Information Systems Management Issues: Reporting and Relevance

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Abstract:
Reports of key information systems issues have been published over the last two decades in many journals. Leading IS journals (e.g., *MIS Quarterly, Information & Management,* among others) have published key IS management issue reports every three or four years over the last 15 years, and will probably continue to provide such reports in the future. Although these reports claim to provide decisional guidance to practitioners, researchers, consultants, etc., the authors in their experience have noted concerns about their usefulness. While not questioning the validity of the methods and analysis conducted in these studies, we address two important questions in this article: the manner of reporting of the key issue results (which might be misleading), and the relevance of the results (are they providing what they intended to?). We hope that our discussion will provide new perspectives in making resource allocation decisions to both readers and authors of key issue articles.
Subject Areas: Factor Analysis, Key Information Systems Issues, and IS Management Issues.

Article:

INTRODUCTION

Without a doubt, information technology (IT) is advancing at a revolutionary speed. Business forces, such as intensifying competition and globalization, when combined with IT, have produced innovative information systems (IS) applications. For example, new types of applications, such as decision support systems, expert systems, executive information systems, and interorganizational systems, have emerged in the last two decades. As a consequence, the nature of IS management issues keeps evolving. To keep pace, a series of studies have been conducted to determine key IS issues for MIS managers in the U.S. Several leading MIS journals (e.g., *MIS Quarterly* and *Information & Management)* have published such studies every three to five years since the early eighties (Ball & Harris, 1982; Brancheau, Janz, & Wetherbe, 1996; Brancheau & Wetherbe, 1987; Dickson, Leitheiser, Nechis, & Wetherbe, 1984; Neiderman, Brancheau, & Wetherbe, 1991; Watson & Brancheau, 1991). Even industry groups have periodically undertaken similar studies; for example, the CSC Index studies (CSC Index, 1995). Spurred by U.S. studies, researchers have conducted similar studies in other parts of the world, for example, Canada (Carey, 1992), Australia (Watson, 1988), Hong Kong (Burn, Saxena, Ma, & Cheung, 1993), India (Palvia & Palvia, 1992), Singapore (Rao, Huff, & Davis, 1987), and Taiwan (Palvia & Wang, 1995).

Such studies apparently assist the decision making of at least two constituencies. First, the issues provide directions to MIS and senior management in the allocation of scarce resources to competing IT priorities, and second, they provide fruitful avenues of inquiry to MIS researchers. In fact, Niederman et al. (1991) stated that IS vendors, professional societies, consultants, educators, and researchers need to be aware of IS executives' key concerns to serve their markets effectively. While there is intuitive appeal and possibly some validity to such claims, they have not been empirically verified to the best of our knowledge. We see some problems with these studies, however, which prevent their full utilization. We understand that there are methodological imperfections in almost any study, for example, sample size, sample representativeness, and respondent bias. Our purpose is not to critique these aspects. In fact, we assume that the data in these studies is fairly sound.

Instead, we address two other important concerns: the issues of reporting and relevance. While the former may easily be corrected, the latter may limit the utility of the results.

REPORTING OF IS MANAGEMENT ISSUES

Many issues reported in past studies appear to represent items of a higher order dimension. In other words, specific issues may not individually represent unique constructs, but as a group are more likely to be indicators or measures of higher order constructs. The authors, their colleagues, and graduate students have noted such patterns in the issues. In fact, the authors of key issue studies themselves have made remarks about possible overlaps and relationships between the issues (Brancheau & Wetherbe, 1996; Niederman et al., 1991). For example, in the Niederman et al. study, the issues "improving the quality of software development" and "planning and using CASE technology" are representative of software development process, as a higher order construct. In the same vein, "improving information security and control" and "establishing effective disaster recovery capabilities" are issues of IS control. The argument we make is that if reporting of such issues is made independent of their underlying constructs, then the results will be distorted and will generate misleading information. We will demonstrate such problems later in the section.

The recommended procedure to correct this apparent anomaly is: treat the originally reported issues as items that measure underlying constructs, establish the constructs, and then report the results for the constructs. For demonstrating this procedure, we focus on the key-issues' study by Niederman et al. (1991), and refer to it as the Niederman study, for brevity. (A new key-issues' study was published recently by Brancheau & Wetherbe, 1996. However, our analysis began before its publication.) For the purpose of analysis, the original data was obtained from the authors of the Niederman study. While their published study reported 25 issues, the data provided to us contained only the top 20 issues; therefore, our analysis is based on these 20 issues. As stated earlier, we will treat these issues as items and will try to evaluate an underlying factor structure. The rankings of these 20 items/ issues, as reported in the Niederman study, are shown in Table 1.

