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Research Directions in MIS: An Assessment of Current Status

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ABSTRACT

The broad nature of MIS as an academic discipline as well as its increasing significance has resulted in an explosion of research into a wide range of topics. This paper reviews current MIS research literature to identify the nature of theories being tested. By identifying those topics that are mainstays of this discipline, as well as those that are resurgent in nature and those that are "fads," this paper provides a definition of the discipline today and can serve as a guide to the domains of future research. One conclusion is that IS Adoption and Use, IS Evaluation, and IS Management continue to provide the basis for the greater part of current MIS research.

Keywords

MIS evolution, theoretical areas, domains

INTRODUCTION

Years ago, a paper by Gary W. Dickson (Dickson, 1981) described the evolution and status of the Management Information Systems (MIS) field. It was then possible to provide in a single reference an analysis of the bulk of research work in the MIS discipline. Since then, the broad nature of MIS as an academic discipline as well as its increasing significance has resulted in an explosion of research into a very wide range of topics.

One of the earliest attempts to define the boundaries of the discipline was provided by Gory and Scott Morton (1971). Their framework focuses on the "structuredness" of decision tasks and the level of managerial activity at which those decision tasks are performed. Mason and Mitroff (1973) added to the formulation of what constitutes research in MIS describing an information system as dealing with the support of individual decision-makers. Davis (1974) provided definitions of MIS and the MIS discipline that have framed and guided our understanding of MIS as an academic discipline. These definitions were formulated into a framework for MIS research by Ives, Hamilton, and Davis (1980, p. 910) who delimit research in MIS as being "the systematic investigation of the development, operations, use and/or impact of an information (sub)system in an organizational environment." Nolan and Wetherbe (1980) synthesized a variety of taxonomies and frameworks in an attempt to define a "comprehensive framework" for MIS research.

Other studies (e.g., Vogel and Wetherbe, 1984) focused on identifying the domains of MIS research, the methodologies of MIS research, orientation of journals toward publication of MIS research, and production volumes of MIS researchers.

Some articles (e.g., Davis, 1980 and Simon, Wilkes, and Sakaguchi, 1999) and conference debates (e.g., ICIS 1995 and AMCIS 2003) have focused on identifying the most critical foundational and reference disciplines of MIS.

This paper aids in understanding the MIS discipline as it exists today. It is a part of a larger project to synthesize the rapidly expanding and changing MIS discipline to aid in developing an historical perspective of MIS as an academic field. This paper reports on a structured review of current MIS research literature undertaken to identify the nature of recent study, the domain of theories being tested, and the specific topic areas being researched. The purpose of this review is to classify and analyze current streams of research and identify today's "hot topics" in an effort to detect emerging trends; to acknowledge issues where great amounts of research exist; and uncover areas where research may be needed. By identifying those topics that are the mainstays of this discipline, as well as those that are resurgent in nature and those that are "fads," this paper may also serve to guide future research.

MANAGEMENT INFORMATION SYSTEMS RESEARCH

Because this study was designed to consider articles published by a number of journals, each with a unique perspective, it was necessary to begin with an accepted and acceptable definition of the *boundaries of the field of MIS*. The journal *Management Information Systems Quarterly* (MIS Quarterly) publishes research "concerning both the management of information technology and the use of information technology for managerial and organizational purposes" (MIS Quarterly, online). Specifically, the domains of interest are "either how information technologies are managed (so that they can be appropriately used within organizations) or how information technologies are used (and the implications of such use) within organizations" (MIS Quarterly, online). Some journals included in this study publish research which, by their own descriptions and intent, covers issues broader than MIS. Consequently, this description, along with the descriptions and definitions of information systems research provided by the literature cited above, was used as a basis for inclusion of papers in this study.

It was necessary to delimit what constitutes *research in the field of MIS*. General interest articles as well as opinion and technical commentary were excluded from consideration. Product and/or interface design (even when supported by usability studies) was not considered relevant for this study, so articles of this nature were not included. Articles that cite or imply generally accepted research methodologies were included in this study.

This paper specifically considered the work of researchers representing educational institutions throughout the world and did not consider the work of practitioners or individuals representing commercial firms. However, any research article that was the product of collaboration between both academic and commercial individuals was considered for inclusion in this study.

