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ABSTRACT

This study examines information systems (IS) research in Chinese Mainland in recent years and identifies the similarities and the differences between international and Chinese IS research in terms of research topics and research methods. The data consists of a total of 410 research papers published in ten leading Chinese academic journals related to IS over the five-year period from 1999 to 2004. Compared to IS research abroad, the following may be said of Chinese IS research: (1) Systems-related issues, especially system design issues, system implementation, analytical models and tools, DSS/ESS/EIS are emphasized in research topics, whereas human-related and research methodologies issues are scarce. (2) Empirical studies, including case study, survey and experiment, are few and far between. (3) The majority of non-empirical studies focus on applications and conceptual description of IS, mainly in different applied fields and introducing or illustrating hot topics abroad. The "general shift" from traditional issues such as system design to non-technical problems is still continuing. There is a need to go beyond mere description of IS related phenomenon and to move away from non-empirical to empirical studies.

Keywords: IS research in China, research topics, research methods, IS journals

I. INTRODUCTION

The IS discipline in Chinese Mainland is young compared to that in North America with its four decades of history. Only in the early 1980s was the concept of MIS introduced to Chinese academic circles. Nevertheless, the strategic task of "industrialization driven by informatization"[1] advanced by the Chinese government in 2000 boosted teaching and applications related to IS. Statistically, of all the undergraduate programs in Chinese universities, the number of MIS program ranks first. More and more students have chosen MIS as their major. In view of the rapid

[1] This notion was brought forward in 15th National Congress of the Communist Party of China.

development of IS in research and practice, the current status of IS research should be examined to reflect on what has been achieved and to position future activities.

With that purpose in mind, this study reviews the literature in the IS field published in leading Chinese academic journals. We selected 410 papers from ten journals in the China Journal Net database and used full text for data analysis. First, we highlight the most researched topics and the research methods used. Then, by contrasting Chinese studies with overseas studies, we identify and analyze the similarities and differences in IS research. Finally, the authors make some suggestions for IS research in Mainland China.

II. LITERATURE REVIEW

Since its inception at the University of Minnesota, the IS discipline has engaged in extensive self-examination. These studies have been conducted from two perspectives. One focused on what constitutes, or should constitute, IS, which brings in the notion of diversity. The major concern is with how diversity might affect the progress of the IS field (Watson et al., 1999). Such studies are often couched in terms of the "intellectual development of the field" (Culnan, 1986; Culnan, 1987;Culnan and Swanson, 1986), "the intellectual structure of MIS" (Alavi and Calson, 1992), or the evolution of IS (Farhoomand and Drury, 2001), and often involve reference disciplines or research methods. For example, Ein-Dor and Segev (1993) identify seventeen major types of information systems, defining and classifying them by vectors of attributes and functions. Quantitative analysis indicates that systems followed two major paths of development: applied artificial intelligence and the human interface. Benbasat and Weber (1996) reflect on the consequences of diversity for the advancement of the IS discipline. They believe that we need both a paradigm (one or more) and diversity in the IS discipline, and we should not mix the notions of the core of the IS discipline and the body of knowledge for the IS discipline. Robey (1996) confirms the evidence of diversity in IS research and identifies the ways in which diversity both threatens and advances the field of IS. Farhoomand and Drury (1999) look at methodological and thematic trends through a quarterly analysis of 2098 IS articles published in eight leading journals and the ICIS Proceedings in the 12-year period from 1985 to 1996. It is a continuation of "MIS Research Strategies" by Hamilton and Ives (1982) and "Scientific Progress of Management Information Systems" by Farhoomand (1987). The results show a significant upward trend in the proportion of empirical studies and significantly increasing trends in organizational, environmental, and educational themes. Vessey (2002) develops a classification system that comprises five key characteristics of reference discipline, level of analysis, topic, research approach, and research method to study diversity empirically in IS research based on a review of five top journals from 1995 to 1999. A more recent article by Liang and Chen (2003) surveys 3841 papers published between 1980 and 2001 in eight major IS journals to understand how the research issues have evolved in the past and what are the driving forces underlying the evolution. Extended study, conducted by Liang and Chen (2005), compares research topics in different periods and driving forces between Taiwan and international research papers.

