

Key Issues in Information Systems Management Surveys: Methodological Issues and Choices in a Norwegian Context

Petter Gottschalk¹, Bo Hjort Christensen¹ and Richard T. Watson²

¹ Department of Information Management,
Norwegian School of Management,
petter.gottschalk@bi.no,
bo.h.christensen@bi.no

² Department of Management,
Terry College of Business,
University of Georgia,
rwatson@blaze.cba.uga.edu

ABSTRACT

Information systems (IS) departments face many challenges in today's rapidly changing environment. One approach to understanding the challenges faced by IS departments is to survey IS managers to elicit what they consider are key issues. Key issues in IS management surveys have been conducted for many years in many nations and regions. However, most of these surveys lack a theoretical basis for the selection of key issues. Furthermore, most studies have used a multi-round Delphi method. Recently, the analysis of key issues in IS management has been extended by a multimethod approach using Q methodology and interpretive structural modeling. This paper provides an overview of research approaches to key issues studies combined with results from previous research. The paper presents methodological issues and choices for a planned survey on key issues in IS management in Norway in 1999. A three step procedure for key issues selection is introduced, and a multimethod approach for analysis is adopted. Since this research is at an early stage, the paper primarily serves as a basis for discussion and feedback to improve the quality of the proposed study.

INTRODUCTION

Information systems (IS) departments face many challenges in today's rapidly changing environment. One approach to understanding the challenges faced by IS departments is to survey IS managers to elicit what they consider are key issues (Watson et al., 1997). According to Niederman et al. (1991), the primary purpose of such studies is to determine:

- Which IS management issues are expected to be most important over the next three to five years and thus most deserving of time and resource investment.
- How much consensus exists about the relative importance of specific issues.
- Why some issues deserve more attention than others.

IS vendors, professional societies, consultants, educators, and researchers need to be aware of IS executives' key concerns to serve their markets effectively (Niederman et al., 1991, p. 476):

Vendors can use this information to develop and market products and services. Professional societies can use this information to plan conferences and seminars as well as disseminate knowledge through their publications. Consultants can use this information to help accelerate the transfer of technology and management skills among their clients. Educators can use this information to develop programs and place their graduates. Finally, researchers can use this information to guide their inquiry and improve understanding of critical managerial issues. Thus, the entire IS community needs to be aware of the issues that are judged to be of critical concern by its leading practitioners.

Key issues in IS management surveys have been conducted for many years in many nations and regions. However, most key issues surveys lack a theoretical basis for the selection of key issues (Watson et al., 1997). Furthermore, most surveys have used only the Delphi technique in multiple rounds (e.g.; Watson, 1989; Brancheau et al., 1996). Recently, the analysis of key issues in IS management has been extended by a multimethod approach using Q methodology and interpretive structural modeling (e.g.; Morgado et al., 1995, 1998). This paper provides an overview of research approaches to key issues studies combined with results from previous work. The paper presents methodological issues and choices for a planned survey on key issues in IS management in Norway in 1999. Since this research is at an early stage, the paper primarily serves as a basis for discussion and feedback to improve the quality of the proposed study.

LITERATURE REVIEW

Over the past two decades, the US Society for Information Management (SIM) has periodically surveyed its members to determine the most critical issues in IS management (Brancheau et al., 1996). Surveys were conducted in 1980, 1983, 1986, 1990 and 1994-95, representing a valuable resource for key issues insights in a time perspective. These SIM studies have had a significant influence on key issues studies in other countries (e.g., Dekleva and Zupancic, 1996; Wang, 1994). IS key issues studies have been conducted in Australia 1993, Canada 1995, Costa Rica 1997, Estonia 1993, Europe 1993, Guatemala 1997, the Gulf Cooperation Council 1992, Hong Kong 1993, India 1992, Indonesia 1996, Poland 1994, the Republic of China (Taiwan) 1990, Slovenia 1993, South Korea 1995, and the United Kingdom 1993 (Watson et al., 1997). A Website (<http://www.cba.uga.edu/iris/>) has been established to report details of key issues studies.

The results of two recent key issues in IS management studies are now considered. The first study listed in table 1 is the most recent US SIM study (Brancheau et al., 1996), while the second study listed in table 2 is the result of an international comparison of several key issues studies (Watson et al., 1997).