THE JOURNALS

This review of current relevant literature included articles published over a recent one-year period in journals that have been widely and consistently ranked highly as publication outlets for IS research in North America (Whitman, Hendrickson, and Townsend, 1999) (Walstrom and Hargrave, 2001) (Mylonopoulos and Theoharakis, 2001). The specific journals included in the study are listed alphabetically in Table 1. A brief description of each of these journals is given below.

Journal	Date Range of Included Issues	Number of Issues
Communications of the ACM	August, 2002 – July, 2003	12 (monthly)
Decision Sciences	Spring, 2002 – Winter, 2002	4 (quarterly)
Information Systems Research	September, 2002 – June, 2003	4 (quarterly)
Management Science	August, 2002 – July, 2003	12 (monthly)
MIS Quarterly	September, 2002 – June, 2003	4 (quarterly)

Table 1 – Journals and Issues considered for inclusion in the study

Communications of the ACM

Communications of the ACM is published by the Association for Computing Machinery. Founded in 1947, "ACM is a major force in advancing the skills of information technology professionals and students worldwide" (CACM, 2003). The 'Information for Authors' page at the CACM web site states, "The *Communications of the ACM* readership represents approximately 85,000 professionals from every known computing discipline: 80% are computing practitioners working in industry; 20% work in government and academia. The majority of readers have been involved in computing for over 12 years, and 65% have advanced degrees" (Communications of the ACM, online). Established in 1957, this journal publishes the research findings and ideas of the creators and innovators of the latest technology trends. This journal is the "premier computing magazine, internationally renowned and respected for its coverage of both existing and emerging technologies" (Communications of the ACM, online).

Decision Sciences

The *Decision Sciences Journal* (DS) is published by the Decision Sciences Institute, a "multidisciplinary international association dedicated to advancing knowledge and improving instruction in all business and related disciplines" (Decision Sciences Journal, online). According to this organization's editorial philosophy, "The central theme of the Decision Sciences

Institute is not problem solving per se, but decision making in public and private organizations utilizing behavioral, economic, and quantitative methods of analysis. *Decision Sciences* articles, therefore, must have a decision-making orientation and address problems of managerial significance" (Decision Sciences Journal, online). *Decision Sciences* "is subscribed to by more than 1,000 libraries and read by over 4,000 faculty and students in all functional areas of business, as well as by corporate-related personnel and consultants" (Decision Sciences Journal, online).

Information Systems Research

Information Systems Research (ISR) "is a journal of INFORMS, the Institute for Operations Research and the Management Sciences. *Information Systems Research* is a leading international journal of theory, research, and intellectual development, focused on information systems in organizations, institutions, the economy, and society" (ISR, 2003). The subjects of this publication include "computer science, business, management information systems, sociology and social work, production and operations management, and sociology" (ABI/Inform, 2003).

Management Science

Published by the Institute for Operations Research and the Management Sciences (INFORMS), *Management Science* (MS) is a "scholarly journal that scientifically addresses the problems, interests and concerns of organizational decision-makers. Through publication of relevant theory and innovative applications, *Management Science* serves the needs of both academicians and practitioners" (Management Science, online). The scope of *Management Science* includes "articles that address management issues with tools from traditional fields such as operations research, mathematics, statistics, industrial engineering, psychology, sociology and political science, as well as cross-functional, multidisciplinary research that reflects the diversity of the management science professions" (Management Science, online).

Management Information Systems Quarterly

Printed since 1977, the *Management Information Systems Quarterly (MIS Quarterly)* publishes research "concerning both the management of information technology and the use of information technology for managerial and organizational purposes" (MISQ, 2003). Specifically, *MIS Quarterly* states the domains of interest are "either how information technologies are managed (so that they can be appropriately used within organizations) or how information technologies are used (and the implications of such use) within organizations" (MIS Quarterly, online).

CATEGORIES OF RESEARCH

To classify current research literature according to categories of theory, domain, and methodology, the classification schemes used by each publication were considered to guide in devising one overarching scheme that accurately represents the knowledge presented in this body of work. Methods to identify the research area vary with each publication surveyed: both *Information Systems Research* and *Management Science* use a keyword identification system, while *Decision Sciences* uses a subject area identification system. Both *MIS Quarterly* and *Communications of the ACM* have rigorous classification schemes that strive to provide a common vocabulary to identify research dealing with similar subjects. To that end, the hierarchical classification frameworks utilized by *MIS Quarterly* and *Communications of the ACM* were examined.