Another perspective centers on what has been achieved and what needs to be accomplished in the future. The primary purpose is to direct disciplinary efforts in the most productive manner (Alavi and Calson, 1992). Lending et al. (1992) categorize MIS research between 1984 and 1990 by university, journal, and type of research. The results are compared with a previous study conducted in 1984 which analyzes research between 1977 and 1983. Lee et al. (1999), examining more than 3000 articles published over five years in four IS journals and five magazines dealing with the themes and differences between research and practice in the IS area, find journals and magazines focusing on different themes and call for a distinction between rigorous and relevant research. Claver et al. (2000) analyze the articles published in the *MIS Quarterly* and *Information & Management* journals between 1981 and 1997, paying attention to the usual topics, as well as strategies, both in research and by the authors. Palvia et al. (2003, 2004) evaluate articles in seven mainstream MIS journals over an 11 year period, 1993-2003, based on the subject area of research and research methodologies. Trends are discussed in light of subjects and methodologies used between 1993-1997 and those used between 1998-2003. Ji

et al. (2004) review 604 research papers published in Chinese academic journals to understand IS research topics and methods in China. The journals they choose, however, all belong to management science rather than IS related journals, which affects the validity of conclusion.

Our position in this study falls into the perspective of what has been achieved and what needs to be accomplished for IS academic discipline in Chinese Mainland because, to date, few researchers have attempted to address it empirically.

III. RESEARCH METHODS

DATA COLLECTION

Our analysis of IS literature is based on the study of journals. Though no academic journal is solely devoted to IS research topics, a number of top journals regularly publish IS research. We select ten such leading journals. Since there are two streams in the MIS field, i.e., information technology oriented and information management oriented, we examine five journals which are management oriented, and the other five are technology oriented. They are: *Journal of Management Science in China*, *Journal of Management Engineering, System Engineering Theory and Practice, Chinese Journal of Management Science, System Engineering Theory Methodology Application, Computer Integrated Manufacturing Systems-CIMS, Application Research of Computers, Computer Engineering, Computer Engineering and Applications, and Microcomputer Applications.* Because few researchers in China publish research papers in Non-Chinese IS leading journals, we did not choose those journals.

With regard to the articles, we used the information provided by the China Journal Net database. This is the largest and one of the most prestigious, academically comprehensive databases in China. It has over 3500 key journals in different disciplines, including the field of Economics and Business Administration from 1994 to 2004, and has the full text of all papers published in these journals. We consider this information sufficient for our study. Unlike previous studies (e.g. Swanson and Ramiller, 1993; Farhoomand and Drury, 2001; Alavi and Carlson, 1992) that determine the primary topic of the paper by examining the abstract, title, and keywords, we determine the topic addressed by the paper by examining the contents of the entire paper. This approach enables us to reliably identify a single topic that is the key focus of the paper, instead of several topics frequently referred to by authors in their keywords and abstract. In order to determine the methodology used, we also look at the full text because the abstract may not be sufficiently informative.

Table 1. The Number of Articles Classified According to Journal

Journals		Number of articles
Journals in the Management Science field (199, 48.5%)	Journal of Management Science in China	46
	Journal of Management Engineering	42
	System Engineering Theory and Practice	53
	Chinese Journal of Management Science	29
	System Engineering Theory Methodology Application	29
Journals in the IT applications field (211, 51.5%)	Computer Integrated Manufacturing Systems-CIMS	44
	Application Research of Computers	40
	Computer Engineering	43
	Computer Engineering and Applications	46
	Microcomputer Applications	38
Total		410

The number of articles obtained from the ten journals is listed in Table 1. In total, 410 articles have been analyzed, 199 of them (48.5 percent) belonging to journals in management science

category, and 211 (51.5 percent) from journals in computers or IT applications field. By drawing a nearly equivalent number of articles from the two journal types, neither type will bias our results.

CLASSIFICATION SCHEME

This study adopts a topics classification scheme similar to that used by Liang and Chen (2005). In their study, they use a three-level scheme, analyze research themes of 3841 papers published between 1980 and 2001 in eight major international IS journals and 111 research papers published between 1993 and 2001 in *Journal of Information Management* based in Taiwan. By using this method, it is easier to discover the similarities and differences between international and Chinese IS research. Their classification scheme is mainly based on the studies of Barki et al. (1993) and Davis (2000). Barki et al. (1988, 1993), developed a classification scheme of IS keywords to provide a description of the discipline. The scheme consists of nine top-level categories (reference disciplines, external environment, technological environment, organizational environment, IS management, IS development and operations, IS usage, information systems, IS education, and research), each of which is divided into subcategories. This taxonomy is a fairly complete and suitable structure which can serve as a starting point for the development of a classification of research topics. With regard to an information systems category, Davis (2000) reviewed articles form *ICIS* and *MIS Quarterly* in an analysis of concepts, theories, processes, and applications and identified five bodies of knowledge unique or somewhat unique to information systems. Their classification framework, complemented by other types of studies (e.g. Swanson, 1984) helps shape the final three-level scheme. The first level has five areas: human-related, systems, technology and analytical models, management, research methods, and theories. The second level has ten categories, and the third level covers 41 major issues. Figure 1 shows the first and second levels of this classification scheme. Detailed topics in each area can be seen in Table 4, Table 5, Table 6, and Table 7.

