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On the Maturity of the MIS Research Field

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Introduction

Researchers benefit considerably from understanding the developments in their field, especially in a relatively young field like MIS. The difficulties of identity and maturity in MIS field are exacerbated by rapidly changing technology and by the eclectic, inter-disciplinary nature of the field. To help clarify the nature of the MIS field and its developments, a stream of studies has examined the emerging pattern of research activities in the field (Culnan (1986), Culnan and Swanson (1986), Farhoomand (1987), Hamilton and Ives (1982), Vogel and Wetherbe (1984), Gorla (1989)). Most of these studies concur that MIS field of research has not made very significant progress as a scientific discipline, and is devoid of unique body of knowledge. At the present stage of the field's development these previous studies provide the opportunity for self-examination which should propel research more directly. Most of the studies assessing the maturity of MIS field considered articles published in 80's. As there is little research with recent MIS articles, we intend to evaluate MIS research field using MIS articles published during 1986 – 1995. In this research, we use three desirable characteristics a mature field should demonstrate: number of references per MIS article, immediacy factor of citations, and proportion of references to other disciplines. Previous researchers have used these measures to assess maturity of MIS (Hamilton and Ives, 1982). However, these measures are not complete representations of maturity by any means, but provide some insights. Thus, we address the following questions:

- To what extent does the MIS research rely on the accumulation of previously published knowledge?
- What is the elapsed time between cited and citing publication date?
- What is the cross-disciplinary reference pattern of MIS research?

Propositions

As a discipline matures, new theories are developed and discipline undergoes evolution including addition of new research fields (Keen, 1980; Culnan, 1987). The amount of bibliographic references in a paper provides a measure of social linkages and scholarliness (Price, 1970) and as a discipline matures, the research papers exhibit larger amount of scholarship. Though referencing increases in all fields over time, established fields (eg. hard sciences) have largest number of references per

article (Summers, 1979). Also supported by Hamilton and Ives (1982), the number of references per article can be an indicator of maturity of a discipline. Research in mature disciplines has a lot more knowledge (references) it needs to draw from. Articles in Physical Sciences exhibited, in general, more references than other disciplines do (Price, 1970). Thus, a mature discipline should exhibit high number of citations per article.

Immediacy factor (Line and Sandison, 1974) is a reflection of the proportion of references in the immediate past. The presence of immediacy effect could be a result of rapid growth of the field, a relative newness, and absence of cumulative tradition. Price index (percentage of references in the last 5 years) is higher for hard sciences such as physics and lower for soft sciences such as sociology (Price, 1970). Low Price index implies the researcher has to digest most of the research that was done before, which will imply that the field matures slowly. A high Price index will mean the researcher has to digest mostly the latest developments in the field, which imply fast advancement of a research front enabling orderly growth of the discipline. Thus, as a discipline matures, it should exhibit a shorter elapsed time between citing and cited articles.

The dependence of MIS research on allied fields has been talked about for the last two decades. At the First International Conference on Information Systems, Keen (1980) pointed out that reference disciplines are more mature than MIS, so MIS researchers should borrow and learn from reference disciplines. Recently, there has been quite a debate whether much dependence on allied fields is desirable or not. Robey (1996) points out the benefits of diversity ("many blooming flowers of IS Research") attainable because of its tight linkages with reference disciplines. Benbasat and Weber (1996) argue that the cross-disciplinary referencing by MIS research increases diversity to the field, but distracts the field from unifying and thus inhibiting the development with its own identity. Similarly, Hamilton and Ives (1982) indicate that a field shows maturity if the proportion of references to other disciplines decreases substantially, in which case MIS research draws most of its knowledge from MIS sources themselves. Thus, as MIS matures, it should demonstrate reduced dependence on allied fields indicated by reduced proportion of references to allied fields. There are other indicators of maturity, such as, the growth rate of MIS research articles and diffusion of MIS research into other journals, which are not considered here.

Methodology

Our research methodology is based on citation analysis of MIS articles published during 1986-1995. Eight highly rated MIS journals (MIS Quarterly, Information Systems Research, Journal of Management Information Systems, Communications of the ACM, Information and Management, Management Science, Decision Sciences, and Harvard Business Review) were selected for the study. The bibliographic references attached to each MIS article were recorded and coded. In coding the articles, a recent framework by Gorla (1989) was used. This MIS framework uses a 5 x 5 matrix to represent MIS research areas, with one dimension being MIS core activities and the other being allied fields that interact with MIS. The core activities include system definition/ analysis, system design/ construction, system operation/ maintenance, system management/ planning, system effect/ use. The allied fields include behavioral science/ psychology, computer science/ engineering, operations research/ quantitative analysis, functional management, economics/ costing. Thus the coding system consisted of basically three major sections: MIS core, MIS interdisciplinary, and allied fields. Totally 7 doctoral students coded the articles and the references, using the key-word list derived from the above framework. 34,202 articles including 1052 main articles published during 1986-1995 and their 33,152 associated references were coded.

Results

In order to justify the use of multiple raters in coding the 34,202 articles, an inter-rater analysis was conducted. Pearson correlation coefficients were used to ensure the consistency in the coding of the five papers selected. The overall average correlation among all the different raters was 0.55 and the individual correlations were significant at 95% confidence level. This result shows an acceptable indication of the reliability of the data used to assess the maturity of the MIS field as well as the consistency among the raters.