Table 1: US SIM Issues in IS Management (Brancheau et al., 1996)

Rank	US SIM Issue
1	Building a responsive IT infrastructure
2	Facilitating and managing business process redesign
3	Developing and managing distributed systems
4	Developing and implementing an information architecture
5	Planning and managing communication networks
6	Improving the effectiveness of software development
7	Making effective use of the data resource
8	Recruiting and developing IS human resources
9	Aligning the IS Organization within the enterprise
10	Improving IS strategic planning

While table 1 is based on a survey in the United States in 1994-95, table 2 is based on surveys in eleven nations and regions in 1988-92. Six issues are present in both lists: strategic planning,

alignment, information architecture, data resources, human resources and software development. The top three issues in the US SIM study are not present on the international list at all: infrastructure, business process redesign and distributed systems. In a time perspective, eight out of ten issues in the 1994-95 US SIM study were present in the top ten list from 1990 (Niederman et al., 1991). The two new issues emerging from 1990 to 1994-95 were business process redesign and distributed systems.

Table 2: International Issues in IS Management (Watson et al., 1997)

Rank	International Issue
1	Strategic planning
2	IS organizational alignment
3	Information architecture
3	Competitive advantage
3	Data as a resource
3	Human resources
3	Security and control
8	Integrating technology
9	Software development
9	IS's role and contribution

Most key issues studies are primarily concerned with issues facing information systems managers in the private sector. Although the IS community may share a common set of concerns across private and public organisations, more can be learned by identifying issues in different sectors. For example, Swain et al. (1995) identified key issues in public management information systems as listed in table 3.

Table 3: Issues Ranking by Public IS Managers (Swain et al., 1995)

Rank	US Public Issue
1	Planning strategically for IS
2	Increasing understanding of the role & contribution of IS
3	Planning and managing applications
4	Encouraging end-user computing
5	Making effective use of data as an agency resource
6	Planning and implementing a communications system
7	Training agency personnel in use of IS technology
8	Educating agency managers about IS capability
9	Integrating processing, automation and communications
10	Improving the quality of systems development

The studies listed in tables 1, 2 and 3 were selected from the large number of key issues studies because they seem to be representative of the mainstream key issues research. Only three issues are present in all three lists: strategic planning, data resources and software development. A description of these issues is provided in table 4 based on Brancheau et al. (1996).

Table 4: Key Issues in All Studies**Improving IS Strategic Planning**

It has always been important to align long-range IS planning with strategic business plans. Rapidly changing business environments, increased involvement of end users, and accelerated technological change underscore the need to continue improving strategic planning skills.

Making Effective Use of the Data Resource

The organisation's data resource is growing in size, complexity, and value. Despite this, it remains largely unrecognised, inaccessible, and underutilised. IS must develop a climate within its department and throughout the organisation which values the data resource as a corporate asset.

Improving the Effectiveness of Software Development

The application development backlog remains at unacceptably high levels. Traditional development methods and platforms are no longer satisfactory. New methods and platforms have not yet proven themselves. Sophisticated users are getting impatient. Improved effectiveness will be essential for next-generation applications.

This research is concerned with key issues selection procedure and key issues survey approach: it is assumed that the ranking results of the studies presented above were influenced by selection procedure and survey approach (Watson et al., 1997). The most common selection procedure is to start with an old key issues list and let it be revised in multiple survey rounds (e.g., Brancheau et al., 1996). Few studies start from scratch by asking respondents to specify issues which they think will be key issues (e.g., Dekleva and Zupanic, 1996). This paper argues that key issues selections should be based on theory (Watson et al., 1997). The most common survey approach is the Delphi technique (e.g., Niederman et al., 1991). Few studies apply other methods (e.g., Morgado et al., 1995, 1998). This paper argues that key issues surveys should be extended by multiple techniques to gain insights into the relationships among key issues which can influence the final ranking.