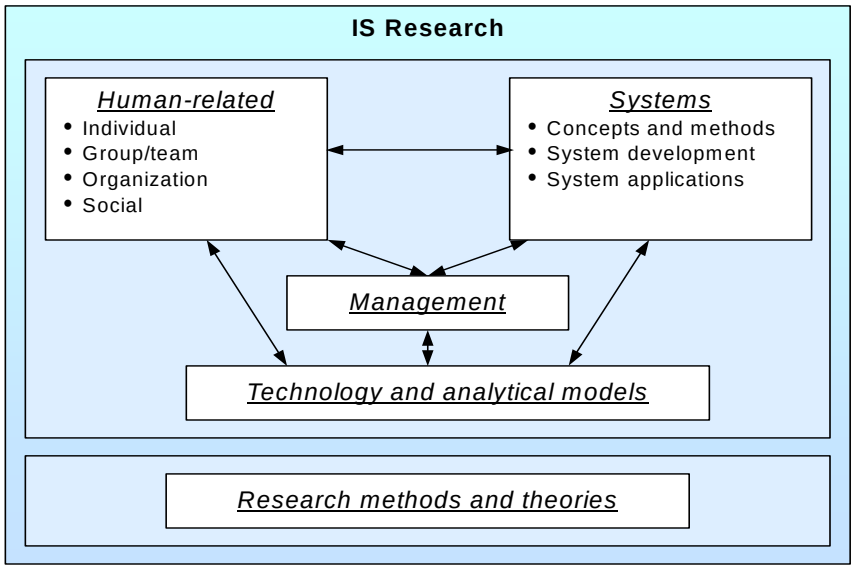


Figure 1. Classification Scheme of IS Research Areas (first and second level)

Source: Liang,T.P, and D.N.Chen (2005) "Evolution of Information Systems Research," *Journal of Information Management*(12)2, pp.1-24.

The distinctive subject matter and research perspective of the IS discipline investigates interactions between technology system and users. *Human-related*, the core of social science research, is divided into four aspects of individual, group/team, organization, and social according to the scopes of users. *Systems*, the traditional topic in MIS research, investigate issues related to IS development and applications which cover concepts and methods, system development,

and system applications. *Technology and analytical models* involves introducing new information technologies and analytical models. Management strategies related to IS belongs to the area of *Management*. Finally, some literature emphasizing more rigorous IS research methods and theories to find effective principles for information management, falls into the area of *Research methods and theories* which does not conflict with other areas.

To deal with research methods classification, we employ the research taxonomy proposed by Hamilton and Ives (1982), which is used in several other studies (e.g. Vogel and Wetherbe, 1984; Farhoomand, 1987; Lending and Wetherbe, 1992; Farhoomand and Drury, 1999). Each article is classified as one of five MIS research strategies: case study, survey, experiment, and non-empirical (relying on secondary sources or author's experience). The non-empirical ones, according to Chinese research practice, are further divided into system development, quantitative modeling, system application, and conceptual description, which allows us to examine these articles more carefully. Because some of the research studies examined do not fall into any of these seven strategies, we add an "*others*" classification to the list. Table 2 offers detailed information on the characteristics of these research methods.

THE CODING PROCEDURE

Reading the contents of an entire paper, two of the three authors categorized an article as belonging to a particular area, topic, and methodology. Every paper was downloaded and double-reviewed. A third author checked the results by performing the same analysis on a random sub-set of the articles. The coders discussed the coding method and had a common understanding of the topics and methodologies, thereby minimizing ambiguity from the coding process.

Table 2. Characteristics of Research Methods

Research methods	Characteristics
Case study	Study one or more organizations in their natural environments. Discuss results through in-depth interview.
Survey	An examination of several organizations with an experimental design, but no controls. Collect data through survey questionnaire.
Experiment	Use a specific design and experiment control with respect to one or more variables. According to the analysis of study object in its natural setting or lab, experiment is divided into field experiments and lab experiments (including computer simulations).
System development	Technical research regarding issues of system design and development.
Quantitative modeling	Use mathematical models to resolve a problem.
System application	System application and exhibition in different applied fields.
Conceptual description	Introduce some ideas and speculations, without survey data and system exhibition.
Others	Cannot be included in above methods.

IV. DATA ANALYSIS

The analysis of the information is divided into two parts. First, we study the topics that appear most often in the journals, and then we analyze the research methodologies.

RESEARCH TOPICS OF IS IN CHINESE MAINLAND

Table 3 shows the number of articles assigned to each area and the total percentage of the articles they represent.