An a Priori Factor Model

In order to evaluate the existence of a factor structure among the 20 items, an a priori model was developed. This model is based on prior literature, a careful reading of the items, logical reasoning, and the authors' knowledge and experience. The model was then tested using confirmatory analysis. Our a priori model has 10 factors (also called constructs); these are described below along with the items that constitute the factors. While we believe that the model described below is fairly good, properly justified, and a good first attempt, we acknowledge that improvements in the model may be possible.

Factor 1: Data and Information Resources (F1)

In our view, the two items "Developing an Information Architecture" and "Making Effective Use of the Data Resource" reflect the same underlying need for the organization to make invaluable data and information available to managers. In practice, the two terms "data" and "information," are frequently used interchangeably. A recent trend is the development of data warehouses, which not only require organizations to consider the architecture but also aim to effectively support ad hoc strategic analysis of information (Davydov, 1996). Furthermore, one fundamental goal of "developing an information architecture" is to allow integration and sharing of data (Niederman et al., 1991). We therefore postulate that these two items are indicators of the construct: Data and Information Resources.

Factor 2: IS Strategic Processes (F2)

IS strategic processes include items that emphasize the strategic role of information technology in business. The items "Improving IS Strategic Planning" and "Building a Responsive IT Infrastructure" relate to this dimension. "Improving Strategic Planning" is clearly a strategic issue, because such planning ensures close alignment of IT with business needs. "Building a responsive IT infrastructure" is a strategic issue, because such an infrastructure not only supports existing business applications but also facilitates timely response to changing business conditions (Niederman et al., 1991). It is important for organizations to follow an architecture-based approach

that results in an integrated IS and business organization, with an integrated strategic plan (Tan, Djoev, & Uijttenbrock, 1997). In effect, the linkage of IT to business needs is what ties these two items together.

Table 1: Twenty top key IS management issues from the Niederman et al. (1991) study (descending rank order).

Rank	Issue Name
1	Information architecture
2	Data resource
3	Strategic planning
4	IS human resources
5	Organizational learning
6	Technology infrastructure
7	IS organization alignment
8	Competitive advantage
9	Software development
10	Telecommunication systems
11	IS role and contribution
12	Electronic data interchange
13	Distributed systems
14	CASE technology
15	Applications portfolio
16	IS effectiveness measurement
17	Executive/decision support
18	End-user computing
19	Security and control
20	Disaster recovery

Factor 3: IS Human Resources (F3)

This is a single-item factor. The full item description is "Specifying, Recruiting, and Developing Human Resources for IS." No other item deals with human resource issues.

Factor 4: IS for Organizational Effectiveness (F4)

The three items under this factor are "Facilitating Organizational Learning and Use of IS Technologies," "Aligning the IS Organization With That of the Enterprise," and "Increasing Understanding of the Role and Contribution of IS." It is logical to argue that the aligning of the IS organization and an increased understanding of IS by organizational members will facilitate organizational learning and use of IS technologies.

Factor 5: IS for Competitive Advantage (F5)

This is a single-item measure. It is tempting to combine this item with the previous factor "IS Strategic Processes" (F2). However, careful examination reveals that the focus here is on using and building systems for competitive advantage and not on the strategic processes behind them. This factor includes information systems specifically deployed to gain competitive advantage, such as the American Airlines reservation system, SABRE (Hopper, 1990).

Factor 6: Software Development Processes (F6)

The two items representing this construct are "Improving the Quality of Software Development" and "Planning and Using CASE Technology." CASE tools are claimed to increase information systems *and* software development effectiveness (Juhani, 1996). The use of CASE technology is widely recognized as linked to improvements in the software development process. In fact, in a recent article, Flynn, Vagner, and Del Vecchio (1995) bring the two issues together explicitly by raising the question: Is CASE technology improving the quality and productivity of software development?

Factor 7: Telecommunications and Networking (F7)

The area of telecommunications and networking encompasses many topics, such as electronic data interchange (EDI), local and wide area networks, and distributed processing (Stallings & Van Slyke, 1998). Technologies such as EDI and distributed systems rely heavily on an effective telecommunications infrastructure. Therefore, it is natural to group the three items: "Planning and Implementing a Telecommunications System," "Enabling Electronic Data Interchange and Multi-vendor Integration," and "Developing and Managing Distributed Systems" under a single category. This factor encompasses issues related to the best aspects of existing networking technologies as well as new capabilities to address performance, management, and cost savings (Harris, 1997).

