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The Growth of Scientific Knowledge in MIS: The MIS Paradigm

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ABSTRACT

Has the MIS discipline matured enough to be considered a paradigm? This paper will review the MIS discipline from its inception, arguing that the discipline was created by what Thomas Kuhn would call a revolution leading to a paradigm shift. Using Kuhnian philosophy, the paper will argue that the MIS discipline has now reached a point to be considered a paradigm, according to the standards set forth by Kuhn in *The Structure of Scientific Revolutions.* The paper will identify several subject areas within the MIS paradigm that demonstrate a line of normal science. Finally, the paper will argue that to continue the growth of scientific knowledge within the MIS paradigm, researchers need to expand beyond what has been called the "IT artifact" and search for new discoveries that will create revolutions within the MIS paradigm.

KEYWORDS

Philosophy of science, MIS paradigm.

INTRODUCTION

The ultimate goal of science is to increase knowledge. Philosophy of science is a field devoted to understanding how scientists do this, by answering "such questions as: What is a scientific explanation? To what extent can scientific claims ever be justified or shown to be false? How do scientific theories change over time? What relations hold between old and new theories? What relations hold, or should hold, between theoretical claims developed in different fields of scientific investigation?" (Bechtel, 1988). The answers to these questions are crucial to the growth of scientific knowledge. Two modern-day philosophers who have made significant contributions in this area are Karl Popper and Thomas Kuhn. Popper believes the growth of scientific knowledge is a process of conjectures and attempted refutations (Fetzer, 1993). He contends that attempted falsification is the only true test of a theory and that these continuous attempts to falsify existing theories are the basis for the growth of scientific knowledge.

Kuhn is not so willing to reject a theory because it has been falsified. He refers to these falsifications as 'anomalies' which do not fit into the accepted paradigm. Kuhn argues that the type of science that Popper is suggesting is 'revolutionary science'. Kuhn contends that most scientists are involved in 'puzzle solving' or 'normal science' which entails spending their time investigating widely accepted theories (which he calls 'paradigms'). Very few participate in 'problem solving' or 'revolutionary science' that involves refuting existing paradigms and establishing new ones. Kuhn contends that it is revolution that ultimately leads to growth in scientific knowledge.

> *"…scientists desiring some guarantee that their research might make more than a minimal contribution to the advance of science should adopt the minimax loss strategy and practice normal science. But scientists who prefer the possibility that their efforts might make maximal contributions to the growth of scientific knowledge should adopt the alternative maximax gain strategy and practice revolutionary science"* (Fetzer, 1993 p. 134).

Throughout history, revolution has been a catalyst for change. In the relative short history of this country (the United States), it has been revolution, both physical and political, that has brought on significant advancement in the lives of the citizens. One could argue that it was in fact revolution that drove the pilgrims to America in 1620 to escape religious persecution and to establish a country were the inhabitants could freely practice their religion. Another revolution, this one of the true physical type including battle and bloodshed, took place in 1776, resulting in the separation of the US from England and the establishment of a new government and a new way of life for the citizens. Other revolutionary events were to come that would change the structure of the country leading to the abolishment of slavery, women's' suffrage, and the civil right movement. Each of these revolutionary events resulted in a new way of seeing both the country and ourselves. It can be argued that another similar revolution is underway right now to allow same-sex marriages. Though the issue was hotly contested and rejected in the recent elections, it is obvious that this is a topic that is not going to go away any time soon. It is possible that in the future, our society will redefine the legal meaning of marriage to include same-sex couples. When this happens, we will have experienced another *paradigm shift*.

Paradigm shifts are also prevalent in the scientific community. According to Kuhn (1996) paradigm shifts in science are brought on by scientific revolutions, such as by the works of Copernicus, Newton, Darwin and Einstein. These revolutions, resulting in a shift from one paradigm to another, result in scientists in the affected paradigms seeing their discipline in an entirely different manner. These revolutions and the ensuing paradigm shifts are considered, by Kuhn, to be significant factors in the growth of scientific knowledge.