Table 3. Articles by Research Areas

Research Areas	Human-related	Systems	Technology and analytical models	Management	Research methods and theories
Frequency	31	247	54	75	3
Percentage	7.6%	60.2%	13.2%	18.3%	0.7%

Over 60 percent of the published research belongs to the system area. The study of technology and analytical models accounts for about 13 percent. Between them, they represent 73 percent of the articles analyzed, which indicates that three out of four researchers in Chinese Mainland focus on technology, system development, and applications. This result is consistent with the findings of an earlier study by Zhang et al. (2005). The classification in that article relied heavily on the scheme used by Claver et al. (2000), who divided IS research topics into four major areas: IS management, Information technologies, IS usage, and others. According to this scheme, the most researched area is IS development (31%), followed by information technologies (29%). IS management has been the area of the fewest number of articles (10%). The high proportion of IS research dedicated to technology-related issues suggests IS researchers in Chinese Mainland must deal with the rapidity of technological changes.

Non-technical themes, especially in the area of human-related (7.6%) and research methods (0.7%), have received slight attention over the years. Computer-human interactions and how they affect our work seems to be complex. Investigating and understanding such areas is, perhaps, the most challenging and complex task for IS researchers. We see little discussion of research methods and theories because most researchers in Chinese Mainland continue to use the traditional methodology of system engineering and computer science to study MIS discipline, ignoring the distinctiveness of this field.

Table 4. Articles by Topics in *Human-related* Area

Area	Categories	Issues	Frenquency
Human-related	Individual	user behavior	
		perception and attitude	
		IS professionals	1
		user performance	
		human-computer interactive	1
	Group/team	group performance	
		group process	
		group support	6
	Organization	business process	4
		innovation	1
		organizational learning and performance	1
		organizational factors(culture/structure/scale)	2
		organization strategy	3
		organizational resource(knowledge management)	6
	Social	legal issues	
		political issues	
		ethical issues	1
		social issues	5

Although IS has been, and will continue to be, influenced by technological developments in a significant way, there seems to be a shift from technical themes towards non-technical themes

(Farhoomand and Drury, 1999). In order to facilitate presentation of the results, articles are classified according to topics in each area (see Table 4, Table 5, Table 6, and Table 7).

In the *human-related* area, we find the majority of studies are conducted at the organization level. Group/team and individual level issues are not studied extensively. User behavior and user attitude issues are never discussed, partly because the researchers are not familiar with human-related theories. These theories, such as technology acceptance model (TAM) and resource based theory, are based on individual psychology. However, most IS researchers in Chinese Mainland are from the discipline of computer science and informatics, and they prefer system-related theories. No article deals with legal and political issues at the social level because they are not the traditional research areas of Chinese IS academics. Organizational resource management, especially knowledge management, is the most popular topic, although the studies in this subject are primarily in the exploratory stage. While group support is the other hot topic in the human-related area, it is studied mostly from the perspective of architecture or conceptual framework.

Table 5. Articles by Topics in *Systems* Area

Area	Categories	Issues	Frequency	Percentage
Systems	Concepts and methods	system development methodologies	3	1.2%
		system development strategy	8	3.2%
	System development	requirements analysis and model development	1	0.4%
		system development process/project management	2	0.8%
		system design issues	89	36%
		system implementation	44	17.8%
		training/educating/using		
	System application	intelligent systems	18	7.3%
		DSS/ESS/EIS	36	14.6%
		telecommunication systems	1	0.4%
		intra- and interorganizational Information systems	27	10.9%
		other application systems	16	6.5%
		applications in industries	2	0.8%

Table 6. Articles by Topics in *Technology and Analytical models* Area

Area	Categories	Issues	Frequency	Percentage
Technology and analytical tools	Technology and analytical tools	technology infrastructure	1	1.9%
		new software technology	10	18.5%
Tools	Tools	analytical models and tools	43	79.6%

Table 7. Articles by Topics in *Management* Area

Area	Categories	Issues	Frequency	Percentage
Management	Management	economic issues	8	10.7%
		IS performance evaluation	13	17.3%
		IS strategic planning	7	9.3%
		decision making	16	21.3%
		other managerial issues	31	41.4%

In the *systems* section, system design issues are the most common topic, followed by system implementation (17.8%), DSS (15%), intra- and inter-organizational information systems (11%). These all are topics related to IT applications in different fields, reflecting the activities and needs of business and industry, indicating the application-oriented nature of the IS discipline.

Among the 54 articles in *technology and analytical models*, we see the significance of articles devoted to analytical models and tools, such as OLAP, tools of data mining, and process modeling. This reflects the engineering background of IS researchers who prefer technology-oriented studies.

In the *management* area of IS research, *other managerial issues* has a considerable number of articles during 1999-2004, including IS risk and security, supply chain management, collaborative management, and virtual enterprises. This phenomenon reminds us that we may further subdivide the management area into more detailed topics, thereby helping us to comprehensively evaluate IS research themes. Research emphasis is also seen in decision making (21%) and IS performance evaluation (17%).