Factor 8: IS Applications Effectiveness (F8)

The two items "Planning and Management of the Applications Portfolio" and "Measuring Information System Effectiveness and Productivity" are crucial for having productive and useful systems in an organization. Whereas the first item relates to the effectiveness of the applications portfolio, the second item pertains to the measurement of the effectiveness of these applications. The specific contributions of various types of IS to organizational effectiveness remain a critical concern to both academic and practitioner communities (Grover, Jeong, & Segars, 1996). Taken together, these items contribute to the overall effectiveness of IS applications in an organization, and are treated as one factor.

Factor 9: End-User Computing & Support (F9)

End-user computing has changed the way decision making and computing is supported within organizations (Rockart & Flannery, 1983). End-user computing includes many tasks that are performed by end users directly, for example, office automation, usage, interactive computing, etc. Specifically, decision support and executive support systems are designed for managerial end users, who can adapt them to their needs (Sprague, 1980). Current software packages and tools (e.g., spreadsheet software) allow end users to even develop their own DSS. In light of these arguments, we combine the items "Facilitating/Managing Decision and Executive Support Systems" and "Facilitating and Managing End-User Computing" into one factor.

Factor 10: IS Control (F10)

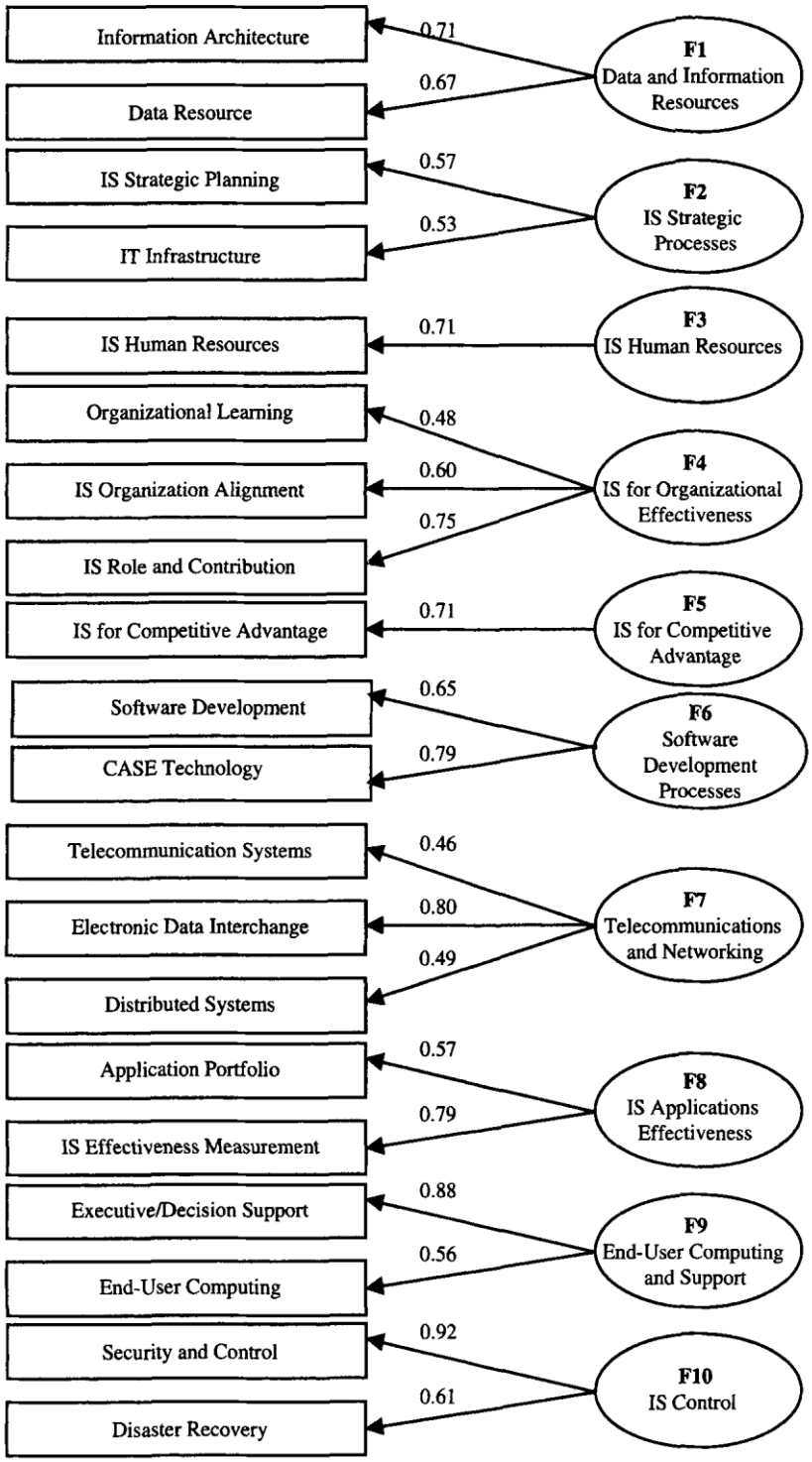
The two items grouped under this factor are "Improving Information Security and Control" and "Establishing Effective Disaster Recovery Capabilities." The first item refers to establishing security controls on IS resources that are preventive in nature. The second item requires that sound measures be taken in advance so as to minimize potential losses in case of a disaster. Clearly, both items are IS control issues and are, therefore, placed together.