In his now famous publication, *The Structure of Scientific Revolution*, Kuhn attempts to define 'paradigm'. Critics state that he used the word in "at least twenty-two different ways" (Kuhn, 1996 p. 181). However, Kuhn states the he uses the term paradigm in only two different senses.

> *"On the one hand, it stands for the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community. On the other, it denotes one sort of element in that constellation, the concrete puzzle-solutions which, employed as models or examples, can replace explicit rules as a basis for the solution of the remaining puzzles of normal science." (Kuhn, 1996 p. 175)*

This paper will look at how both of these definitions apply to the field of MIS. The argument will be made that the discipline of MIS was actually created by a paradigm shift that aggregated research from various disciplines, such as computer science, management, operations research, sociology, psychology, economics and other academic areas into the 'constellation of beliefs, values and techniques' shared by the MIS community today. The paper will also seek to apply Kuhn's second sense of paradigm to the MIS discipline by exploring what I refer to as the paradigms within the MIS paradigm. Finally, this paper will conclude by using Kuhnian philosophy to evaluate the viewpoint of Benbasat and Zmud (2003) made in their controversial MISQ article. Ultimately the objective of this paper is to demonstrate the growth of scientific knowledge within MIS and to make the claim that MIS has indeed reached paradigmatic status.

THE MIS PARADIGM

> *"In principle, a new phenomenon might emerge without reflecting destructively upon any part of past scientific practice. Though discovering life on the moon would today be destructive of existing paradigms (these tell us things about the moon that seem incompatible with life's existence there), discovering life in some less well-known part of the galaxy would not. By the same token, a new theory does not have to conflict with any of its predecessors. It might deal exclusively with phenomena not previously known, as the quantum theory deals with subatomic phenomena unknown before the twentieth century"* (Kuhn, 1996 p. 95).

When did MIS officially become a paradigm? Ask ten different people and you are likely to get ten different answers, including the response that MIS has not yet achieved paradigmatic status. Kuhn (1996) states that the two essential characteristics that make a paradigm are (1) the paradigm needs to be unprecedented to attract the scientific community, and (2) the paradigm should be open-ended to allow several different scientific groups to study different problems within the same paradigm. Does the field of MIS possess these characteristics? To address the first characteristic, we need to go back to the roots of MIS. In fact, the argument can be made that MIS is a paradigm that was created by crisis and revolution within other paradigms. However, as mentioned above in the quotation from Kuhn, this paradigm emerged not from the destruction of another paradigm, but instead from the emergence of an area not previously studied.

The origins of MIS go all the way back to 1958, when Leavitt and Whistler (1958) addressed what they felt would be the concerns for the emerging area of "information technology". Up to this point, the study of computers and technology was considered a "hard" science and studied from a more technological/mathematical perspective. These "hard" science areas had little interest in studying computers/technology from a business perspective. In fact, the emergence of MIS was greatly affected by the inadequacy of the computer science discipline in addressing the problems that were associated with the use of computers and technology in a business context (Jayaratna, 1994). As a result researchers began to call for a field of expertise to study computing technologies in businesses (Bonini, 1963). The term "MIS" actually became popular in 1965 (Dickson, Benbasat, & King, 1980), and in the late 1960s, the first textbooks started to appear (e.g., Dearden & McFarlan, 1966) and the first academic program for MIS was announced (Dickson, 1981). However, there was still competition for ownership of the MIS field of study. In the business schools the areas of management, operations research, and accounting where themselves conducting research on MIS topics, and the computer science area was still laying claim to any topic that dealt with computers (Davis & Olson, 1985). Kuhn (1996) states that this is to be expected during the pre-paradigm period of development. He goes on to explain that through research and notable scientific achievements, the number of disciplines will eventually be reduced to one, resulting in a more efficient mode of scientific practice.