COMPARATIVE ANALYSIS OF RESEARCH TOPICS BETWEEN CHINESE MAINLAND AND INTERNATIONAL

Table 8 lists the proportion of the papers examined according to the research areas. The third column is the proportion of the topics in Liang and Chen's study (2005). International research topics are grouped into four major clusters: 1980-1984, 1985-1991, 1992-1998, and 1999-2001 which shows the four stages of evolution of IS research. Figure 2 exhibits the comparison of IS research areas between Chinese Mainland and international.

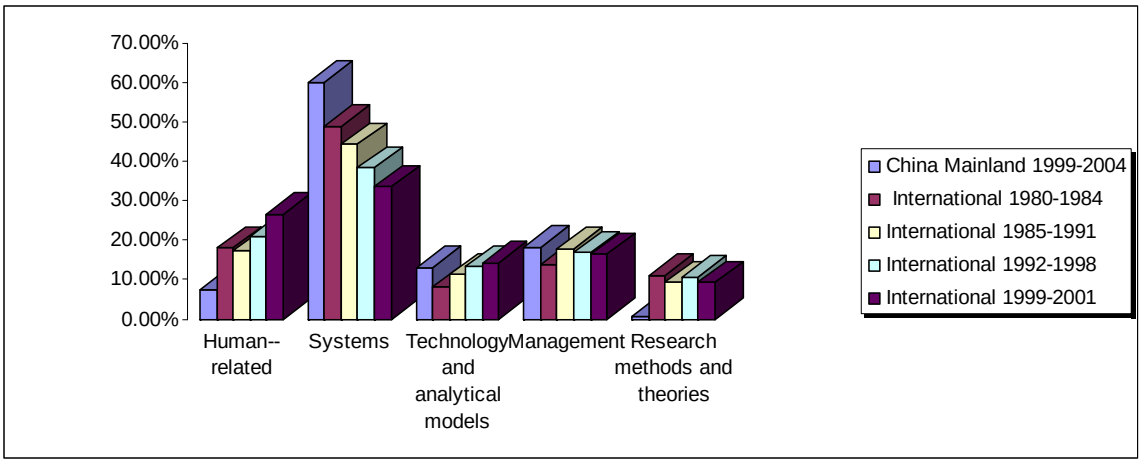
Table 8. Articles by Research Areas----Chinese Mainland vs. International

Research areas	Chinese Mainland	International			
	1999-2004	1980-1984	1985-1991	1992-1998	1999-2001
Human--related	7.6%	18.0%	17.2%	20.9%	26.6%
Systems	60.2%	49.0%	44.4%	38.4%	33.6%
Technology and analytical models	13.2%	8.1%	11.3%	13.2%	14.2%
Management	18.3%	13.8%	17.9%	16.8%	16. 4%
Research methods and theories	0.7%	11.0%	9.2%	10.7%	9.3%

Overseas data source: Liang,T.P, and D.N.Chen (2005) "Evolution of Information Systems Research" *Journal of Information Management*(12)2, pp.1-24.

There are relatively few papers on human-related, research methods and theories indicating the wide gap between Chinese and overseas research in these topics. The popularity of systems (60%) in Chinese Mainland, compared with 40 percent overseas, shows that IS researchers tend to focus their attention on traditional matters such as system design and development.

In Liang and Chen's study (2005), both human-related and technology, analytical models areas show significant upward trends over the 1980-2001 period. There is also a significant downward trend in the systems area. As time goes on, IS researchers will realize that the emphasis of MIS discipline must shift to human or users. Such emphasis is consistent with the definition of MIS by Davis and Olson (1985): *MIS is an integrated, user-machine system for providing information to support operations, management, and decision-making functions in an organization*. Examining user behavior and attitudes contributes to better IS usage in organizations. The increase of technology and analytical models shows the role of technology innovation. The attention given to research methods and theories over the last 20 years, suggests the requirements of MIS discipline for rigor.



Overseas data source: Liang,T.P, and D.N.Chen (2005) "Evolution of Information Systems Research" *Journal of Information Management*(12)2, pp.1-24.

Figure 2. Comparison of IS Research Areas

Human-related issues are a good opportunity for Chinese researchers to publish articles in international journals, if the current trend continues. In addition, IS academics in Chinese Mainland should emphasize studies and discussion on MIS research methods.

Next, we select five favorite topics, both in Chinese Mainland and overseas, as shown in Table 9.

Publications in international journals indicate that the major issues that gained popularity during the period of 1980-1998 are related to system design issues and DSS/ESS/EIS. In 1999-2001, however, major issues shift to applications and technology infrastructure, and away from system design issues and DSS/ESS/EIS, which disappear in the top five research topics. This change means that the focus of IS research has moved from the design of good systems to the power of technology infrastructure and user-organization requirements (Liang and Chen, 2003). Our data leads us to conclude that the pattern of research topics now in Chinese Mainland is consistent with international studies in 1990s.