MIS Quarterly utilizes both IS research literature (ISRL) categories and keywords to represent the theories and/or domains of the research it publishes. The ISRL classification scheme (Barki, Rivard and Talbot, 1993) specifies nine major reference categories, each with multiple sub-levels of classification. Table 2 outlines the top two layers in the hierarchy of this classification scheme.

A	Reference Disciplines
AA	Behavioral Science
AB	Computer Science
AC	Decision Theory
AD	Information Theory
AE	Organizational Theory
AF	Management Theory
AG	Language Theories
AH	Systems Theory
AI	Research
AJ	Social Science
AK	Management Science
AL	Artificial Intelligence
AM	Economic Theory
AN	Ergonomics
AO	Political Science
AP	Psychology
B	External Environment
BA	Economic Environment
BB	Legal Environment
BC	Political Environment
BD	Social Environment
C	Information Technology
CA	Computer Systems
CB	Software
D	Organizational Environment
DA	Organizational Characteristics
DB	Organizational Functions
DC	Task Organizations
DD	Organizational Dynamics
E	IS Management
EA	Data Resource Management
EB	Personnel Resource Management
EC	Hardware Resource Management
ED	Software Resource Management
EE	IS Project Management
EF	IS Planning
EG	Organizing IS
EH	IS Staffing
EI	IS Evaluation
EJ	IS Control
EK	IS Security
EL	IS Management Issues
F	IS Development and Operations
FA	IS Development Strategies
FB	IS Life Cycle Activities
FC	IS Development Methods and Tools
FD	IS Implementation
FE	IS Operations
G	IS Usage
GA	Organizational Use of IS
GB	Users
GC	Type of IS Support
GD	Type of IS Access
GE	Type of Processing
H	Information Systems
HA	Types of Information Systems
HB	IS Application Areas
HC	Components of IS
HD	IS Characteristics
I	IS Education and Research
IA	IS Education
IB	IS Research
IC	IS Professional Societies
ID	History of IS

Table 2. Top Two Layers of *MIS Quarterly* Classification Scheme

Communications of the ACM also utilizes a hierarchical format that is meant to "accurately reflect the essential structure of the discipline over an extended time" (ACM, online). This scheme includes a sub-level termed "subject descriptors" that is meant to cope with new developments in the field. Table 3 outlines the top two layers of the system used to categorize articles published in *Communications of the ACM.*

A	General Literature
A.0	General
A.1	Introductory and Survey
A.2	Reference
B	Hardware
B.0	General
B.1	Control Structures and Microprogramming
B.3	Memory Structures
B.4	Input/Output and Data Communications
B.5	Register-Transfer-Level Implementation
B.6	Logic Decision
B.7	Integrated Circuits
B.8	Performance and Reliability
C	Computer Systems Organization
C.0	General
C.1	Processor Architectures
C.2	Computer-Communications Networks
C.3	Special-Purpose and Application-Based Systems
C.4	Performance of Systems
C.5	Computer System Implementation
D	Software
D.0	General
D.1	Programming Techniques
D.2	Software Engineering
D.3	Programming Languages
D.4	Operating Systems
E	Data
E.0	General
E.1	Data Structures
E.2	Data Storage Representations
E.3	Data Encryption
E.4	Coding and Information Theory
E.5	Files
F	Theory of Computation
F.0	General
F.1	Computation by Abstract Devices
F.2	Analysis of Algorithms and Problem Complexity
F.3	Logics and Meanings of Programs
F.4	Mathematical Logic and Formal Languages
G	Mathematics of Computing
G.0	General
G.1	Numerical Analysis
G.2	Discrete Mathematics
G.3	Probability and Statistics
G.4	Mathematical Software
H	Information Systems
H.0	General
H.1	Models and Principles
H.2	Database Management
H.3	Information Storage and Retrieval
H.4	Information Systems Applications
H.5	Information Interfaces and Presentation
I	Computing Methodologies
I.0	General
I.1	Symbolic and Algebraic Manipulation
I.2	Artificial Intelligence
I.3	Computer Graphics
I.4	Image Processing and Computer Vision
I.5	Pattern Recognition
I.6	Simulation and Modeling
I.7	Document and Text Processing
J	Computer Applications
J.0	General
J.1	Administrative Data Processing
J.2	Physical Sciences and Engineering
J.3	Life and Medical Sciences
J.4	Social and Behavioral Sciences
J.5	Arts and Humanities
J.6	Computer-Aided Engineering
J.7	Computers in Other Systems
K	Computing Milieux
K.0	General
K.1	The Computer Industry
K.2	History of Computing
K.3	Computers and Education
K.4	Computers and Society
K.5	Legal Aspects of Computing
K.6	Management of Computing and Information Systems
K.7	The Computing Profession
K.8	Personal Computing