> *"What is today the subject matter for a single broad community has been variously distributed among diverse communities in the past" (Kuhn, 1996 p. 179)*

Several disciplines were considered primary contributors to the IS field, including management science, computer science, organizational science, and managerial accounting (Culnan & Swanson, 1986; Davis & Olson, 1985). There have also been many supporting disciplines, including sociology, psychology, statistics, political science, economics, behavioral science, philosophy, mathematics, architecture, and anthropology (Avison & Myers, 1997; Bariff & Ginzberg, 1982; Boland & Hirshheim, 1987; Kriebel & Moore, 1982; Lee, 1991; Nolan & Wetherbe, 1980). Even though research in MIS was already well underway, in 1980 during the first International Conference of Information System (ICIS), Peter Keen argued that MIS was not yet a substantive field, but was simply an applied discipline drawing from the other reference disciplines (Keen, 1980). However, this was to change dramatically in the decade of the 1980s. As technology began to become a more integral part of the business environment there was a greater demand for the knowledge of MIS, resulting in the growth of those studying MIS and those receiving advanced degrees in the field. Though still in a pre-paradigmatic phase, the field was truly developing its own identity. However, even as late as 1989, the MIS discipline was still characterized as a 'fragmented adhocracy' (Banville & Landry, 1989), though many considered this a strength because of the MIS discipline's need for flexibility to adapt to a rapidly changing environment.

Kuhn also makes some observations about the establishing of a new paradigm.

> *"In the sciences…the formation of specialized journals, the foundation of specialists' societies, and the claim for a special place in the curriculum have usually been associated with a group's first reception of a single paradigm" (Kuhn, 1996 p. 19).*

Since the 1990s the MIS discipline has really taken form. MIS already had a specialized journal, MISQ (first published in 1977), and saw the introduction of another journal, Information Systems Research (first published in 1990), both of which were committed to publishing quality MIS research. Other journals, such as the Journal of Management Information Systems (first published in 1984) were also publishing MIS research. Specialist societies have been formed, including the Society for Information Management (SIM) and the Association for Information Systems (AIS), along with a wide selection of international and regional conferences, such as ICIS, AMCIS (Americas Conference on IS), ECIS (European Conference on IS), and PACIS (Pacific Asia Conference on IS). There are also several conferences designed for specialist groups covering such topics as global outsourcing, information security, and knowledge management. In addition there are now online periodicals, such as Communications of the Association for Information Systems (CAIS) and Journal of the Association for Information Systems (JAIS), and other online resources such as ISWORLD which provides a variety of resources for the IS community including a discussion group exclusively for IS community members. And finally, almost all major universities have established MIS areas that offer undergraduate, graduate, and even advanced degrees. These three requirements, the establishment of specialized journals, specialized societies, and a place in the academic curriculum lead one to the belief that MIS has indeed reached paradigmatic status.

Upon approaching a more mature phase, though, the so-called MIS paradigm still continues to define itself and its research. Early definitions focused on MIS as being a "management information system"; a type of computer system used in the management of organizational information (Davis & Olson, 1985; Ives, Hamilton, & Davis, 1980; Mason & Mitroff, 1973). Definitions of MIS now include the previous definitions, in addition to MIS meaning the "management" of information systems, investigating the socio-technical aspects of technology.

> *"Research in the information systems field examines more than just the technological system, or just the social system or even the two side by side; in addition, it investigates the phenomena that emerge when the two interact. This embodies both a research perspective and a subject matter that differentiate the*

> *academic field of information systems from other disciplines. In this regard, our field's so-called "reference disciplines" are actually poor models for our own field. They focus on the behavioral or the technological, but not on the emergent socio-technical phenomena that set our field apart. For this reason, I no longer refer to them as reference disciplines, but as "contributing disciplines" at best" (Lee, 2001 p. iii).*

As we look back over the years, from Leavitt and Whistler's (1958) first introduction of information technology" to early definitions of MIS to Benbasat and Zmud's (2003) concept of an IT artifact, we can see that defining MIS continues to be an ongoing (and controversial) topic. However, what we can see is MIS was an unprecedented area that has definitely attracted the scientific community. This thus addresses the first of Kuhn's characteristics of a paradigm.

PARADIGMS WITHIN THE MIS PARADIGM

> *"…there can be small revolutions as well as large ones, that some revolutions affect only the members of a professional subspecialty, and that for such groups even the discovery of a new and unexpected phenomenon may be revolutionary"* (Kuhn, 1996 p. 49).