KEY ISSUES SELECTION

Some key issues appear to emerge quickly. The sudden prominence of business process redesign in table 1, for example, indicates that IS managers may be too willing to respond to a current hot topic, and their attention may be too easily diverted from fundamental, long-term issues (Watson et al., 1997). If asked today, many Norwegian IS managers would probably rank "Year 2000" as a key issue. The Year 2000 issue is, however, both a short-term problem and an issue which is part of a bigger problem of maintaining software. Hence, the selection of key issues for survey research is associated with several problems (Watson et al., 1997) as listed in table 5.

Table 5: Key Issues Selection Problems

Problem	Description
Time	Key issues change over time, critical issues in the early 1990s differ from critical issues in the late 1990s. Therefore, the use of previous key issues lists in new surveys has limitations.
Fashion	The IS profession is notable for its fashion swings. In the last few years the hot topics have included outsourcing, business process redesign and Internet.
Events	Certain events strongly influence ranking, for example the Year 2000 issue.
Overlaps	Some issues are not defined properly to avoid overlap with other issue(s).
Granularity	While some issues refer to broad general problems, other issues refer to more narrow and specific concerns.
Theory	Application of theory is lacking in key issues selection.
Clarity	Some issues are not formulated and communicated properly to understand the contents of the issues.
Causality	Some issues might, although ranked as unimportant, represent important drivers of other key issues. For example, recruiting and developing IS human resources might be an important driver of building an IT architecture.

The lack of theory is a major concern. Watson et al. (1997) suggest that a sufficiently relevant theoretical model, on which to base a new key issues framework, should be identified. They discuss role theory, managerial IS competencies and general management practices as “redesign” approaches to potential new key issues frameworks (Watson et al., 1977, p. 111):

Advantages of the “redesign” approach include the possibility that the framework be complete, consistent, parsimonious, and both regionally and temporally stable. Disadvantages include the lack of continuity with previous studies and the danger that the issues might become so abstract that they would cease to have meaning to IS managers and executives, thus breaking an important link to practice.

Niederman et al. (1991) made a theoretical contribution by classifying key issues along three dimensions and categorising them into four groups. The three dimensions were management issues versus technology issues (M/T), planning issues versus control issues (P/C) and internal issues versus external issues (I/E). The four groups consisted of:

- **Business relationship:** These issues deal with concerns external to the IS department. They focus on managing the relationship between IS and the business. The group included data resources, strategic planning, organisational learning, IS organisation alignment and competitive advantage.
- **Technology infrastructure:** These issues deal with technology concerns. They focus on the integration of technology components to support basic business needs. The group included information architecture, technology infrastructure, telecommunications systems, distributed systems, and electronic data interchange.
- **Internal effectiveness:** These issues focus internally on the IS function. They are concerned with those essential activities comprising the bulk of the IS function’s work. The group included human resources, software development, applications portfolio and IS effectiveness measurement.
- **Technology application:** These issues focus on the business application of specific information technologies. The group included CASE technology, executive/decision support, end-user computing and image technology.

In this research, the selection of key issues will follow a three step procedure. Firstly, the US SIM issues (Brancheau et al., 1996) will be mapped to dimensions and categories as illustrated in table 6. The table can be used to identify both potentially missing issues and potentially

overlapping issues. For example, there are no business relationship issues involving technology while there are four business relationship issues involving management-control-external. Then, the SIM issues will be generalised using the dimensions and categories. Finally, issues will be added and modified to minimise the effects of problems listed in table 5.

Table 6: US SIM Issues by Dimensions and Categories

DIMENSIONS/ CATEGORIES	Key Issues in IS Management 1994-95 SIM Delphi Results	M/T		P/C		I/E	
		M	T	P	C	I	E
Business relationship	Business Process Redesign	2			2		2
	Data Resources	7			7		7
	IS Organization Alignment	9			9		9
	IS Strategic Planning	10		10			10
	IS Role & Contribution	13		13			13
	Organizational Learning	14			14		14
	Competitive Advantage	17		17			17
Technology infrastructure	Responsive IT infrastructure		1		1	1	
	Distributed Systems		3		3		3
	Information Architecture		4	4		4	
	Communication Networks		5		5		5
	MultiVendor Open Systems		18		18	18	
	Electronic Data Interchange		19		19		19
Internal effectiveness	Software Development		6		6	6	
	IS Human Resources	8			8	8	
	IS Effectiveness Measurement	11			11	11	
	Legacy Applications		15		15	15	
	Outsourcing	20			20		20
Tehnology application	Collaborative Systems		11		11		11
	End-User Computing	16			16		16

