Key Issues in IS Management in Norway: An Empirical Study Based on Q Methodology

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Information systems (IS) departments face many challenges in today's rapidly changing environment. One approach to understanding these challenges is to survey IS managers to elicit what they consider are key issues. Studies of key IS management issues have been conducted for some 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 single-round or a multi-round Delphi method. This paper provides an overview of research approaches to key issues studies combined with key issues results from previous research. The paper presents methodological issues and choices for a survey on key issues in IS management which was conducted in Norway. A three step procedure for key issues selection is introduced, and a Q-sort analysis is adopted. The paper presents results from the Q-sort survey and analysis. The highest ranked key issue in Norway, according to the survey, is concerned with improving links between information systems strategy and business strategy.

INTRODUCTION

Information systems (IS) departments face many challenges in today's rapidly changing environment. One approach to understanding these challenges is to survey IS managers to elicit what they consider are key issues. According to Niederman et al. (1991), the primary purpose of such studies is to determine the IS management issues expected to be most important over the next three to five years and thus most deserving of time and resource investment.

This paper provides an overview of research approaches to key issues studies and presents methodological issues and choices for a survey on key issues in IS management which was conducted in Norway in 1998. A three step procedure for key issues selection is introduced, and a Q-method analysis is adopted. Finally, the paper presents results from the Q-sort survey and analysis.

LITERATURE REVIEW

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. The most common selection procedure is to start with an old key issues list and let it be revised in multiple survey rounds as shown in Table 1. Some studies start from scratch by asking respondents to specify issues that they think will be key issues. The most common survey approach is the Delphi technique as shown in Table 1. Some studies apply other methods. This research applies Q-sort that already has been used in Brazil by Morgado et al. (1995, 1999).

KEY ISSUES SELECTION

Some key issues appear to emerge quickly. The sudden prominence of business process redesign in many recent studies (e.g., Brancheau et al., 1996), 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. If asked in 1998, many Norwegian IS managers would probably rank "Year 2000" as a key issue. The Year 2000 issue was, however, both a short-term problem and an issue that is part of the larger problem of maintaining software. Hence, the selection of key issues for survey research is associated with several problems as listed in Table 2.

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" ap-

proaches to potential new key issues frameworks (Watson et al., 1997, 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 categorizing them into four groups. The three dimensions are management versus technology issues (M/T), planning versus control issues (P/C), and internal versus external issues (I/E). The four groups consist 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 includes data resources, strategic planning, organizational learning, IS organization 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 includes 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 includes 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 includes CASE technology, executive/decision support, and end-user computing and image technology.

Table 1: Comparison of Methodological Choices in Key Issues Studies

Study	Key Issues Selection			Key Issues Survey		
	List	New	Method	Respondents	Score	Nation
Badri (1992)	Old	No	1 round	CIOs	Rate	Gulf nations
Brancheau et al. (1996)	Old	Yes	Delphi 3 rounds	SIM members	Rate	USA
Burn et al. (1993)	Old	Yes	Delphi 3 rounds	Managers	Rate	Hong Kong
CSC (1998)	Old	No	Survey 1 round	IS executives	Rate	USA, Europe, Asia/Pacific
Deans et al. (1991)	Old	Yes	Survey and Interview	MIS managers	Rate	USA
Dekleva and Zupancic (1996)	New	Yes	Delphi 4 rounds	IS managers	Rate	Slovenia
Dexter et al. (1993)	New	Yes	Delphi 3 rounds	IT managers	Rate	Estonia
Galliers et al. (1994)	New	No	Delphi 1 round	Executives	Rate	UK
Harrison and Farn (1990)	Old	No	Survey 1 round	Professionals	Rate	USA Taiwan
Kim et al. (1999)	New	No	Survey 1 round	IS practitioners	Rate	USA
Mata and Fuerst (1997)	Old	Yes	Survey 1 round	IS managers	Rate	Costa Rica Guatemala
Morgado et al. (1995, 1999)	Old	Yes	Q-sort ISM	IT managers	Rank	Brazil
Moores (1996)	Old	No	Delphi 1 round	MIS managers	Rate	Hong Kong
Olsen et al. (1998)	Old	No	Delphi 1 round	IT managers	Rate	Norway
Palvia and Palvia (1992)	Open	Yes	Seminar	Managers	Rate	India
Pervan (1993)	New	Yes	Delphi 3 rounds	IS managers	Rate	Australia
Pollard and Hayne (1996)	Old	Yes	Delphi 2 rounds	IS personnel	Rate	Canada
Swain et al (1995)	Old	Yes	Delphi 1 round	Information manager	Rate	USA
Usman and Stein (1999)	Old	No	Delphi 1 round	IS managers	Rate	Australia
Wang (1994)	Old	No	Delphi 1 round	IT manager	Rate	Taiwan
Wrycza and Plata-Przechlewski (1994)	Old	No	Survey 1 round	Seminar participants	Rate	Poland
This study	New	Yes	Q-sort	CIOs	Rank	Norway