Kuhn's second characteristic was that the paradigm should be open-ended to allow several different scientific groups to study different problems within the same paradigm. This does not seem to be an issue in the MIS community. Within the MIS paradigm, there have emerged a plethora of distinct subject areas that have lead to their own line of research. I refer to these subject areas as 'paradigms within the MIS paradigm'. There are informal networks, or "invisible colleges" (Price, 1963), that form to focus on common problems in similar ways. Much like the overall definition of paradigms we have been discussing, these 'intraparadigm paradigms' have attracted their own groups from within the MIS community, resulting in their own conferences, and even their own journals. Kuhn (1996) calls this type of research within the paradigms "normal science". Normal science is the puzzle-solving activities conducted by scientist within paradigms.

> *"Normal research, which is cumulative, owes its success to the ability of scientists regularly to select problems that can be solved with conceptual and instrumental techniques close to those already in existence"* (Kuhn, 1996 p. 96).

The open-endedness of MIS can be demonstrated by the number of these intraparadigm paradigms. Several studies were conducted in the 1980s to identify these specific paradigms/areas of study (Culnan, 1986; Culnan, 1987; Ives et. al, 1980). Culnan (1986) identified seven subfields within MIS, based on journal publications from 1972-1982; (1) foundations; (2) system science; (3) computing impacts; (4) implementation; (5) individual differences; (7) human factors and; (8) computer conferencing. Culnan (1987) reevaluated MIS publications from 1980-1985 and narrowed the subfields which she identified down to five, including (1) foundations; (2) individual approaches to MIS design and use; (3) MIS management; (4) organizational approaches to MIS design and use; and (5) MIS curriculum. Culnan felt at that time (1987), MIS was still pre-paradigmatic, but was making progress.

In a more recent evaluation of MIS research, Davis (2000) reviewed articles from MIS Quarterly and ICIS to determine research areas that were unique to IS. He identifies five areas (paradigms); (1) *information systems management processes*, including strategic planning, evaluation of IS within the organization, the management of IS personnel, and the management of the IS function itself; (2) *information systems development*, consisting of IS project management, IS project risk management, technical and social requirements, system implementation, and training, acceptance and use; (3) *information systems development concepts*, such as socio-technical concepts, quality concepts for IS, and social construction for requirements; (4) *representations in information systems*, including database concepts, coding , and tracking changes; and (5) *application systems*, consisting of knowledge management, DSS and GDSS, collaborative work systems, ERP systems, e-commerce systems, and customer support systems.

Within these intraparadigm paradigms we have seen extensive examples of normal science on a variety of topics including decision support systems/group decision support systems (DSS/GDSS) (Dennis, George, Jessup, Nunamaker, & Vogel, 1988; DeSanctis & Gallupe, 1987; Dickson, Senn, & Chervany, 1977; George, Easton, Nunamaker, & Northcraft, 1990; Nunamaker, Dennis, Valacich, Vogel, & George, 1991; Sprague, 1980; Watson, DeSanctis, & Pool, 1988; Zigurs, Poole, & DeSanctis, 1988), technology acceptance (Adams, Nelson, & Todd, 1992; Davis, Bagozzi, & Warshaw, 1989; Mathieson, 1991; Srinivasan, 1985); media richness (Carlson & Davis, 1998; Daft, Lengel, & Trevino, 1987; Kahai & Cooper, 2003;

Marcus, 1994), and information systems design and development (Davis, 1982; Fichman & Kemerer, 1997; Henderson & Cooprider, 1990; Ravichandran & Rai, 2000), as well as a line of normal research on numerous other topics.

Another example of the open-endedness of MIS can be seen in the use of various methodologies. Though the pre-paradigmatic period consisted primarily of positivist/quantitative research, the past 20 years have seen significant progress in the use of both quantitative and qualitative research, including the acceptance of interpretive research (Lee, Lieberau, & DeGross, 1997; Mingers, 2004; Myers, 1997). In fact, positivist, interpretivist, and critical research articles are now equally welcome in the top journals of MIS as long as the research is considered high quality. The acknowledgement of the importance of diverse methodological paradigms is certainly a strength of the MIS community (Baskerville & Myers, 2002). Again showing open-endedness, the MIS community has recently began to warm up to action research, indicated by MIS Quarterly publishing a special issue dedicated to the use of action research in MIS.