Table 9. The Top Five Research Topics---- Chinese Mainland vs. International

	Chinese Mainland	International			
Rank	1999-2004	1980-1984	1985-1991	1992-1998	1999-2001
1	system design issues	system design issues	system design issues	DSS/ESS/EIS	applications in industries
2	system implementation	DSS/ESS/EIS	DSS/ESS/EIS	analytical models and tools	theories
3	analytical models and tools	research methodologies/ philosophy	research methodologies/ philosophy	system design issues	other managerial issues
4	DSS/ESS/EIS	system development process/project management	other managerial issues	research methodologies/ philosophy	analytical models and tools
5	other managerial issues	applications in industries	IS performance evaluation	other managerial issues	IS performance evaluation

Overseas data source: Liang,T.P, and D.N.Chen(2005) "Evolution of Information Systems Research" *Journal of Information Management*(12)2, pp.1-24.

RESEARCH METHODS OF IS IN CHINESE MAINLAND

Table 10 shows the classification of the articles according to the research methodologies used. When we find it impossible to classify an article in this way, we include it in the *Others* area. The analysis of this table shows that an overwhelming majority of the studies are non-empirical (97.2 percent), compared with only 1.6 percent empirical studies. Among the non-empirical studies are system applications, followed by conceptual description, system development, and, finally, quantitative modeling. As for empirical studies, case study, survey, and experiment account for only seven papers in total. There is only one paper (related to computer simulation) which used the experimental method.

Table 10. Articles Classified According to Research Methods

Research methods	Case study	Survey	Experiment	System development	Quantitative modeling	System application	Conceptual description	Others
Frequency	3	3	1	88	58	132	120	5
Percentage	0.7%	0.7%	0.2%	21.5%	14.2%	32.2%	29.3%	1.2%
Percentage	1.6%			97.2%				1.22%

COMPARATIVE ANALYSIS OF RESEARCH METHODS BETWEEN CHINESE MAINLAND AND INTERNATIONAL

Compared with earlier studies, there is a major difference between Chinese and international researchers in research methods. Table 11 lists the proportion of papers examined according to the research methods. International data is divided into three periods to help us further understand research patterns in Chinese Mainland. Figure 3 clearly displays the comparison of methods between Chinese IS research and international research.

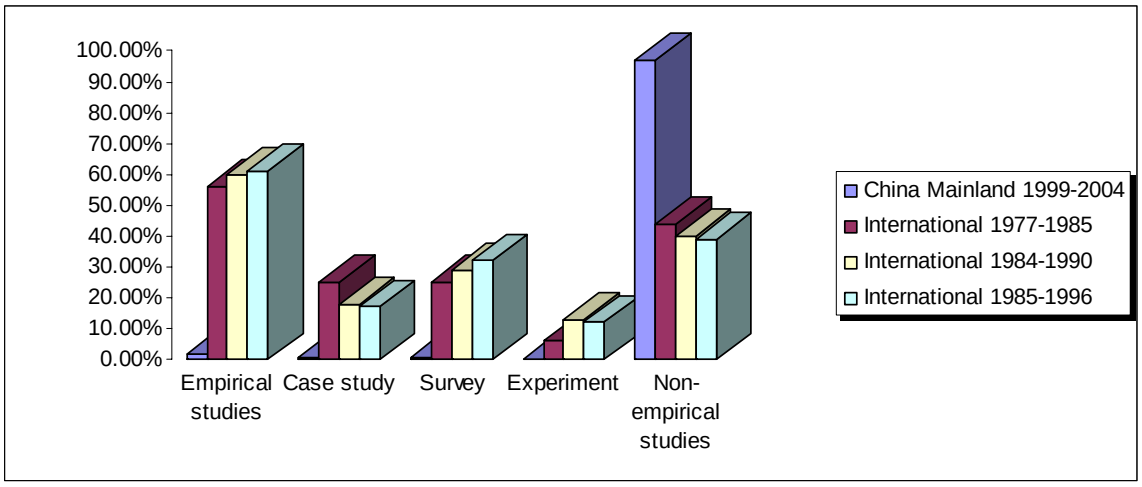
Table 11. Articles by Research Methods----Chinese Mainland vs. International.