The complete a priori measurement model can be represented by a diagram showing the various relationships between the items and the factors. Space limitations prevent the separate inclusion of the model diagram. However, the model can be inferred easily from the above discussion and the results shown in Figure 1. Figure 1 does not include many of the parameters and connections, to keep it from being cluttered. For example, δ is the random error for each item, λ is the coefficient relating each item to its posited factor, and ϕ is the covariance between two factors. 'The covariance connections and the arrows representing random errors are not shown. Note, however, that all factors are allowed to intercorrelate freely.

Confirmatory Factor Analysis

The above a priori measurement model was evaluated using confirmatory factor analysis. The Windows-based PC-version of LISREL 8.14 was used for analysis. The results are presented in Figure 1 and Table 2. There is no single recommended measure of model fit. In general, smaller chi-square values are indicative of better fitting models. However, the chi-square statistic is sensitive to large sample sizes and models with large number of indicators. In such cases, even the slightest model misspecification can result in significant chi-square values. Therefore, other measures of model fit, such as adjusted chi-square, goodness of fit indices, mean square residual, etc., have been suggested to assess model adequacy (Bagozzi & Yi, 1988; Bollen, 1989; Jöreskog & Sörbom, 1989). These measures are summarized in Table 2.

Figure 1: Results of the confirmatory measurement model.



Examining Table 2, the chi-square test seems to indicate that the model does not fit the data. However, as stated above, the likelihood of rejecting a true model with the chi-square test is very high with large sample size and large number of indicators. In fact, many of the models presented in the literature (including MIS literature) are rejected on this basis (e.g., Adams, Nelson, & Todd, 1992; Segars & Grover, 1993). We therefore need to look at other measures. The value of chi-square divided by degrees of freedom is 1.49, which is well below the cutoff value of 3, and is indicative of model fit. The goodness of fit index is 0.87 and the adjusted goodness of fit index is 0.78, indicating a reasonable fit, although both values are slightly lower than desired. The root mean square residual (.072) is at an acceptable level. In addition, Figure 1 lists the λ coefficients relating the items to

the factors; they are all statistically significant (t >12.001). About half of them are higher than the stringent cutoff of .707.

Table 2: Fit measures for the a priori measurement model.

Measure	Recommended Value	Actual Value
Chi-Square	$p > .05$	189.03 ($p = .0003$)
Chi-Square / *df*	≤ 3	1.488
Goodness of Fit	≥ .90	.87
Adjusted Goodness of Fit	≥ .80	.78
Root Mean Square Residual	≤ .10	.072

Together, the above measures indicate a reasonable fit for the a priori model to Niederman's original data. Furthermore, past studies in confirmatory analysis exhibit similar statistical properties (Adams, Nelson, & Todd, 1992). In summary, the confirmatory analysis undertaken here provides support for the postulated model. This model will, therefore, serve as the basis for providing recommendations on the reporting of results.