Table 3. Top Two Layers of *Communications of the ACM* Classification Scheme

Both *MIS Quarterly* and *Communications of the ACM* have been ranked as top-tier information systems journals in the world (Mylonopoulos and Theoharakis, 2001). The differences in their research classification schemes present both opportunities and challenges to the creation of one scheme to represent the articles from the journals included in this survey. The question

becomes one of how to combine and/or rationalize these two classification systems into one simple system that describes the research published within the last year. One step in this process is the selection of articles for inclusion in this study.

While nearly every article published in *MIS Quarterly* and *Information Systems Research* was selected, the task of choosing among articles published in other journals was not so straightforward. Generally, the decision was made to include an article in this survey by asking a series of questions: "Does this research address the effective use of IT in organizations? Does this research address the evaluation or use of an information system or information technology? Does this research address an issue regarding how people and/or organizations use information systems or information technology?" If the research topic could be framed by one of these questions, then the article was included in this evaluation. To that end, 94 articles were selected. The number of articles included from each journal is shown in Table 4.

Journal	Articles
Communications of the ACM	36
Decision Sciences Journal	9
Information Systems Research	22
Management Science	19
MIS Quarterly	17
Total	**94**

Table 4. Number of Research Articles per Source

The large number of articles from *Communications of the ACM* may be attributed to that publication's monthly production schedule and practitioner orientation, as opposed to the quarterly production and academic orientation of other journals included in this survey.

THE CLASSIFICATION PROCESS

The next step required the creation of a framework to effectively organize this research. Beginning with articles published in *MIS Quarterly*, and using the ISRL categories used therein, a listing of IS general theoretical areas was generated that incorporated the ideas of the ISRL groups as well as the general classifications used by *Communications of the ACM*. The following scheme of eight general IS theory categories was used to identify the overall theoretical area of each research article included in this study. The final coding scheme is a synthesis by the authors of the highest level categories from the classification frameworks used by *MIS Quarterly* and *Communications of the ACM*. For example, the category "IS in Organizations" was derived from the MISQ classification "Organizational Environment" while "IS Technology" was derived from the CACM categories "Information Technology" and "Computer Systems."

IS Adoption and Use
IS Design and Development
IS Evaluation
IS Management
IS in Organizations
IS Planning and Implementation
IS Research
IS Technologies

The challenge of identifying specific theory across the range of research evaluated here required this "broad brush" approach. While specific theory that forms the foundation of research is generally identified or implied in articles published in *MIS Quarterly* and *Information Systems Research,* the theoretical foundations of other research surveyed here are perhaps not as clearly identified or readily identifiable. Consequently the remaining articles were classified according to the simplified IS theoretical areas listed above. To identify an appropriate domain designation for each article, aspects that were examined included titles, keywords, subject area identifiers, research models and/or frameworks, as well as any lower-level ISRL designations and/or computing classification sub-categories that may have been provided within the abstract or the article.

The domain identification served to distinguish the specific area of interest within the structure of the general IS theory category. The domain tags were developed in accordance with Lowry, et al.'s (2000) description of "focus areas" as "spheres of knowledge influence or activity." (Their approach, but not their specific tags, was used.)

The greatest percentage (26%) of the current MIS published research evaluated in this study can be classified under the general theoretical area of IS Adoption and Use, while the area of IS Evaluation accounts for 18% and IS Management accounts for 16% of this research. IS in Organizations accounts for 12% of the total, while IS Technologies accounts for 10% of the total. The last three categories each account for less than 10% of the research considered here. Eighty percent of the research evaluated was published by authors affiliated with North American universities. Consequently, as might be expected, theory distribution for this group reflects, with only slight variation, the larger distribution. Research published by authors affiliated with universities outside North America shows no research in the categories of IS in Organizations or IS Research. The greatest amount of research by authors affiliated with universities outside North America is classified under the areas of IS Evaluation and IS Technologies. The overall numbers of authors affiliated with universities outside North America is not sufficient to warrant strong conclusions regarding this distribution. The distribution of the research by general theoretical area is shown in Figure 1.