However, classifying issues into dimensions and categories is a challenging task (Smith, 1995). In Table 3, the latest US SIM classification is listed.

Table 3 can be used to identify both potentially missing and overlapping issues. For example, there are no business relationship issues involving technology, and there are four business relationship issues involving management-control-external. This analysis shows that there are essentially 32 different issues, which are generated by crossing the four categories with the three binary measures (i.e., M/T, P/C, I/E).

Table 2: Key Issues Selection Problems

Problem	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 the Internet.
Events	Certain events strongly influence ranking, for example the Year 2000 issue.
Overlaps	Some issues are not defined properly and overlap with other issues.
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 enable respondents 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.
Reliability	Interrater reliability measures the consistency by which issues are assigned to categories and dimensions. A test of five faculty members at the Norwegian School of Management resulted in a low interrater reliability for the latest US SIM issues.

The importance of each of the four categories in Table 3 can either be determined by the relative number of issues in the category or by the median ranking of the issues in the category. The table is sorted according to the number of issues in each category. If the median ranking is applied, then technology infrastructure has the median rank of 4.5 (1, 3, 4, 5, 18, 19), followed by business relationships 10, internal effectiveness 11 and technology application 13.5. Rankings are ordinal data, and it would be incorrect to compute an average. The correct measure of central tendency is the median.

KEY ISSUES SURVEY

The dominant approach to key issues research is the Delphi method, which uses 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 prior results. The process is continued until a reasonable level of consensus is achieved (Brancheau et al., 1996). However, the Delphi survey approach has some problems as listed in Table 4.

Q METHODOLOGY

Morgado et al. (1999) suggest extending the analysis of key issues by demonstrating two techniques that might provide greater insight into the concerns of IS managers than the

Table 3: US SIM Issues Classified by Categories and Dimensions

CATEGORIES	SIM KEY ISSUES	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
	Multi Vendor Open Systems		18		18	18	
	Electronic Data Interchange		19		19		19
Internal effectiveness	Software Development				6	6	
	IS Human Resources	8			8	8	
	IS Effectiveness Measurement	11			11	11	
	Legacy Applications		15		15	15	
	Outsourcing	20			20		20
Technology application	Collaborative Systems		11		11		11
	End-User Computing	16			16		16

Note: The numbers in the columns are the ranks of the key issues from the SIM study. For example, the issue "Responsive IT infrastructure" was ranked first, belonging in this table to "Technology infrastructure" with the dimensions technology "T", control "C" and internal "I".

Table 4: Delphi Survey Problems

Problem	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 (Hart et al., 1985).
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 utilized. 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).

traditional rating method used by most recent studies. They used Q-sort (Brown, 1993, 1996) and interpretive structured modeling (ISM) (Warfield, 1991) in a survey of Brazilian banks (Morgado et al., 1999, p. 4):

Q-sort (Stephenson, 1953) and interpretive structural modeling (ISM) (Warfield, 1976) allow researchers and participating IT managers to gain a deeper understanding of the relationships among key issues. A factor analysis of Q-sort data can potentially identify groups of IT managers with similar problems. Studies using a rating scale tend not to categorize managers and thus imply that key issues are homogeneous across IT managers. Clearly, this may not always be the case.

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 (Brown, 1996). 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).

The issue of ranking versus rating has to be addressed. While previous studies mainly did rating, Q methodology applies ranking. Niederman et al. (1991) asked participants to rate, rather than rank, since rating may seem less taxing mentally because issues can be evaluated one at a time rather than requiring simultaneous consideration of all issues. The main shortcomings of rating are the lack of scale use and the indifference among issues. While the scale in most rating studies ranges from 1 to 10, the range of results is less than half of the scale. For example, while the top issue in Brancheau et al. (1996) got a rating of 9.10 on average, the bottom issue got 5.40. These close ratings cause indifference among issues. Ranking forces all re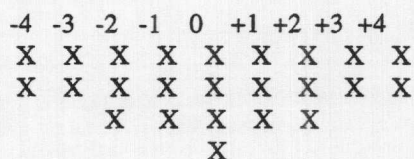spondents to utilize the complete scale as illustrated in Figure 1 where 24 issues are allocated to 24 available spaces from +4 to -4 in a quasi-normal distribution.