Recommended Reporting

It is more objective to report the composite score of each of the 10 factors rather than the individual scores of the items that comprise the factor. The item scores may also be reported, but they should be reported as constituents of the underlying factor. The reporting of item scores alone will misrepresent the factors to the users of such information and may mislead them in their decision making. For example, individual reporting of only the items in a high-ranked factor would give extra importance to the underlying factor at the expense of other items and other factors. Below, we provide the composite scores of the 10 factors along with the scores of the items that make up each factor. In essence, these 10 factors can be viewed as 10 issues that replace the old 20 issues.

A simple average of the importance ratings of all items under each factor was computed to obtain the rating of the factor. Table 3 lists these factors (or recast issues) in priority order together with the ratings of the items belonging to the factor. An argument can be made for using a weighted average; however, the weights are not known and would be difficult to obtain. Moreover, Ives, Olson, and Baroudi (1983) have observed that weighted and unweighted scores are highly correlated, making the additional information provided by weights unnecessary.

The following comments are in order based on a comparison of Tables 1 and 3.

1. The number of issues have been reduced from 20 to 10. Although 10 may not be the exact number of factors, what it means is that the IS managers are generally thinking of much fewer issues than the large number some-what arbitrarily imposed by a questionnaire. However, the 20 items may still be worth measuring and exploring, as together they provide measurements for the 10 factors.

2. The original ranking is distorted because of the reported factor structure among the items. One consequence is that some issues are overrepresented. For example, "Data and Information Resource" appears two times in the Niederman's top-10 list: ranked Number 1 as "Information Architecture" and ranked Number 2 as "Data Resource." However, these two items combined as one factor appear only once in the new top-10 list as rank Number 1. By the same token, items for the factor "IS Strategic Processes" appear twice in Niederman's top-10 list, ranked as Number 3 and 6, while its factor rank is Number 2.

3. The overrepresented issues have the effect of pushing the positions of lower ranked issues even lower. Thus, several issues are underrepresented. For example, "Software Development" was rated Number 9 and CASE technology was rated Number 14 in the Niederman list. However, the two combined as one factor called "Software Development Processes," ranked Number 6. This is a significant upward shift in rank. Another example is the factor "End-User Computing & Support," which is ranked Number 8 in Table 3. The items comprising it: "Executive/Decision Support" and "End-User Computing" were ranked Number 17 and 18 in

Niederman's list. Obviously, if practitioners were using the 1991 Niederman list directly for resource allocation guidance, and researchers were using it for topic selection, then their efforts would be misguided.

Table 3: Revised key-issue ranks.

Rank	Description of Issue	Rating
1	Data and information resource	8.32
	Information architecture (8.32)	
	Data resource (8.31)	
2	IS Strategic Processes	7.75
	Strategic planning (8.06)	
	Technology infrastructure (7.44)	
3	IS Human Resources	7.74
4	IS for Competitive Advantage	7.34
5	IS for Organizational Effectiveness	7.26
	Organizational learning (7.54)	
	IS organizational alignment (7.39)	
	IS role and contribution (6.85)	
6	Software Development Processes	6.93
	Software development (7.22)	
	Case technology (6.63)	
7	Telecommunications and Networking	6.73
	Telecommunication systems (6.92)	
	Electronic data interchange (6.63)	
	Distributed systems (6.63)	
8	IS Applications Effectiveness	6.29
	Applications portfolio (6.37)	
	IS effectiveness measurement (6.20)	
9	End-User Computing & Support	5.98
	Executive/decision support (6.02)	
	End-user computing (5.93)	
10	IS Control	5.76
	Security and control (5.82)	
	Disaster recovery (5.69)	

Note: Numbers in parentheses represent the individual scores of each item (that comprise the factor).

It is imperative to remind the readers that our recasting of the results is tentative and for demonstration purposes. While the factor structure proposed here exhibits good statistical properties, we do not exclude the possibilities of improving it. The important message from this analysis is that a factor structure does exist between the various items and an effort must be made to report the ratings of the factors first, followed by the ratings of the items. We suggest that future "key IS management issues" studies carefully consider the following in order to address the concerns raised here:

1. Explicitly consider and develop a factor structure for the items. Such an a priori analysis will actually improve the items that are finally included in the study.

2. Validate the a priori model (e.g., using confirmatory analysis).

3. Report the composite average scores of the factors. While item scores may also be presented, the focus clearly should be on the factors.

4. Include a correlation matrix of all the items. The correlation matrix will inform readers of the relationships among items and will allow them to conduct further analysis on their own. (Space restrictions prevent us from including it, but it can be obtained from the authors.)

