far as the author of this thesis is aware there has only been one widespread systematic study that attempts to ascertain the views of all (junior as well as senior) IS researchers on the major research issues they face. This study is the "Research Issues" sub-study that is part of the Association for Information Systems (AIS) "The State of the IS Academic Discipline" (AIS, 2005) study referred to in Chapter 2. This study is still in progress.

Specific questions that could be surveyed in this area include the following.

- Do IS researchers think that some academic research should be 'relevant' to practice – and if so how much research should be relevant, to whom should it be relevant, and how should it be relevant?
- How do researchers, who are concerned about the relevance of their research to practitioners, find out what is of interest to practitioners?
- What information sources, in addition to academic journal articles, do IS researchers use to keep abreast of their field?

The "Research Issues" sub-study, referred to above, invited IS researchers (at the end of March, 2005) to complete an on-line questionnaire asking them to indicate how strongly they rated the importance of each of the fifty-six research issues. Five of these issues are concerned with the relevance of IS research and its relationship with practice and three are concerned with the low level of recognition that those outside the IS domain place on IS research. The results of the AIS research may provide some answers to the first two questions in the above list.

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