Note: In table 1, the top ten key issues from the US SIM study were listed. In this table, the top twenty key issues from the same study are listed. Dimensions and categories are the same as in Brancheau et al. (1996, Appendix D). The numbers in the columns are the ranks of the key issues. This table can be used to identify both potentially missing issues and potentially overlapping issues. A total of 32 different issues are possible in this matrix by combining four categories with three double dimensions. Several potentially missing issues can be identified. For example, there are no business relationship issues involving technology. Several potentially overlapping issues can be identified. For example, there are four business relationship issues involving management-control-external.

KEY ISSUES SURVEY

The dominating survey approach of key issues in IS management studies is the Delphi method. The Delphi method uses a series of questionnaires (Brancheau et al., 1996, p. 226):

Essentially, the Delphi method employs a series of linked questionnaires. Successive rounds of questionnaires summarize subjects' responses to the preceding questionnaire and ask respondents to re-evaluate their opinions based upon the summarized results. Questionnaire rounds are continued until a reasonable level of consensus is achieved.

The Delphi technique represents a methodology for organising and prioritising the collective judgement of a group through iterative surveying of the same group. The initial procedure is to prepare, distribute, and synthesize a series of issues for evaluation. Participants receive feedback in the form of their own previous responses and data describing the entire group. This enables participants to reaffirm original opinions, modify some and add new issues to the list. It is

believed that the technique leads to consensus (Dekleva and Zupancic, 1996). However, the Delphi survey approach is associated with problems (Morgado et al., 1998) as listed in table 7.

Table 7: Delphi Survey Problems

Problem	Description
Consensus	Reported consensus in Delphi studies is somewhat illusory. Rather, what is reported traditionally is not consensus, but possibly an aggregation of concerns that are quite different for disparate groups of respondents.
Interaction	Independent consideration of key issues disregards interaction between issues. For example, an unimportant issue might be an important driver for a key issue.
Theory	Application of theory is lacking in key issues modifications.
Difference	Differences in rating scores are low, i.e. the full potential of scales is not utilised. For example, while a scale from 1 to 10 is provided, the highest rated issue achieves 9.10 and the lowest rated issue achieves 5.40 in the 20 key issues list in Brancheau et al. (1996).

Morgado et al. (1998) suggest extending the analysis of key issues in information systems management by demonstrating two techniques that may provide greater insight into the concerns of IS managers than the traditional rating method used by most recent key issues studies. Their research used Q-sort (Brown, 1980, 1993) and interpretive structural modeling (ISM) (Warfield, 1994) based on a survey of banks in Brazil (Morgado et al., 1998, p. 3):

These approaches allowed us and the participating IT managers to gain a deeper understanding of the relationships among the key issues. A factor analysis on the Q-sort data identified three groups of banks with similar IT situations and strategies, and led to the conclusion that key issues can vary considerably among respondents. Application of ISM resulted in a revision of IT managers’ perceived priorities and proved to be a significant contribution to their understanding of their key concerns.

The use of Q-sort to rank the key issues, followed by a factor analysis to identify three types of IS units in Brazilian banks, provided for more detailed dissection of key issues. The analysis highlighted that the consensus reported by the traditional key issues approach is somewhat illusory. The use of ISM provided a deeper understanding of the relationships among the key issues as shown in figure 1 based on Morgado et al. (1998). ISM forces IS managers and researchers to move beyond the independent consideration of key issues to evaluation of how issues interact.