RELEVANCE OF IS MANAGEMENT ISSUES

We examine the question of relevance of the "IS management issues" studies from two vantage points. First, we examine whether the information presented in these studies is "new" or is readily available elsewhere. Can available IS literature pro-vide this information? Second, we examine one of the stated goals of these studies. These studies state that IS executives, vendors, professional societies, consultants, educators, and researchers need to be aware of IS executives' key concerns to serve their markets effectively (Brancheau et al., 1996; Niederman et al., 1991). Of these, the output of educators, researchers, IS management, and to some degree consultants, is reflected in IS publications. We can examine IS publications to determine if the IS management studies are serving their intended purpose. Once again, we use the Niederman study as the primary focus of our investigation.

Methodology and Data Collection

It is important to note that the Niederman 1991 study was actually conducted in 1989. The time lag between the conduct of the study and its publication is due to the extensive review process undertaken by top academic journals. The issues, obviously, reflect the time at which the study was conducted; thus, the 1991 study represents 1989 issues. We therefore used 1989 as the base year, and conducted an extensive search of MIS literature from the beginning of 1989 to the end of 1994. Because the Niederman study asked IS executives to rate critical IS management issues over the next three to five years, six years of data was adequate for the purpose of comparison.

An exhaustive search of MIS articles appearing in leading MIS journals was conducted using abstracts from the ABI database. Nine journals highly regarded in MIS (Gillenson & Stutz, 1991) were chosen. There were six academic journals: *MIS Quarterly, Management Science, Decision Sciences, Information Systems Research, Information & Management,* and *Journal of MIS;* two practitioner journals: *Harvard Business Review* and *Sloan Management Review;* and a hybrid: *Communications of the ACM.* A massive database containing selected information from 849 abstracts of MIS articles was created. Information captured on each article included: article title, journal name, author name(s), date of publication, and a maximum of three subject areas.

The subject areas or keywords were assigned to each article according to the list of key issues developed in the Niederman et al. (1991) study. The same rationale and definitions used by them were used to assign keywords to the articles. A single article could conceivably cover more than one issue; therefore, each article could be assigned from one to three keywords. A maximum of three keywords proved adequate to classify the articles. Two issues had to be added to accommodate a large group of articles that did not fit any of Niederman's 25 issues: artificial intelligence and expert systems. It is interesting to note that while "artificial intelligence" was dropped from the Niederman study, it was included in all prior key-issue studies.

Several individuals completed the task of assigning keywords to each article. Each abstract was reviewed by at least one person to assign the keywords. When there was some doubt, others in the research team were consulted to arrive at a consensus. Once the database was complete, statistical tabulation procedures were used for data analysis. The primary unit of analysis was the count of the number of articles by subject area by year.

Analysis and Results

Can available literature provide the key IS management issues?

There is not an unequivocal answer to this question. It seems that the literature can identify at least half of the issues reported in the Niederman study. Because their study was published in December 1991, we considered the publications in 1989, 1990, and 1991 for comparing to their study. These publications were available at the time and could have been used for compiling the issues prevalent in the literature. Table 4 provides the rank order of issues as determined by the frequency of articles addressing each issue in the 1989-91 time period.

Note that there is multiple counting of articles as each article could cover up to three issues. For quick comparison, the rank of each issue as determined by Niederman et al. (1991) is also shown.

Table 4: Issues ranked by frequency of appearance in 1989 to 1991 IS publications.

Rank	Issue Name	Niederman Rank
1	Executive/Decision Support Systems	17
2	End-User Computing	18
3	Software Development	9
4	Strategic Planning	3
5	IS Human Resources	4
6	Expert Systems	
7	Competitive Advantage	8
8	IS Effectiveness Measurement	16
9	IS Role and Contribution	11
10	Telecommunication Systems	10
11	Organizational Learning	5
12	IS Organization Alignment	7
13	Security and Control	19
14	Technology Infrastructure	6
15	Electronic Data Interchange	12
16	Organizational Structure	
17	Applications Portfolio	15
18	Technology Islands	
19	IS Asset Accounting	
20	Information Architecture	1
21	Data Resource	2
22	CASE Technology	14
23	Artificial Intelligence	
24	Distributed Systems	13
25	Global Systems	
26	Image Technology	
27	Disaster Recovery	20

In terms of similarities between Table 4 and the Niederman study, five of the top-10 issues identified by Niederman et al. (1991) appear in the top-10 issues addressed by the 1989-91 literature. These are: strategic planning, IS human resources, competitive advantage, software development, and telecommunications. On the other hand, all but two (namely, information architecture and data resource) of the top-10 IS issues in the Niederman study appear in the top-15 list of MIS publications. Thus, there are marked similarities between the Niederman study and the 1989-91 publications.