Other examples or these intraparadigm paradigms that demonstrate the open-endedness of MIS can be found by looking at special issues of top MIS journals that focus research attention on important IS problems (Baskerville & Myers, 2002). As can be seen from the before mentioned examples, MIS surely satisfies Kuhn's second characteristic. MIS is a very open area of research, facilitating the study of a wide range of topics, using a wide variety of methodologies.

Perhaps the strongest argument that MIS can indeed be considered its own paradigm comes from Baskerville and Myers (2002) who claim that MIS has reached the point where IS research serves as a foundation for other IS research, and in addition, IS is poised to serve as a reference discipline for other academic areas, even those that were once a reference discipline for IS.

> *"IS has developed its own subject matter, a distinctive research perspective, and an excellent scholarly communication system. These developments clearly demonstrate the emergence of a research tradition in IS" (*Baskerville & Myers, 2002).

CONCLUSION

> *"Almost always the men who achieve those fundamental inventions of a new paradigm have been either very young or very new to the field whose paradigm they change. And perhaps that point need not have been made explicit, for obviously these are the men who, being little committed by prior practice to the traditional rules of normal science, are particularly likely to see that those rules no longer define a playable game and to conceive another set that can replace them" (Kuhn, 1996 p. 90).*

By looking back at the inception and evolution of MIS and applying Kuhn's characteristics of a paradigm, I have made the argument that MIS can indeed be considered its own paradigm. In the beginning, the topics studied within MIS were unprecedented which did in fact attract many from the scientific community to join in the MIS community. I have also demonstrated the open-endedness of MIS, allowing different groups of scientists to work on a wide array of problems, utilizing a variety of methodologies. However, even though I argue that MIS has reached paradigmatic status, there is still much work to be done to continue the growth of scientific knowledge within the MIS paradigm. Others have argued that the MIS community needs to clearly define the "IT artifact" and focus research squarely on this area (Benbasat & Zmud, 2003). It is not surprising that this suggestion came from two of the community's most well respected members, who have been around MIS for a long time. This would come as no surprise to Kuhn. Kuhn (1996) states that it is the older, well-established members of a paradigm that will strive to keep the paradigm alive by stifling creativity. However, by insisting on a closed IT artifact, Benbasat and Zmud are essentially attempting to build a wall around the MIS paradigm, which will only hinder the growth of scientific knowledge in MIS. Others have argued that the gray area around the IT artifact suggested by Benbasat and Zmud is an area that offers significant opportunity for growth in MIS (Whinston & Geng, 2004). Others argue that members of scientific communities build colonies outside the periphery of their paradigm (Ives, Parks, Porra, & Silva, 2004). It is these colonies than eventually become annexed into the original paradigm that results in growth. For the continued growth in MIS we must realize that, by nature, MIS is constantly changing because of the speed at which new technologies are introduced. Tying MIS down to the suggested IT artifact will result in the community not being able to keep up with the rapidly shifting boundaries.

> *"Boundary shift is inevitable within this dynamic. The shifting boundaries of scholarly attention away from the IT artifact may be reflective of the field's maturing and inclusion of a new generation of members and leaders whose interests center on topics that differ somewhat from those of the original founders. New*

generations bring new research practices; this is inevitable in the evolution of a community and a signal of its vibrancy. Many young scholars are deeply interested in interdisciplinary research, and so they may act to push the boundaries of the IS field away from its core roots" (DeSanctis, 2003)

It is the new young scholars that represent the future of the MIS paradigm. It is up to them to choose between conducting "normal science" within the IT artifact, or to revolt against the IT artifact and attempt to expand the boundaries of the MIS paradigm. Only with this revolution will we see significant growth of scientific knowledge within MIS.