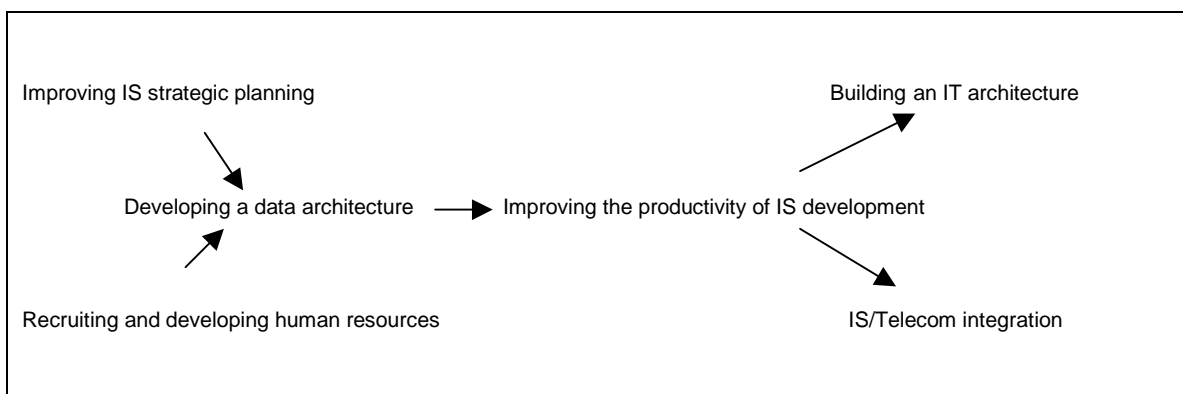


Figure 1: ISM Diagram

METHODOLOGICAL CHOICES

In this research, the survey approach will follow a three step procedure as suggested by Morgado et al. (1998):

- **Questionnaire preparation:** The set of key issues selected on a theoretical basis as discussed in the key issues selection section of this paper, will be submitted in a series of meetings to IT managers in Norway. This group will add issues and require revision of the explanations for some other issues in order to adapt them to the local Norwegian conditions. Furthermore, complete instructions for using Q-sort for this list of key issues will be added and tested. (A Web-site has been established [<http://www.rz.unibw-muenchen.de/~p41bsmk/qmetod/>] about Q methodology.)
- **The survey:** The Q-sort material will be sent to IT managers in Norway based on the corporate membership list of the Norwegian Computing Society as applied by Gottschalk (1998) in a different survey. The results of the Q-sort will be factor analysed to identify homogeneous groups of respondents and patterns of management concern or focus.
- **ISM workshop:** A group of IT managers, who participated in the survey, will be invited to a meeting to discuss the results of the survey and to participate in a session to review and structure the top ten key issues of the survey.

Q-methodology is a qualitative and quantitative way of gathering and processing data (in this case key issues) that requires participants to perform a ranking task. By requiring the participants to sort statements into a forced quasi-normal distribution, many of the problems associated with questionnaires (e.g., central tendency, leniency) can be avoided (Kendall and Kendall, 1993). In this research, respondents might be asked to sort 25 key issues into nine piles as illustrated in figure 2. Only one issue can be placed in the most important (4) and most unimportant (-4) positions, while five issues can be placed in the middle position. One of the main assumptions of Q-methodology is that taken together, all of the issues used in the Q-sort represent the possible domain of opinion on the topic existing in the organisation (Kendall and Kendall, 1993). In this research, that means that the issues identified initially require theory to represent the possible domain of opinions about key issues. The methodological choices discussed above are illustrated in figure 3.

-4	-3	-2	-1	0	1	2	3	4
X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	
		X	X	X	X	X		
			X	X	X			
				X				