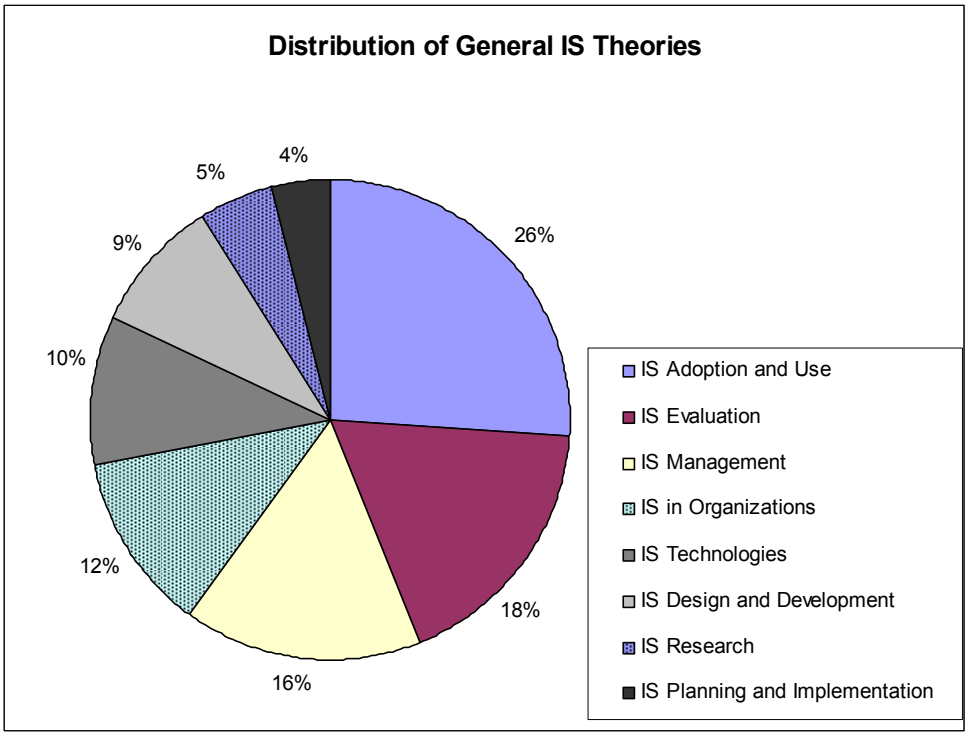

Figure 1. Percentage Distribution of Research by General Theoretical Area

Theories by Publication

Research published in *MIS Quarterly* is characterized most frequently as IS Adoption and Use or IS in Organizations (see Figure 2). Research published in *Information Systems Research* is characterized most frequently as IS Adoption and Use or IS Evaluation (see Figure 3). Research published in *Communications of the ACM* is overwhelmingly characterized as IS Adoption and Use (see Figure 4). Research published in both *Decision Sciences* (see Figure 5) and *Management Science* (see Figure 6) is categorized most frequently as IS Evaluation.