Research methods	Chinese Mainland	International		
	1999-2004	1977-1985	1984-1990	1985-1996
Empirical studies	1.6%	56%	60%	61%
Case study	0.7%	25%	18%	17%
Survey	0.7%	25%	29%	32%
Experiment	0.2%	6%	13%	12%
Non-empirical studies	97.2%	44%	40%	39%
System development	21.5%			
Quantitative modeling	14.2%			
System application	32.2%			
Conceptual description	29.3%			

Overseas data source: Farhoomand, A. F.(1987) "Scientific Progress Of Management Information Systems," *DataBase*(18)4, pp.48-56. Lending,D. and J.C.Wetherbe. "Update on MIS Research, A Profile of Leading Journals and US Universities," *Database* (23)3, pp.5-11. Farhoomand,A.F. and D.H.Drury(1999) "A Historiographical Examination of Information Systems," *Communication of the AIS*(1)19, pp.1-26.

An obvious difference of MIS research methods is the imbalance of empirical (1.7%) and non-empirical (97.1%) studies in Chinese Mainland. Chinese IS researchers are not inclined to use empirical based methods. Besides the different sociological paradigms and research traditions, we believe that this is due to the fact that Chinese IS researchers are not familiar with these methods. The scarcity of experiments in both China and international research may reflect the difficulty experienced in carrying out such experiments. However, as experiments are usually

based on articulated hypotheses targeted at testing and developing substantive theories, the increasing use of experiments appears to be a healthy development.



Overseas data source: Farhoomand, A. F.(1987) "Scientific Progress Of Management Information Systems," *DataBase*(18)4, pp.48-56. Lending,D. and J.C.Wetherbe. "Update on MIS Research, A Profile of Leading Journals and US Universities," *Database* (23)3, pp.5-11. Farhoomand,A.F. and D.H.Drury(1999) "A Historiographical Examination of Information Systems," *Communication of the AIS*(1)19, pp.1-26.

Figure 3. Comparison of Research Methods

Internationally, about 39% of the IS literature is based on non-empirical studies during 1985-1996 (Farhoomand and Drury, 1999). In the late 1970s, more than two thirds of IS studies used non-empirical approaches, which relied on secondary sources or authors' experiences to support conclusions (Hamilton and Ives, 1982). The percentage of non-empirical studies decreases to about 44% for articles published between 1977-1985 (Farhoomand, 1987) and to 40% for articles published between 1984-1990 (Lending and Wetherbe, 1992). The results indicate that there has been a steady move away from non-empirical studies toward empirical studies. Of empirical studies, surveys are still dominant, constituting 32% of published studies (over half of empirical studies) in the paper's 1985-1996 sample (Farhoomand and Drury, 1999). In comparison, for the periods between 1977-1985 and between 1984-1990, about 25% (Farhoomand, 1987) and 29% (Lending and Wetherbe, 1992) of published articles are based on surveys, thus showing an upward trend. Case studies are the second most popular empirical research strategy, constituting 17% of published studies between 1985-1996 (Farhoomand and Drury, 1999). The case study was the most commonly employed empirical method in the 1970s (Hamilton and Ives, 1982), decreasing to about a quarter of the published articles by the mid-1980s (Farhoomand, 1987) and to about 18% by 1990 (Lending and Wetherbe, 1992). There is no evidence of increasing or decreasing trends for experimental research methods.

Alavi and Carlson (1992) believe that non-empirical studies were appropriate in the early years of the academic IS discipline. With the maturity of the field, empirical studies are more suitable for illustrating theories that already exist, or building theories based on empirical facts. However, non-empirical studies also serve a valuable role in demarcating the boundaries of the MIS field, if these studies are related to theoretical development of the field (Farhoomand and Drury, 1999). In Chinese Mainland, conceptual description, accounting for 29.27 percent, is the second most popular method used in non-empirical studies. These studies, however, are anecdotal, descriptive, and without substantive theoretical underpinning, and thereby, seriously hamper the progress of IS as a scientific discipline. Mere descriptions of IS related phenomena and the serious lack of empirical studies strongly indicate that the IS field in Chinese Mainland is still a very young discipline.

V. DISCUSSION AND CONCLUSION

LIMITATIONS

Several difficulties were confronted in the survey phase of this study. These limitations are classified into three broad categories related to the methodological issues:

(1) *Sample Bias*. As previously noted, there is no specialized IS research journal in China. We employed a sample of ten journals identified as being important to the communication of MIS research. Although the sample included the bellwether journals, it lacked completeness and, consequently, does not claim general validity. Moreover, in order to avoid journal bias, we struck a balance in the choice of journals in the management science category and the journals in computers or IT applications field.

(2) *Classification of Topics.* Through examining the contents of the entire paper, we identified a single topic that was the key focus of the paper instead of several topics frequently listed by authors in their keywords and abstract. Because of the multi-disciplinary, multi-dimensional nature of MIS studies some researchers (e.g. Farhoomand, 1987; Liang and Chen, 2005) have classified them into several different research themes. The lack of multi-themes classification and a measure that could incorporate the extent of contribution of a particular theme could have some bearing on the results of the topic analyzed.