Only two issues can be placed in the most important (+4) and most unimportant (-4) positions, while four 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 organization (Kendall and Kendall, 1993). In our research, this implies that the issues identified initially require theory to represent the possible domain of opinions about key issues. This was accomplished by covering all combinations of categories and dimensions as defined by Niederman et al. (1991).

INITIAL SELECTION

The Norwegian context 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 organization 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 organization size implies that surveys in nations with large organizations like the USA may contain the same initial key issues list as surveys in nations with small organizations like Norway. Watson et al. (1997) suggest that context elements should include national culture, economic structure, political/legal environment and technological status. Disregarding context elements of, for example, economic development implies that surveys in nations with developed economies (Mata and Fuerst, 1997) like Australia, Norway and the United States may contain the same initial key issues list as surveys in nations with developing economies such as Costa Rica, India and Slovenia. Burns et al. (1993) addressed the context and dropped five US SIM issues before their Hong Kong survey was conducted.

Figure 1: Q-sort for Key Issues Survey

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-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
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Old key issues were derived from the most recent US SIM study (Brancheau et al., 1996) and a recent Norwegian study which adopted the US SIM study results (Olsen et al., 1998). Ideas from Norwegian CIOs were obtained through a

Table 5: Structured Sample of Key Issues for a Q-sort

C	D	Key Issue	Sources	#
BR	MPI	NA: BR only external	NA: BR only external	
BR	MPE	Improving Links between Information Systems Strategy and Business Strategy	Expanded from Olsen et al. (1998) and Brancheau et al. (1996), and suggested by CIO; also found in general MIS literature (e.g., Ward and Griffiths, 1996; Robson, 1997)	1
BR	MCI	NA: BR only external	NA: BR only external	
BR	MCE	Making Effective Use of Data and Information Systems Resources	Expanded from Olsen et al. (1998) and Brancheau et al. (1996)	2
BR	TPI	NA: BR only external	NA: BR only external	
BR	TPE	Improving Interorganizational Information Systems Planning	Norwegian context: Most organizations are small and cooperative	3
BR	TCI	NA: BR only external	NA: BR only external	
BR	TCE	Improving Control, Security and Recovery Capabilities	Two low-ranked issues combined from Brancheau et al. (1996)	4
TI	MPI	Improving Information Technology Infrastructure Planning	Expanded from Olsen et al. (1998) and Brancheau et al. (1996)	5
TI	MPE	Planning Information Technology Projects for Competitive Advantage	Adapted from Olsen et al. (1998) and Brancheau et al. (1996)	6
TI	MCI	Managing the Technical Foundation of Information Systems	General MIS literature (e.g., Laudon and Laudon, 1998)	7
TI	MCE	Improving Availability of National and International Networks	Adapted from Dekleva and Zupancic (1996)	8
TI	TPI	Developing and Implementing an Information Architecture	Adopted from Olsen et al. (1998) and Brancheau et al. (1996)	9
TI	TPE	Planning Information Technology for Electronic Commerce	General MIS literature (e.g., Laudon and Laudon, 1998)	10
TI	TCI	Controlling a Responsive Information Technology Infrastructure	Adapted from Olsen et al. (1998) and Brancheau et al. (1996)	11
TI	TCE	Implementing Information Technology for Electronic Commerce	Expanded from Olsen et al. (1998) and Brancheau et al. (1996)	12
IE	MPI	Recruiting and Developing IS Human Resources	Suggested by CIO and adopted from Brancheau et al. (1996) and Olsen et al. (1998)	13
IE	MPE	NA: IE only internal	NA: IE only internal	
IE	MCI	Reducing IT Projects' Completion Time	Suggested by CIO	14
IE	MCE	NA: IE only internal	NA: IE only internal	
IE	TPI	Improving Computer Operations Planning	Adapted suggestion by CIO	15
IE	TPE	NA: IE only internal	NA: IE only internal	
IE	TCI	Improving Software Engineering Practices	Suggested by CIOs	16
IE	TCE	NA: IE only internal	NA: IE only internal	
TA	MPI	Managing Application Architecture Planning	General MIS literature (e.g., Laudon and Laudon, 1998; McNurlien and Sprague, 1998)	17
TA	MPE	Managing Internet Applications	General MIS literature (e.g., Laudon and Laudon, 1998)	18
TA	MCI	Measuring Benefits from Information Technology Applications	Adapted suggestion by CIO, Olsen et al. (1998) and Brancheau et al. (1996)	19
TA	MCE	Managing and Controlling End-User Computing	Adopted from Olsen et al. (1998) and Brancheau et al. (1996)	20
TA	TPI	Ensuring Quality with Information Systems	General MIS literature (e.g., Laudon and Laudon, 1998)	21
TA	TPE	Scanning Emerging Technologies	General MIS literature (e.g., Robson, 1997, p. 357; Laudon and Laudon, 1998; McNurlien and Sprague, 1998)	22
TA	TCI	Assuring Software Quality	General MIS literature (e.g., Laudon and Laudon, 1998)	23
TA	TCE	Implementing and Managing Knowledge Work Systems	Adopted from Olsen et al. (1998) and Brancheau et al. (1996)	24