Figure 2. MISQ – Distribution of IS Theory

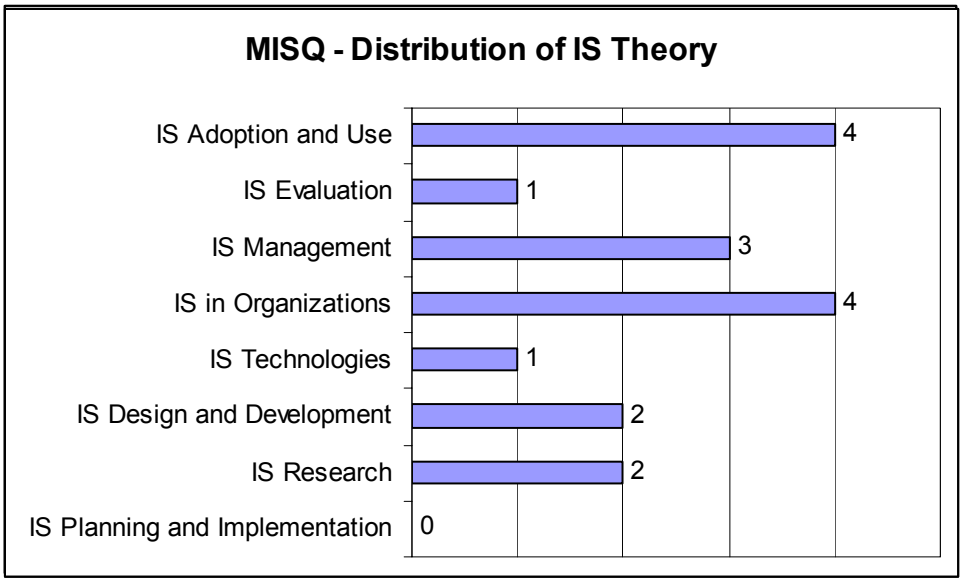

Figure 3. ISR – Distribution of IS Theory

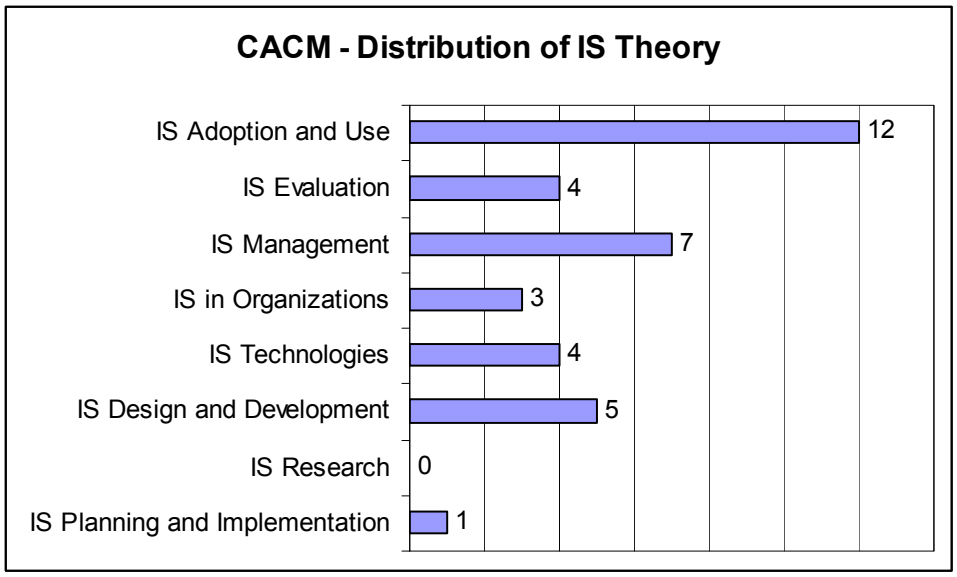

Figure 4. CACM – Distribution of IS Theory

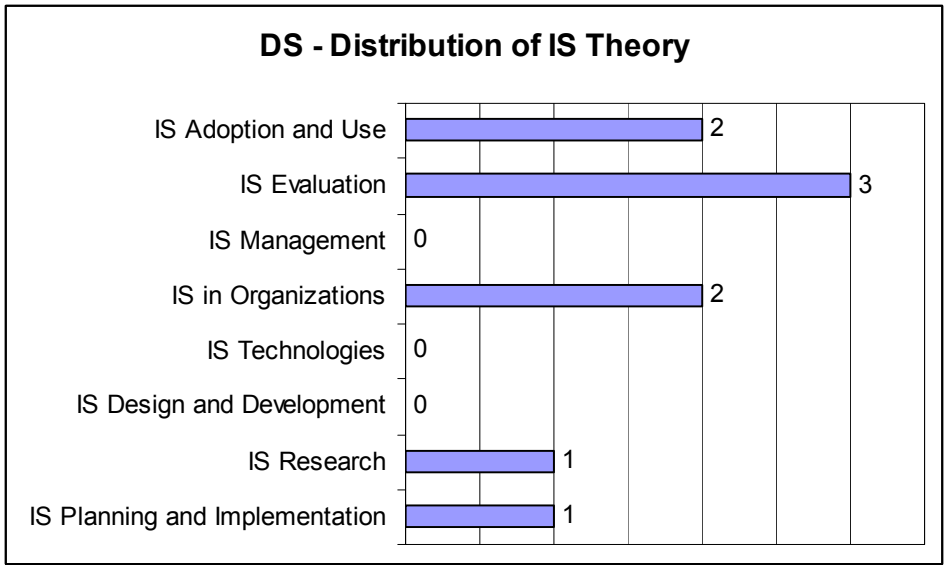

Figure 5. DS – Distribution of IS Theory

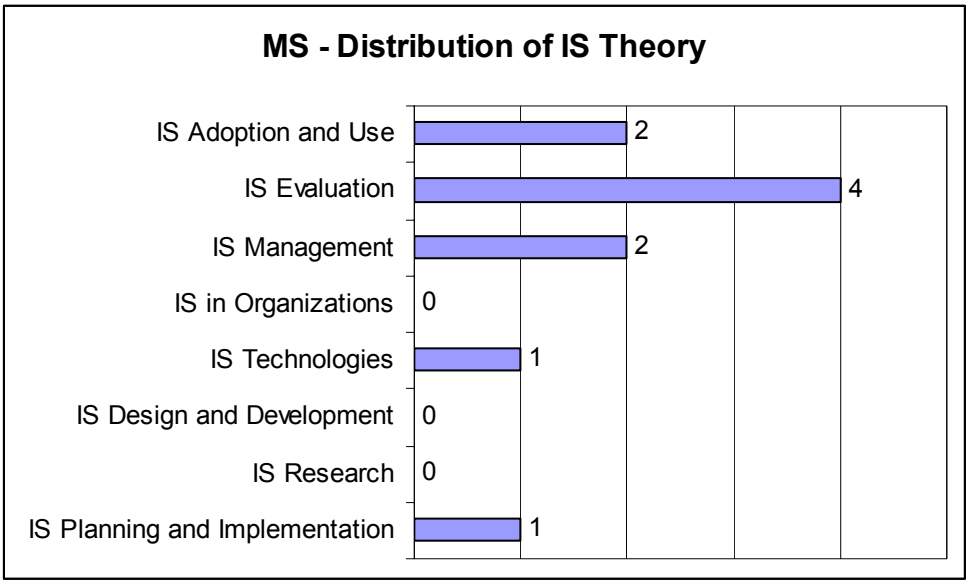

Figure 6. MS – Distribution of IS Theory

DOMAINS

The domain identification serves to distinguish the specific area of interest of each article. To identify research dealing with similar subjects, somewhat generic names were applied to the particular spheres of knowledge, influence or activity described. For example, the article entitled, *Studying Knowledge Management in Information Systems Research: Discourses and Theoretical Assumptions* (Schultze and Leidner, 2002), is assigned the domain tag "knowledge management." At the same time, the knowledge management tag is given to the article, *Informational Influence in Organizations: An Integrated Approach to Knowledge Adoption (*Sussman and Siegal, 2003). The first article (*Studying Knowledge Management*) is classified under the general theoretical area of IS Research, while the second article (*Informational Influence*) is classified as IS Adoption and Use; however, for purpose of analysis, both articles are considered to be in the domain of knowledge management.

Furthermore, some domain categories (such as knowledge management) are specific unto themselves; that is, they are without qualifiers, while other domain categories are more general and may include qualifiers. For example, the domain category "users" includes research on user self-efficacy as well as research on user preferences, and the category "software" includes research on software development as well as software quality. In these examples, self-efficacy, preferences, development, and quality are domain qualifiers. By associating domain topics in this way, research concerning analogous subject matter may be grouped in order to identify topical trends.