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REFERENCES

1. Adams, D.A., Nelson, R.R., & Todd, P.A. (1992) Perceived usefulness, ease of use, and usage of information technology: A replication, *MIS Quarterly*, 16(2), 227-247.
2. Avison, D., and M. Myers (1997) Information Systems and Anthropology: An Anthropological Perspective on IT and Organizational Culture, *Information Technology & People*, 10:3, 43-56.
3. Banville, C, and M. Landry (1989) Can the Field of MIS Be Disciplines? *Communications of the ACM*, 31:1, 48-60.
4. Bariff, M. and Ginzberg, M. (1982) MIS and the Behavior Sciences: Research Patterns and Prescriptions, *Data Base*, Fall, 19-26.
5. Baskerville, R. and M. Myers (2002) Information Systems as a Reference Discipline, *MIS Quarterly*, 26(1), 1-14.
6. Bechtel, W. (1988) Philosophy *of Science: An Overview for Cognitive Science*, Hillsdale, New Jersey: Lawrence Erlbaum Associates, Publishers.
7. Bonini, C. (1963) *Simulation of Information and Decision Systems in the Firm*, Prentice-Hall Inc., Englewood Cliffs, N.J.
8. Carlson, P. and Davis, G. (1998) An investigation of media selection among directors and managers: From 'self' to 'other' orientation, *MIS Quarterly*, 22(3), 335-358.
9. Culnan, M. (1986) The Intellectual Development of Management Information Systems, 1972-1982: A Co-Citation Analysis, *Management Science*, 32(2).
10. Culnan, M. (1987) Mapping the Intellectual Structure of MIS, 1980-1985; A Co-Citation Analysis, *MIS Quarterly*, 341-353.
11. Culnan, M. and Swanson, E. (1986) Research in Management Information Systems, 1980-1984: Points of Work and Reference, *MIS Quarterly*, 10(3), 289-301.
12. Daft, R.L., Lengel, R.H. & Trevino, L.K. (1987) Message equivocality, media selection, and manager performance: Implications for information systems, *MIS Quarterly*, 11(3), 355-366.
13. Davis, G. (1982) Strategies for information requirements determination, *IBM Systems Journal*, 21(1).
14. Davis, F.D. (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
15. Davis, G. and M. Olson (1985) *Management Information Systems: Conceptual Foundations, Structure, and Development Second Edition*, McGraw-Hill, New York.
16. Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. (1989) User acceptance of computer technology: A comparison of two theoretical models, *Management Science*, 35(8), 982-1003.
17. DeLone, W.H., & McLean, E.R. (1992). Information systems success: The quest for the dependent variable, *Information Systems Research*, 3(1), 60-95.
18. Dennis, A.R., George, J.F., Jessup, L.M., Nunamaker, Jr., J.F., and Vogel, D.R. (1988) Information technology to support electronic meetings, *MIS Quarterly*, 12(4), 591-624.
19. DeSanctis, G. and Gallupe, R.B. (1987) A foundation for the study of group decision support systems, *Management Science*, 33(5), 589-609.
20. DeSanctis, G. (2003) The Social Life of Information Systems Research: A Response to Benbasat and Zmud's Call for Returning to the IT Artifact, *JAIS*, 4(16).
21. Dickson, G., Senn, J. and N. Chervany (1977) Research in Management Information Systems: The Minnesota Experiments, *Management Science*, 23(9), 43-53.
22. Dickson, G. (1981) Management Information Systems: Evolution and Status, *Advances in Computers*, Vol. 20, 2-37.