focus group meeting (Krueger, 1994). The theoretical framework consisted of four categories and three binary dimensions suggested by Niederman et al. (1991). A total of 32 different issues are possible by combining categories and dimensions. However, business relationships are by definition concerned with external issues, thereby excluding internal issues. Furthermore, internal effectiveness is by definition concerned with internal issues, thereby excluding external issues. Hence, the theoretical framework requires generation of 24 key issues to cover all dimensions and categories.

The issue of selection of respondents has to be addressed. The typical key issues study uses the IT manager (CIO) as respondent. Morgado (1999) asked the highest ranked IT manager in each bank, Swain (1995) asked the information resource manager, Wang (1995) asked the highest ranked IS manager or a high ranked general manager, Dekleva and Zupancic (1996) asked IS managers, and Brancheau et al. (1996) asked SIM institutional and board members. This research follows the same tradition by asking the IT manager.

We generated 24 different key issues listed in Table 5 by crossing the four categories with the three binary dimensions as discussed above. The first column in Table 5 lists categories (C), which are business relationships (BR), technology infrastructure (TR), and internal effectiveness (IE) and technology application (TA). The second column lists combinations of dimensions (D) which are management (M)

or technology (T), planning (P) or control (C), and internal (I) or external (E). Two combinations have been excluded for theoretical reasons. First, business relationship issues can only be external issues. Second, internal efficiency issues can only be internal issues.

Q-SORT SURVEY

The Q-sort material was distributed to 769 IT mangers in Norway in September 1998. The mailing consisted of a cover letter, a deck of 24 cards, an instruction sheet, a list of 24 issues (the same as on the cards), a large Q-sort sheet, and a one page response fax sheet. We knew that the exercise would be time consuming for respondents, thereby reducing expected response rate. However, Q-methodology is a subjective methodology with no requirement for high response rate (Brown, 1980, 1993). We did not do any follow-up to influence response rate. We concluded data collection after one month having received 58 responses. In this section, we will present the results from our key issues Q-sort survey in Norway in 1998. First, a key issues ranking is presented. Then, three groups of IT managers are identified. Finally, research results are discussed by assigning the groups to stages of IS growth. Analysis was conducted using PQMethod 2.0 which is available at http://www.rz.unibw-muenchen.de/~p41bsmk/qmethod/.

Respondents returned a sheet similar to Figure 1 where issue numbers replaced the Xs. The average score for each