Figure 2: Q-sort Representing Key Issues

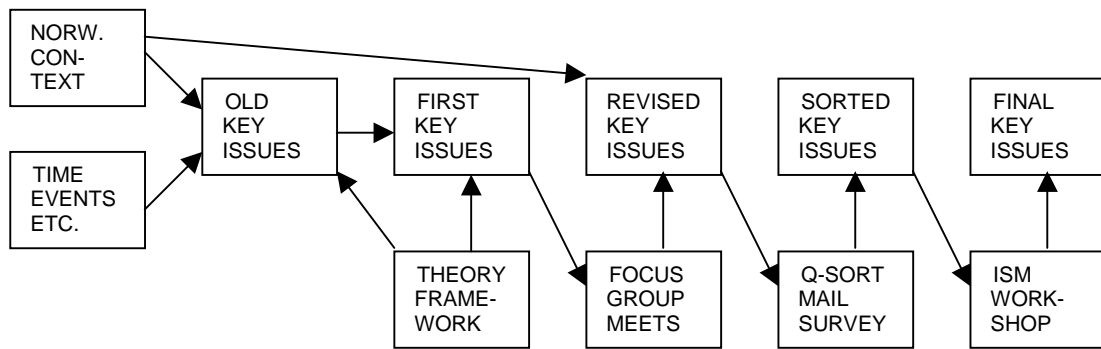


Figure 3: Planned Key Issues Research Approach

The Norwegian context illustrated in figure 3 has to be addressed. This context is of importance both in the key issues selection process and in the key issues revision process, as well as in comparisons of results with studies from other nations. Previous key issues studies have primarily addressed the context after survey completion for comparison of results. One important context element is organisation size. Wang (1994) found that size, measured in total IS budget, number of total employees and number of IS staff, has a significant influence on the relative importance of IS management issues. Disregarding the context element of organisation size implies that surveys in nations with large organisations like the USA may contain the same initial key issues list as surveys in nations with small organisations like Norway. Other important context elements include national culture, economic structure, political/legal environment and technological status (Watson et al., 1997). Disregarding the context element of, for example, economic development implies that surveys in nations with developed economies like Australia, Norway and the United Kingdom may contain the same initial key issues list as surveys in nations with developing economies such as India, Slovenia and Taiwan. Hence, in the planned key issues survey in Norway, contextual considerations will influence both the initial key issues selection and the key issues revision, in addition to comparisons of results.

CONCLUSIONS

To provide greater insight into key issues in IS management in Norway, this research will select key issues on a theoretical basis and then conduct a multimethod study including Q-sort and ISM. However, this research is at an early stage making the paper serve primarily as a basis for discussion and feedback valuable for future research: What theories should be used to derive a set of key issues? Is the Niederman et al. (1991) classification appropriate? How serious are the major concerns with the current Delphi survey methodology? The empirical study of key issues in Norway is planned for 1999.

REFERENCES

Brancheau, J.C.; Janz, B.D. and Wetherbe, J.C., 1996. "Key Issues in Information Systems Management: 1994-95 SIM Delphi Results", *MIS Quarterly*, Vol. 20 (2), pp. 225-242.

Brown, S.R., 1980. *Political Subjectivity: Applications of Q Methodology in Political Science*. New Haven, CT, USA: Yale University Press.

- Brown, S.R., 1993. "A primer on Q methodology", Operant Subjectivity, Vol. 16, pp. 91-138.
- Dekleva, S. and Zupancic, J., 1996. "Key issues in information systems management: a Delphi study in Slovenia", Information & Management, Vol. 31, pp. 1-11.
- Gottschalk, P., 1998. Content characteristics of formal information technology strategy as implementation predictors. Oslo, Norway: Tano Aschehoug.
- Kendall, J.E. and Kendall, K.E., 1993. "Metaphors and Methodologies: Living Beyond the Systems Machine", MIS Quarterly, 17 (3), pp. 149-171.
- Morgado, E.M.; Reinhard, N. and Watson, R.T., 1995. "Extending the analysis of key issues in information technology management", Proceedings of the sixteenth International Conference on Information Systems, Amsterdam, Netherlands, December, pp. 13-16.
- Morgado, E.M.; Reinhard, N. and Watson, R.T., 1998. Adding value to key issues research. Athens, GA, USA: University of Georgia Working Paper.
- Niederman, F.; Brancheau, J.C. and Wetherbe, J.C., 1991. "Information Systems Management Issues for the 1990s", MIS Quarterly, Vol. 17 (4), pp. 475-500.
- Swan, J.W.; White, J.D. and Hubbert, E.D., 1995. "Issues in Public Management Information Systems", American Review of Public Administration, Vol. 25 (3), pp. 279-296.
- Wang, P., 1994. "Information systems management issues in the Republic of China for the 1990s", Information & Management, Vol. 26, pp. 341-352.
- Warfield, J., 1994. A prism handbook. Ottawa, Ontario, Canada: Saunders Consulting Group.
- Watson, R.T., 1989. "Key Issues in information systems management: An Australian perspective – 1988", The Australian Computer Journal, Vol. 21 (2), pp. 118-129.
- Watson, R.T.; Kelly, G.G.; Galliers, R.D. and Brancheau, J.C., 1997. "Key Issues in Information Systems Management: An International Perspective", Journal of Management Information Systems, Vol. 13 (4), pp. 91-115.
- .