In terms of differences, three issues that ranked low in the Niederman study, end-user computing, IS effectiveness measurement, and EIS/ DSS, are listed among the top-10 in the MIS publications list. Five of the top-10 issues in the Niederman study fall below the tenth place in the publications list: information architecture, data resource, organizational learning, technology infrastructure, and IS organization alignment. Four of the top-10 issues in the publications list fall below the tenth ranking in the Niederman study: IS role and contribution, IS effectiveness measurement, executive/decision support, and end-user computing. Two new issues in the publications list are "artificial intelligence" and "expert systems"; they were not included by Niederman.

The conclusion follows that more than half of the important issues from the Niederman study can be found by simply examining the literature. We attempted to improve on this proportion by looking at the data in different

ways. We examined academic journals alone, practitioner journals alone, included more journals in the database (additional journals included were *Datamation, IBM Systems Journal, Interfaces,* and *Journal of Systems Management),* and examined the years 1989, 1990, and 1991, individually. In every case, while the ranks of individual issues changed depending on the journals included, the proportion of issues common with Niederman et als' (1991) top issues remained very close to the 50% mark. Thus, to the credit of the key-issues studies, it appears that they are providing some new information that is not readily available in the literature. This may be a worthwhile argument in favor of continuing the key-issues studies. Note, however, that the notion of new information in the key-issues studies is weakened if we consider the higher order factors discussed earlier. Although we did not do a detailed analysis, there was greater commonality between Niederman study results and the publications if factors were considered instead of items.

Do future IS publications reflect the key IS management issues?

The answer to this question will provide information on the usefulness of the key-issue studies and whether they serve their intended purpose. The Niederman study predicted issues three to five years in the future. If predictions were accurate, it would seem that the publications in 1992 to 1994 (three to five years from 1989) should reflect these issues. If not, then either the predictions were inaccurate or future authors were not paying attention to the key issues. In either case, the purpose of the key-issue studies is defeated.

Table 5: Top 15 issues in 1992-1994 publications ranked by frequency of appearance.

Rank	1992-1994	1992	1993	1994
1	Software Development (9)	EIS/DSS	Software development	Software development
2	EIS/DSS (17)	Software development	EIS/DSS	EIS/DSS
3	Expert Systems	IS Human Resources	Telecomm. Systems	Expert Systems
4	IS Human Resources (4)	Expert Systems	Expert Systems	Strategic Planning
5	End-User Computing (18)	End-User Computing	IS Human Resources	IS Human Resources
6	Telecomm. Systems (10)	CASE Technology	IS Role and Contribution	End-User Computing
7	Strategic Planning (3)	Strategic Planning	End-User Computing	Organizational Structure
8	CASE Technology (14)	Telecomm. Systems	Applications Portfolio	Competitive Advantage
9	IS Role and Contribution (11)	Information Architecture	IS Effectiveness	Electronic Data Interchange
10	Information Architecture (1)	Security and Control	Information Architecture	IS Effectiveness
11	IS Effectiveness (16)	Technology Infrastructure	CASE Technology	Organizational Learning
12	Electronic Data Interchange (12)	Distributed Systems	Strategic Planning	Security and Control
13	Security and Control (19)	Electronic Data Interchange	Technology Infrastructure	Information Architecture
14	Organizational Structure	Data Resource	Distributed Systems	Technology Infrastructure
15	Technology Infrastructure (6)	Organizational Learning	Electronic Data Interchange	Artificial Intelligence

Note: Numbers in parentheses in the first column represent the original ranking of the item in the Niederman study.

The second column of Table 5 shows the ranks of the top-15 issues based on frequency of occurrence in 1992 to 1994 publications (the Niederman ranks are shown in parentheses). The top-10 issues in these 1992-94 publications include five of the top-10 Niederman key issues. This is the same level of commonality as was observed when comparing the Niederman key issues with 1989-91 publications. However, since the key issues are claimed to be predictive in nature, we would have expected a greater level of commonality with the 1992-94 publications. In fact, the predictive ability of the key issues shows a further decline when we examine the top-15 issues in the 1992-1994 publications. These 15 issues contain only six of the top-10 Niederman key issues, whereas the top-15 issues from 1989-91 publications contained eight.