Table 6: Key Issues Ranking

E/I	M/T	C/P	Rank	Issue	Score
E	M	P	1	Improving links between information systems strategy and business strategy	3.28
E	M	P	2	Planning information technology projects for competitive advantage	2.00
E	T	P	3	Improving interorganizational information systems planning	1.05
I	T	P	4	Developing and implementing an information architecture	1.02
I	T	C	5	Controlling a responsive information technology infrastructure	1.02
I	M	P	6	Recruiting and developing IS human resources	0.90
I	T	C	7	Assuring software quality	0.86
I	T	P	8	Ensuring quality with information systems	0.36
I	M	C	9	Reducing it projects' completion time	0.34
E	M	C	10	Making effective use of data and information systems resource	0.31
I	M	C	11	Measuring benefits from information technology applications	0.16
E	M	P	12	Managing internet applications	-0.02
I	M	P	13	Managing application architecture planning	-0.10
E	T	C	14	Improving control, security and recovery capabilities	-0.21
I	T	P	15	Improving computer operations planning	-0.21
E	T	C	16	Implementing and managing knowledge work systems	-0.34
I	M	P	17	Improving information technology infrastructure planning	-0.47
E	T	P	18	Planning information technology for electronic commerce	-0.78
I	T	C	19	Improving software engineering practices	-1.00
E	T	C	20	Implementing information technology for electronic commerce	-1.10
E	M	C	21	Improving availability of national and international network	-1.41
I	M	C	22	Managing the technical foundation of information systems	-1.67
E	M	C	23	Managing and controlling end-user computing	-1.78
E	T	P	24	Scanning emerging technologies	-2.21

key issue is listed in Table 6. "Improving links between information systems strategy and business strategy" received the highest average score, while "scanning emerging technology" received the lowest score.

Table 6 shows that the top five key issues in information systems management in Norway are: improving links between information systems strategy and business strategy, planning information technology projects for competitive advantage, improving interorganizational information systems planning, developing and implementing an information architecture, and controlling a responsive information technology infrastructure.

Improving links between information systems strategy and business strategy was the top key issue in this survey. The issue was expanded from Olsen et al. (1998) and Brancheau et al. (1996), and it was suggested by CIOs. It was also found in general MIS literature (e.g., Ward and Griffiths, 1996; Robson, 1997). Approaches to this issue are suggested by Henderson and Venkatraman (1993, 1996), Luftmann (1996) and Venkatraman and Henderson (1993). According to CSC (1998), the single greatest challenge confronting chief information officers throughout the world is to assure that the priorities of their information technology organizations are in line with the business strategies of their corporations, according to a survey of almost 600 I/T executives from around the world by CSC. "Aligning I/S and corporate goals" has been on the top of their annual survey results list for many years (CSC, 1998, p. 5):

> More and more, it's becoming apparent that "aligning I/S and corporate goals" is a different kind of mission. It's not project oriented like "cutting I/S costs" or "changing technology platforms". Nor is it driven by external innovations such as "connecting to customers, suppliers, and/or partners electronically". The reality is that I/S aligned with corporate goals is what companies must strive to be. It's a way of doing business. A mantra that doesn't change when profits are down or new technologies are introduced.

DISCUSSION

The scientific method for selecting criteria of important issues has to be discussed. Researchers have to be careful as not to put ideas in the heads of respondents. In this research, we conducted a scientifically-based method for selecting a group of topics and then sent those topics to the respondents. Just because we had used this method does not mean that the list will be inclusive of their opinions and who is to say that their reaction will not be, "the academics think these issues are important, therefore this should be the things that I am considering". In other words, are we biasing the responses in the first place. This paper presents no safeguards to prevent this, making it an interesting aspect of future research in the area of key issues studies.

Furthermore, the application of our initial key issues selection procedure has limitations. We only conducted a one-way generation of first key issues by using different sources of input. If we would analyze the generated issues, we would question many of the resulting categorizations and dimensions. For example, to represent TI and TPE in this research (see Table 5), we generated the issue "planning information technology for electronic commerce" where electronic commerce represents the external focus. However, it could be argued that this issue should be assigned to another category, such as TA. Hence, a two-way generation of first key issues is recommended for future research. By two-way generation we mean an iterative process of matching generated issues to categories and dimensions. Also, interrater reliability should have been evaluated in this research before the survey was conducted. As pointed out in Table 6, interrater reliability measures the consistency by which issues are assigned to categories and dimensions. A test of five faculty members at the Norwegian School of Management resulted in a low interrater reliability for the latest US SIM issues (Brancheau et al., 1996). A similar test should have been done for the issues in Table 5.

The generalization concern has to be addressed. Our research results are based on 58 CIOs in Norway. Brown (1980, p. 67) makes the following comment on gneralizations when Q-methodology is applied:

> Generalizations in Q, unlike those in surveys, are not best thought of in terms of sample and universe, but in terms of specimen and type - i.e., we are prepared to say what it is that is of concern to specimen persons of the A type, the factor being a generalized abstraction (based on communalities) of a particular outlook or value orientation. Generalizations are expected to be valid for other persons of the same type, i.e., for those persons whose views would lead them to load highly on factor A.