A review of the domain tags assigned to the 94 articles reveals a preponderance of the term "e-Commerce," with a total of 17 articles concerned with this particular area of MIS research. Furthermore, the most frequent qualifiers to the e-Commerce domain are metrics and trust. The wealth of papers devoted to e-Commerce metrics are attributed to *Information Systems Research*, Vol. 13, No. 3, September, 2002.

With seven articles, the second-most frequent domain identified in this review is "knowledge management." During the time period under study, *MIS Quarterly* published four papers on knowledge management, while *Decision Sciences, Information Systems Research* and *Communications of the ACM* each published one article on this subject. Tying with knowledge management, the domain of "software" is the subject of seven articles, with qualifiers that include development, development costs, quality, and resource management.

Considering frequency of occurrence, eleven domains associated with at least three articles are identified below, while those domains associated with fewer than three articles are not listed. Sixty articles (64% of those surveyed) are represented by these eleven domains:

Domain	Number of articles
e-Commerce	18
Knowledge management	7
Software (and programming issues)	7
Users	4
Supply chain management	4
IT investment/payoff	4
Technology	4
Outsourcing	3
Pricing IS goods/services	3
Database management	3
ERP systems	3
Total	**60**

Table 5. Number of Articles Per Domain

AUTHORS AND ACADEMIC INSTITUTIONS

Analysis of 94 articles in five publications reveals 207 unique authors. Collaboration among researchers is the norm, with more than 92% of the papers produced by groups of two or more authors.