A year-by-year comparison of publications provides further insights. As pointed out earlier, journal publications contain an inherent delay from the execution of research. If we assume a one-year delay, then 1992 publications reflect 1991 work, 1993 publications reflect 1992 work, and 1994 publications reflect 1993 work. Given that the key issues predict three to five years in the future, the 1989 Niederman predictions should be better for 1993 and 1994 publications (which are based on 1992 and 1993 work, i.e., three and four years away from 1989), than for 1992 publications (which are based on 1991 work, two years away from 1989). The year-by-year comparison is also included in Table 5. In 1992, there are five matches between the top-10 published issues and

the top-10 Niederman issues. In both 1993 and 1994, this number reduces to four. Comparing the top-15 published issues with the top-10 Niederman issues, the matches are eight, six, and seven for years 1992, 1993, and 1994, respectively. Thus, the predictive ability of the key issues does not seem to hold. If anything, the predictive quality of the Niederman study deteriorated in the third and fourth years.

What do the key IS management issues represent?

Given the above analysis and discussion, it appears that the key IS management issues published periodically in leading MIS journals represent more of the prevalent issues and less of the issues of the future. In fact, we made similar observations when examining the previous key IS management issues study published in 1987 (Brancheau & Wetherbe, 1987). In other words, they cannot be relied upon as being leading indicators of key IS issues. At best, they are current indicators. At the other extreme, in some cases, they may even be lagging indicators.

We present some anecdotal evidence of the "lagging" nature of the key issues. 'The topic of "business process reengineering/redesign" (BPR) has enjoyed much attention in the IS press in the last six years. The two landmark articles on this subject were published in 1990 (Davenport & Short, 1990; Hammer, 1990). Since then, there has been a widespread interest in BPR and a number of articles have been published. The landmark articles were published very close to 1989, when Niederman et al. (1991) conducted their study, yet the respondents failed to identify this issue. However, the most recent key-issues study conducted in 1994- 95 and published in 1996 (Brancheau et al., 1996) ranks BPR as the second most important issue. Clearly, a three to five year lag is indicated. Another example of an issue that has not appeared in any of the key issues study (including the latest 1994-95 study) is "Internet and electronic commerce." The Internet/information super highway (Kettinger, 1994) has revolutionized the global communication of information and has given rise to new forms of trade and commerce (Ellsworth & Ellsworth, 1994). If the key issue studies were futuristic, at least the 1994-95 study should have predicted "Internet and electronic commerce" as an important issue. We contend that if the key-issue study was conducted today, the Internet and electronic commerce would appear as an important IS management issue.

The above discussion also points to the nature of MIS research. In order to be useful, it needs to be responsive to the business community. Is MIS research responsive or is it reactive? Is it visionary or is it lagging? MIS research has been criticized in practitioner circles for its reactive nature, and our analysis seems to support that. Key issues are claimed to be futuristic by their authors. But if future issues are not properly identified, the research itself may be misled. While there is decidedly some value from reactionary research, much greater value is derived from research that meets the current and future needs of MIS professionals. The following quote from the reviewer of an earlier version of this article highlights our concern:

> [T]he 'armchair' approach to issue identification misses the boat on futuristic issues. That IT has been advancing at a revolutionary rate is, of course, the empty excuse to rationalize this failing. True visionaries can and do see beyond the "gadget of the week" and are able to offer key issue predictions and the associated rationale for the predictions.

CONCLUSIONS AND IMPLICATIONS

In this article we have raised some concerns about the series of "key IS management issues" that are published in leading MIS journals every few years. We did not question the methodology or the accuracy of the results; we assumed that they are fairly well-conducted studies. Our first concern is about the manner in which the results are reported. By ignoring the factor structure among the issues, an unsuspecting reader may be misled. Fortunately, this problem can be easily corrected, and we have provided appropriate suggestions.

The "relevance" question is a more serious concern. We were able to demonstrate that many key issues are lagging or at best current. Both authors and editors must address this concern squarely. The authors must provide evidence of the usefulness of their results in specific and identifiable terms. They should clearly indicate whether their results are leading, current, or lagging indicators. And if the results are lagging or current

indicators, they must specify their "contribution" and tell readers why they cannot obtain the information elsewhere. The editors and reviewers in turn must make sure that the authors address these concerns.

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