(3) *Classification of Methods*. A portion of the articles in the sample introduced a model or presented an argumentative/subjective discussion before conducting a small illustrative case. Since the taxonomy of the research strategies is treated as mutually exclusive categories, we did not classify this type of illustrative studies in the case study category. Therefore, the figure reported for this classification (0.73%) appears to be deflated.

In addition, we only analyzed and compared the distribution of research topics and methods within a six-year period. It would be fruitful to conduct a similar study with a longer period to investigate any potential shifts for certain types of research and strategy.

Finally, the reliability/validity concern of this study is that no measure of agreement between coders was made. However, because the coders have a common understanding of topics and methodologies, using caution, care, and formal procedures this limitation does not diminish the findings or the value of the study's significance.

CONCLUSION

This study could be of value to Chinese IS researchers in positioning their research, not only from the viewpoint of topic, but also from the choice of research method. They might wish to identify major areas where few research works have been published, which might therefore represent an opportunity for their own research.

The analysis of 410 research papers published in ten leading Chinese academic journals from 1999 to 2004 indicates that IS researchers have mainly concentrated on either design-related studies or on purely non-empirical methods of research. The results of this study show that:

(1) Systems-related issues, especially system design issues, system implementation, analytical models and tools, DSS/ESS/EIS, are emphasized in research topics, whereas human-related and research methodologies are scarce.

(2) User behavior, user attitude, and user performance in individual level, group performance, and group process in group level, legal issues, and political issues in social level, all those belonging to the human-related area, are never studied.

(3) The pattern of research topics now in Chinese Mainland is consistent with international studies in 1990s.

(4) Empirical studies, including case study, survey, and experiment are few and far between.

(5) The majority of non-empirical studies focus on system applications and conceptual description, mainly investigating IS in different applied fields and introducing or illustrating hot topics abroad.

Moreover, there are strong indications that a large portion of research in the field is still not well-grounded in the fundamentals of organizational behavior and organizational theory. This has consequently prevented Chinese IS research from building a cumulative research tradition. As Popper (1959) notes, scientific growth is possible only through the proliferation of theories. Studies which are primarily preoccupied with technology will not facilitate MIS in reaching this objective.

A lag between theory and practice affects progress of IS discipline in Chinese Mainland, as well as the depth and scope of research communication with overseas researchers. Also, it is difficult for most IS researchers in Chinese Mainland to establish and maintain collaborative relationships with industry partners because of the communication gap between academics and practitioners, thus limiting access to the data needed for empirical research. As an interdiscipline, IS research has received low recognition from most funding bodies. When writing a grant application, it may be difficult to select a disciplinary code for research. Therefore, obtaining research funding is difficult for IS researchers compared to other disciplines. In addition, Chinese researchers could do well to deepen their understanding of research methodologies in order to use appropriate methods to conduct their research. We propose to start a core curriculum of "Research Methodology" in Chinese universities. The "general shift" from traditional matters such as system design to non-technical problems is still continuing in China. The essence of IS is the use of IT-based systems to solve organizational problems which often arise from environmental challenges. Therefore, IS research should pay more attention to management and human-related issues, as well as, topics of information technologies and IS applications.

There is currently no specialized IS journal in Chinese Mainland. As time goes by, it is inevitable that the IS field will specialize due to the need to handle an ever-increasing volume and complexity of knowledge. This process has important implications for the Chinese IS academics because any field needs journals that are representative of the field as a whole, as well as journals that serve specific constituencies (Vessey et al., 2002).

Before 2004, there were too few opportunities for Chinese IS researchers to interact with other IS researchers and find collaborators with similar research interests. The only special conference for IS researchers is the Cross Strait Conference on Information Management Development Strategy. In 2004, the Eight Pacific-Asia Conference on Information Systems was first convened in Shanghai, China. The Chinese-speaking Chapter was formed during this conference. With the associated efforts of Chinese IS academics and practitioners, China Association for Information Systems (CNAIS) was established. The first conference of CNAIS (CNAIS2005) was held in Beijing. This conference became the first where leading researchers, practitioners, and policy makers from China and many other countries could exchange ideas about the development, use, application, and impact of information technology and systems; thereby, fostering China's international collaboration within the IS academic and practitioner communities.

The current IS field is perhaps the century's most significant accomplishment, with far-reaching and complex impacts (Farhoomand and Drury, 1999). It has transformed many aspects of government, industry, and education worldwide. Despite abundant IS research opportunities in Chinese Mainland, they have not been tapped effectively. The challenge for Chinese academics is to make full use of these opportunities, to conduct research based on sound conceptual foundations, and with empirical support, to describe and explain IS activities and phenomena from Chinese perspectives. In the process, they can contribute to theory building in the IS discipline, a move that will be welcomed by their international colleagues.

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