Number of authors	Number of papers	Percentage of papers
1	7	7.4%
2	45	47.9%
3	33	35.1%
4	7	7.4%
5	2	2.1%
	94	**100%**

Table 6. Multiple Authorship Distribution

Three researchers had authored three papers in the selected journals, and fourteen researchers had authored two papers in the selected journals The 207 authors represent 109 unique institutions. Indiana University, Bloomington, and Nanyang Technological University, Singapore had five articles attributed to faculty members. The table below lists those universities that had at least three articles attributed to a faculty member.

University	Unique Articles	Unique Authors
Indiana University, Bloomington	5	5
Nanyang Technological University, Singapore	5	5
Carnegie Mellon University, Pittsburgh	4	4
Michigan State University, East Lansing	4	4
University of Central Florida, Orlando	4	4
University of Maryland, College Park	4	4
North Carolina State University, Raleigh	4	5
University of Pittsburgh	4	5
University of Connecticut	4	6
Georgia State University, Atlanta	3	1
Bentley College, Waltham, MA	3	3
Florida State University, Tallahassee	3	3
University of Arkansas, Fayetteville	3	3
The University of Hong Kong	3	3
University of Notre Dame	3	3
University of Kentucky, Lexington	3	3
University of Southern California, Los Angeles	3	3
University of Georgia, Athens	3	4
University of Texas, Austin	3	4
University of Wisconsin, Milwaukee	3	5

Table 7. Authorship by University

Of the 109 unique institutions represented, 84 are United States universities. The other universities represented are located in 11 countries (see Table 8).

Country	Universities	Country	Universities
United States	84	United Kingdom	3
Canada	4	The Netherlands	2
Australia	3	Croatia	1
Hong Kong	3	India	1
Singapore	3	Korea	1
Taiwan	3	Mexico	1

Table 8. Authorship by Country

SUMMARY

The theoretical areas of IS Adoption and Use, IS Evaluation, and IS Management, which are mainstays of this discipline, continue to provide the basis for the greater part of current MIS research. The area of IS Adoption and Use accounts for more than one-fourth of the current literature, continuing to attract significant interest even though considerable research exists in

this area. IS Evaluation is another area that attracts significant interest, perhaps reflecting the economic climate of the past few years.

The emerging or "fad" topic appeared to be e-Commerce, as evidenced by the number of articles citing that domain, be it e-Commerce, electronic markets, or e-service. Because much of the e-Commerce literature deals with trust, the issue of trust itself may be resurgent in nature. An emerging topic of interest may be mobile commerce, as one article was concerned with trust in mobile commerce. In fact, mobile commerce may be the next "hot topic" in IS research, while the e-Commerce distinction may come to be viewed as a passing fad, due to its nature as a business model (an application of computers to business) rather than a distinct, specialized area within the field of Management Information Systems.

Knowledge management is another "hot topic" in IS research that may have more staying power than does e-Commerce. Because the information systems function is increasingly called upon to provide the means and the methods to capture, organize, store and disseminate organizational knowledge, the field of knowledge management may continue to attract significant interest in IS research.

Software and programming issues also continue as subjects of research with topics such as software development costs and pricing of IS services driving renewed interest in outsourcing IS functions. Furthermore, topics appearing farther down on the list of domains, such as supply chain management and IT investment/payoff, will most likely continue as areas of interest in future streams of research.

Framing this study in the historical context of MIS research, some research issues are a function of the issues of the moment while others are continuations of major themes of the discipline. Even much research into "flavor of the week" builds on a history of our research models and theory.

LIMITATIONS

The results of this study provide an important although limited snapshot of the nature of current research in MIS. The classification system used to evaluate this research results in subjective categorization, so the conclusions that follow from this analysis are subjective as well. A certain amount of "self-fulfilling prophesy" exists in any attempt to categorize research by analyzing publication patterns in certain journals. The selection of journals and the selection of the criteria for article inclusion bias the process. But the journals selected are widely held to be among the top journals in MIS. And the criteria stem from the consensus definitions and descriptions of the field. A larger problem (which will be addressed in the extensions of this work) is the lack of multiple reviewers and classifiers in order to ascertain interrater reliability of the classifications. Follow-up studies with an expanded time period will employ multiple researchers to separately select and classify research articles.

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