Having proved for the applicability of the data set, various descriptive analyses were conducted to give a good picture of the bibliographic data on hand. The data was split into two separate groups corresponding to the periods: 1986-1988 (F3) and 1993-1995 (L3). The period 1989-1992 was not included, in order to get an appropriate separation between the two groups. The total number of articles during these two periods was 261 (F3) and 374 (L3), respectively. Out of the main articles considered in this analysis, 374 articles belonged to the MIS core and 651 articles belonged to the MIS interdisciplinary areas.

Figure 1 indicates the average number of references per MIS article, across the ten year span. It is evident that there had been a consistent increase in the average number of references in the MIS articles. The average number of references per MIS article for F3 and L3 were 21.54 and 36.36 respectively. In their paper, Hamilton and Ives (1982) found that the average references per MIS article was 18.6 for the period 1970-1979. These numbers signify a 16 percent increase in the referencing for the period 1986-1988 and a 69 percent increase for the period 1992-1995 over the previous periods. Median elapsed time as used in this study represents the typical delay between publication dates of all citing articles and the date of publication of the original work. There had been a consistent increase in the median elapsed time of referencing in the MIS articles during the period 1986-95. The average median elapsed time for F3 and L3 were 5.21 and 6.20 respectively. The high median elapsed time also indicates the validity of utility of past information. Though MIS is rapidly growing, we do not find a low median elapsed time as suggested by Line and Sandison (1974). Interaction with prior research can also be classified by content by analyzing cross-disciplinary journal reference patterns. The referencing of the MIS articles to the core, interdisciplinary MIS and allied fields were compared for the two periods F3 and L3 (Table 1). Comparison of means denotes a significant difference in the reference pattern between these two periods. The results show that, in case of MIS interdisciplinary research, the percentage of references to allied fields has significantly increased from 20% to 42% between the periods F3 and L3. There is a corresponding significant decrease (from 59% to 48%) in the percentage of references to MIS interdisciplinary research. Similar phenomenon can be seen for MIS core research. Thus, MIS referencing has shifted from MIS interdisciplinary research to allied fields during the period 1986-95.

Discussion and Conclusion

The objective of this study was to examine the present state of MIS discipline regarding maturity and provide some related empirical support. We posit that some of the desirable properties a mature discipline should exhibit are frequency of references, immediacy factor of citations, and cross-disciplinary reference pattern. Citation analysis was utilized on MIS articles published during 1986-95 to measure these indices and to come up with research conclusions.

Our results lead to mixed conclusions regarding maturity of MIS field. First, we find a significant increase in the number of references per MIS article during 1986-95. This finding is consistent with that of Hamilton and Ives (1982) in that number of references increased during the period 1970-79 also, indicating maturity of MIS research. Second, the elapsed time between citing and

cited articles has increased; this finding is inconsistent with previous trend. This measure does not support improvement of MIS towards maturity. Third, the percentage of references has shifted from MIS research to allied fields during the period 1986-95. However, this percentage is lower than what was witnessed by Hamilton and Ives. Thus, our results support the evidence that MIS is trying to rely on its own knowledge and showing improvement towards becoming a unified and mature field. However, in the absolute terms, the percentage of references is over 40%, which is quite high; this indicates that the progression towards unifying and maturing has been very slow. More efforts are needed by researchers to speed up the progression of MIS towards more identity and maturity.

Based on our research we conclude that presently MIS field is growing rapidly while utilizing highly the cumulative knowledge (but mostly from allied fields). The increased referencing to the allied fields coupled with high median elapsed time might signify that MIS research is deeply rooted in allied fields and is of high quality. But the down side is that MIS research is fragmented and is not progressing well towards becoming a unified and mature field. Based on guidelines of Price (1970), we assess that our field has “thin skin” in the sense that a lot of the reference knowledge is derived from older research articles. MIS does not possess a rich current research front based on which future MIS research can utilize the

knowledge from its own research itself. Thus, there is evidence of diversity of MIS research, rather than maturity. Other researchers (Benbasat and Weber, 1996; Robey, 1996) made similar observations. While maturity thrives to be a unified field, diversity thrives to have more varied research areas and themes obtainable with linkages with allied disciplines. Thus, we support the popular opinion that MIS still has identity problems. Our results are in agreement with King’s (1993) commentary “... it is arguable that information systems probably is not even a field, but rather an intellectual convocation that arose from the confluence of interests among individuals from many fields....”

A limitation of our research is that the desirable characteristics of maturity we used in this research do not give a complete picture of MIS research. However, our findings provide some insights into the state of MIS research. Future research is needed considering other aspects as indicated in this paper.

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References available upon request from Narasimhaiah Gorla

Table 1. Cross-disciplinary reference patterns				
Main Articles		MIS Core	MIS Interdisciplinary	Allied Fields
MIS Core	(1986-1988)	36.92	37.41	22.43
	(1993-1995)	32.27	28.31*	40.80*
MIS Interdisciplinary	(1986-1988)	17.20	58.61	20.09
	(1993-1995)	13.81	48.15*	42.03*

Figure 1. Average number of references during the period 1986-95