CONCLUSION

Initial key issues selection and key issues survey approach represent two important methodological choices. In this research, initial key issues selection was extended by applying a theoretical framework combined with considerations of the Norwegian context, earlier key issues studies, key issues selection problems and ideas from CIOs. Q-sort was chosen as the most appropriate survey approach because of its ability to create a quasi-normal rank distribution and enable an analysis of groups of respondents.

This study opens up several directions in future research. First, how can we keep a practical relevance and avoid issues which are too broad and abstract caused by the theoretical framework? Second, how do results from other key issues studies compare with this study? Third, how can interpretive structural modeling (ISM) be applied to the results of this study?

REFERENCES

Badri, M.A., 1992. "Critical Issues in Information Systems Management: An International Perspective", *International Journal of Information Management*, Vol. 12, 179-191.

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), 225-242.

Brancheau, J.C. and Wetherbe, J.C., 1987. "Key Issues in Information Systems Management", *MIS Quarterly*, Vol. 11 (1), pp. 23-45.

Brown, S.R., 1980. *Political Subjectivity – Applications of Q methodology in political science*, New Haven: Yale University Press.

Brown, S.R., 1993. "A Primer on Q Methodology", *Operant Subjectivity*, Vol. 16 (3/4), 91-138.

Brown, S.R., 1996. "Q Methodology and Qualitative Research", *Qualitative Health Research*, 6 (4), November, 561-567.

Burn, J.; Saxena, K.B.C.; Ma, L. and Cheung, H.K., 1993. "Critical Issues in IS Management in Hong Kong: A Cultural Comparison", *Journal of Global Information Management*, Vol.1 (4), 28-37.

CSC, 1998. *Critical Issues of Information Systems Management - 11th Annual Survey of I/S Management Issues*. Computer Science Corporation (CSC), USA: El Segundo, California.

Deans, P.C.; Karwan, K.R.; Goslar, M.D.; Ricks, D.A. and Toyne, B., 1991. "Identification of Key International Information Systems Issues in U.S.-Based Multinational Corporations", *Journal of Management Information Systems*, Vol. 7 (4), 27-50.

Dekleva, S. and Zupancic, J., 1996. "Key issues in information systems management: a Delphi study in Slovenia", *Information & Management*, Vol. 31, 1-11.

Dexter, A.S.; Janson, M.A.; Kiudorf, E. and Laast-Laas, J., 1993. "Key information technology issues in Estonia", *Journal of Strategic Information Systems*, Vol. 24 (2), 139-152.

Galliers, R.D.; Merali, Y. and Spearing, L., 1994. "Coping with information technology? How British executives perceive the key information systems management issues in the mid-1990s", *Journal of Information Technology*, Vol. 9, 223-238.

Harrison, W.L. and Farn, C.K., 1990. "A Comparison of Information Management Issues in the United States of America and the Republic of China", *Information & Management*, Vol. 18, pp. 177-188.

Hart, S. ; Boroush, M.; Enk, G. and Hornick, W., 1985. "Managing Complexity Through Consensus Mapping: Technology for the Structuring of Group Decisions", *Academy of Management Review*, Vol. 10 (3), 587-600.

Henderson, J.C. and Venkatraman, N. , 1993. "Strategic alignment: leveraging information technology for transforming organizations", *IBM Systems Journal*, 32 (1), 4-15.

Henderson, J.C. and Venkatraman, N., 1996. "Aligning business and IT strategies". In: *Competing in the information age: strategic alignment in practice*, J.N. Luftmann (ed.), New York, Oxford University Press, 21-42.

Kendall, J.E. and Kendall, K.E., 1993. "Metaphors and Methodologies: Living Beyond the Systems Machine", *MIS Quarterly*, 17 (3), pp. 149-171.

Khandelwal, V.K., and Ferguson, J.R., 1999. "Critical Success Factors (CSFs) and the Growth of IT in Selected Geographic Regions", *Proceedings of the 32nd Hawaii International Conference on Systems Sciences* (HICSS-32), January 5-8, USA: Maui.

Kim, Y.; Shim, S.J. and Yoon, K.P. , 1999. "Bridging the Gap between Practitioner-Educator Perceptions of Key IS Issues for Effective Implementation of IS Curriculum"., In: Khosrowpour, M. (ed.), "Managing Information Technology Resources in the Next Millenium", *Proceedings of the 1999 IRMA International Conference*, May 17-19, Hershey, USA, 513-518.