23. Dickson, G., Benbasat, I. and W. King (1980) The Management Information Systems Area: Problems, Challenges and Opportunities, *Proceedings of ICIS*.
24. Fetzer, J.H. 1993. *Philosophy of Science*, New York: Paragon House.
25. Fichman, R.G. & Kemerer, C.F. (1997) The assimilation of software process innovations: An organizational learning perspective, *Management Science*, 43(10), 1345-1363.
26. George, J.F., Easton, G.K., Nunamaker, Jr., J.F. & Northcraft, G.B. (1990). A study of collaborative group work with and without going to up computer-based support, *Information Systems Research*, 1(4), 440-457.
27. Henderson, J. & Cooprider, J. (1990). Dimensions of I/S planning and design aids: A functional model of CASE technology. *Information Systems Research*, 1(3), 227-254.
28. Hevner, A., March, S., Park, J., Ram, S. (2004) Design Science in Information Research, *MIS Quarterly*, 28(1) 75-105.
29. Ives, B., Hamilton, S. and G. Davis (1980) A Framework for Research in Computer-Based Management Information Systems, *Management Science*, 26(9).
30. Ives, B., Parks, M., Porra, J. and L. Silva (2004) Phylogeny and Power in the IS Domain: A Response to Benbasat and Zmud's Call for Returning to the IT Artifact, *JAIS*, 5(3), 108-124.
31. Izak Benbasat and Robert W. Zmud (2003) The Identity Crisis Within the IS Discipline: Defining and Communicating the Discipline's Core Properties, *MIS Quarterly*, 27(2) 183-194.
32. Jayaratna, N. (1994) *Understanding and Evaluating Methodologies*, McGraw-Hill, London.
33. Kahai, S. and Cooper, R.(2003) 'Exploring the Core Concepts of Media Richness Theory: The impact of cue multiplicity and feedback immediacy on decision quality', *Journal of Management Information Systems* (20:1), 263-299.
34. Keen, P. (1980) MIS Research: Reference Disciplines and a Cumulative Tradition, *Proceedings of ICIS*.
35. Kuhn, T.S. (1996) The *Structure of Scientific Revolutions Third Edition*, University of Chicago Press, Chicago, Ill.
36. Leavitt, H.J. and T.L. Whistler (1958) Management in the 1980's, *Harvard Business Review*, 36:6, 41-48.
37. Lee, A., Lieberau, J. and DeGross, J. (Eds) (1997) *Information Systems and Qualitative Research*, London: Chapman and Hall.
38. Lee, A. (2001) Editorial, *MIS Quarterly*, 25(1), iii-vii.
39. Markus, L. M. (1994) Electronic Mail as the Medium of Managerial Choice, *Organization Science*, (5:4), 502-527.
40. Mason, R. and I. Mitroff (1973) A Program for Research on Management Information Systems, *Management Science*, 19(5,) 475-487.
41. Mathieson, K. (1991) Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior, *Information Systems Research*, 2(3), 173-191.
42. Mingers, J. (2004) Real-izing Information Systems: Critical Realism as an Underpinning Philosophy for Information Systems, *Information and Organization*, 14(2).
43. Myers, M. (1997) Qualitative Research in Information Systems, *MIS Quarterly*, 21(2), 241-242.
44. Nolan. R. and Wetherbe, J. (1980) Toward a Comprehensive Framework for MIS Research, *MIS Quarterly*, 4(2), 1-19.
45. Nunamaker, Jr. J.F., Dennis, A.R., Valacich, J.S., Vogel, D.R., and George, J.F. (1991) Electronic meeting systems to support group work, *Communications of the ACM*, 34(7), 40-61.
46. Ravichandran, T. & Rai, A.(2000) Quality Management in Systems Development: An Organizational System Perspective, *MIS Quarterly*, 24(3), 381-415
47. Robey, D. (2003) Identity, Legitimacy and the Dominant Research Paradigm: An Alternative Prescription for the IS Discipline: A Response to Benbasat and Zmud's Call for Returning to the IT Artifact, *JAIS*, 4(15).
48. Sprague, R.H. (1980). A framework for the development of decision support systems, *MIS Quarterly*, 4(4).
49. Srinivasan, A. (1985). Alternative measures of system effectiveness: Associations and implications, *MIS Quarterly*, 9(3), 243-253.
50. Watson, R.W., DeSanctis, G.L. & Poole, M.S. (1988) Using a GDSS to facilitate group consensus: Some intended and unintended consequences, *MIS Quarterly*, 12(3), 463-478.
51. Whinston, A., and G. Xianjun (2004) Operationalizing the Essential Role of the Information Technology Artifact in Information Systems Research: Gray Area, Pitfalls, and the Importance of Strategic Ambiguity, *MIS Quarterly*, 28(2), 149-159.
52. Zigurs, I., Poole, M.S. & DeSanctis, G.L. (1988) A study of influence in computer-mediated group decision making, *MIS Quarterly*, 12(4), 625-644.