Krueger, R.A., 1994. *Focus Groups, A Practical Guide for Applied Research*, USA: SAGE Publications, Thousand Oaks.

Laudon, K.C. and Laudon, J.P., 1998. *Management Information Systems - New Approaches to Organization & Technology*. Fifth Edition, USA: Prentice Hall International, Inc.

Luftmann, J.N., 1996. "Applying the strategic alignment model. In: *Competing in the information age: strategic alignment in practice*, J.N. Luftmann (ed.), New York, Oxford University Press, 43-69.

Mata, F.J. and Fuerst, W.L., 1997. "Information systems management issues in Central America: a multinational and comparative study", *Journal of Strategic Information Systems*, Vol. 6, 173-202.

McNurlien, B.C. and Sprague, R.H., 1998. *Information Systems Management in Practice*. Fourth Edition. USA: Prentice-Hall International, Inc.

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, 13-16.

Morgado, E.M.; Reinhard, N. and Watson, R.T., 1999. "Adding value to key issues research through Q-sorts and interpretive structured modeling", *Communications of the AIS*, Vol. 1(3), 1-24.

Moores, T.T., 1996. "Key issues in the management of information systems: A Hong Kong perspective", *Information & Management*, Vol. 30, pp. 301-307.

Niederman, F.; Brancheau, J.C. and Wetherbe, J.C., 1991. "Information Systems Management Issues for the 1990s", *MIS Quarterly*, Vol. 17 (4), 475-500.

Olsen, D.H.; Eikebrokk, T.R. and Sein, M.K., 1998. "Key Issues in Information Systems Management in Norway: An Empirical Study", *Proceedings of the NOKOBIT-98 conference*, 17-19 June, Norwegian School of Management, Norway: Oslo, pp. 1-17.

Palvia, P.C. and Palvia, S., 1992. "MIS Issues in India, and a Comparison with the United States", *International Information Systems*, April, 100-110.

Pervan, G. H., 1993. "Results from a study of key issues in Australian IS management", *Proceedings of the 4th Australian Conference on Information Systems*, University of Qeensland, Brisbane, Australia, 28-30 September, 113-128.

Pollard, C.E. and Hayne, S.C., 1996. "A Comparative Analysis of Information Systems Issues Facing Canadian Business", *Proceedings of the 29th Annual Hawaii International Conference on System Sciences*, 68-77.

Robson, W., 1997. *Strategic Management & Information Systems*. Second Edition, UK: Financial Times, Pitman Publishing.

Smith, G.F., 1995. "Classifying managerial problems: an empirical study of definitional content", *Journal of Management Studies*, Vol. 32 (5), 679-706.

Stephenson, W., 1953. *The study of behavior: Q-technique and its methodology*, Il., USA: University of Chicago Press.

Swain, J.W.; White, J.D. and Hubbert, E.D., 1995. "Issues in Public Management Information Systems", *American Review of Public Administration*, Vol. 25 (3), 279-296.

Usman, S.A. and Stein, A.R., 1999. "Key Issues in Management of Information Systems in the Australian Environment". In: Khosrowpour, M. (ed.), "Managing Information Technology Resources in the Next Millenium", *Proceedings of the 1999 IRMA International Conference*, May 17-19, Hershey, USA, 554-563.

Venkatraman, N. and Henderson, J.C., 1993. "Continous strategic alignment: Exploiting information technology capabilities for competitive success". *European Management Journal*, 11 (2), 139-149.

Wang, P., 1994. "Information systems management issues in the Republic of China for the 1990s", *Information & Management*, Vol. 26, 341-352.

Ward, J. and Griffiths, P., 1996. *Strategic Planning for Information Systems*, 2nd Edition, UK: John Wiley & Sons.

Warfield, J.N., 1976. "Complexity and Cognitive Equilibrium: Experimental Results and Their Implications", *Human Systems Management*, 10 (3), 195-202.

Warfield, J.N., 1991. "Complexity and Cognitive Equilibrium: Experimental Results and Their Implications". *Human Systems Management*, 10, 195-202.

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), 91-115.

Wrycza, S. and Plata-Przechlewski, T., 1994. "Key issues in information systems management. The case of Poland". *Proceedings of the 4th International Conference on Information Systems Development*, Bled, Slovenia, 289-296.

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