Key Information Systems Management Issues in Estonia for the 2000s and A Comparative Analysis

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ABSTRACT

This study reports key information system (IS) management issues in Estonia, for a second time since 1993. The study enlists the views of knowledgeable practitioners from both the information technology (IT) and non-IT (business managers) fields. The primary objective was to compare and contrast the findings in the previous study with the present effort. Other secondary objectives included investigating the views across professional classifications and sectors. Further, a comparison between Estonia (an emerging economy) and Norway (a developed country) was made. The findings of the study indicate the following: 1) the past decade has produced salient changes in the ranking of key IS issues for Estonia, 2) there are significant differences in key IS issues across professional groupings (IT and non-IT), 3) a convergence of opinions regarding key IS issues seems to be noticeable in Estonian public and private sectors, and 4) there is a significant difference in the ranking of comparable issues between Estonia and Norway. The implications of the study for both research and practice are discussed.

KEYWORDS

Key Information Systems Management Issues, IT and Non-IT professionals, Sectors, Emerging Economy, Estonia

INTRODUCTION

Today, information technology (IT) is an important component in the management and survival of organizations dependent on it for support and competitive advantage (Porter and Millar, 1985; Cash et al., 1992). There are many challenges facing both information systems (IS) departments and management of organizations where IT systems are being used, because of the rapidly changing business environments often accompanied by the emergence of diverse technologies (Cash et al., 1992; Watson et al., 1997; Khandelwal, 2001; Luftman, 2005). What is critical today may become irrelevant tomorrow. These changes suggest that those in charge of IT systems, namely IT professionals and to some extent management of organizations must be aware of trends in IT/IS and should be able to assess their impacts (Niederman et al., 1991; Brancheau et al., 1996; Luftman, 2005).

Studies of key IS management issues have been investigated in many countries and regions of the world (e.g., Watson et al., 1997; Gottschalk et al., 2000; Palvia et al., 2002). Among the examples cited is the work by Dexter et al. (1993) that investigated and reported key IS issues in Estonia for the 1990s. However, a follow-up study was

not conducted, and the findings may now be outdated. Particularly troublesome is that current IS researchers continue to reference this study. For example, Watson et al. (1997), Palvia et al. (2002), and Ifinedo (2005) cited key IS issues in Estonia using the work of Dexter et al. Watson et al. (1997, p.100) stated "In Estonia, for example, the availability of telephone lines is *still* very much an issue, and this in turn has a direct impact on telecommunications." The question is: Are these studies highlighting the key issues for Estonia for the preceding years, or the future?

The unsuspecting and those unfamiliar with the country and region, may not be aware of ongoing trends regarding IT issues (Datamonitor, 2001; WEF, 2004; Ifinedo and Davidrajuh, 2005). Importantly, Dexter et al. (1993) emphasized the need to replicate their study in the future as Estonia continues to transform technologically, politically, and economically. To that end, this current study will update key IS management issues in Estonia, which to some extents, adds to the body of knowledge in global IT management (Watson et al., 1997, Palvia et al., 2002, Berthon et al., 2002). Thus, the primary objective of this study is to provide answers to the following questions:

- Over the next three to five years, what key IS management issues are most deserving of time and resource investment by Estonian organizations?
- What are the top ten key IS management issues that Estonian organizations will face over the next three to five years?
- How do key IS management issues in this study compare with those previously reported for Estonia?

The secondary objective is to contribute to research on key IS management issues, in the following three areas: (1) compare the views of IT and non-IT professionals, i.e., business managers, (2) compare and contrast the views across private and public sectors, and (3) compare and contrast key IS issues for an emerging economy with those of a developed country.

First, interest is growing for studies that compare the views of IT professionals with those of their management counterparts (Ward and Peppard, 1999; Senn, 2003). However, our review of the literature indicates that only a few studies exist in relation to key IS management issues. Among the few are the studies by Brancheau and Wetherbe (1987), Galliers et al. (1994), and Khandelwal (2001) who found that each group of professionals has a different view of key IS management issues. Second, others suggest that IT issues in the public and private sector differ (Mansour and Watson, 1980; Pollard and Hayne, 1996). For example, Mansour and Watson (1980) note that IT issues for a government environment differs from those in the private sector. Moreover, private sector firms are profit-oriented operating in competitive environments (Cash et al., 1995). Furthermore, in a study of key IS management issues in Canada, Pollard and Hayne (1996, p. 74) state that "the largest number of significant differences occurred between public and private firms." Third, comparative studies indicate that the priority of key IS management issues may depend on the economic development of a nation. Palvia et al. (2002) found that developed countries (e.g. Canada, Norway, and the United States) emphasize strategic issues in IS management issues while developing (emerging) countries, e.g. Estonia and South

Korea, highlight issues that are operational in nature. We will add to the foregoing discussions by exploring the following:

- Do IT and non-IT professionals have different views concerning the importance of key IS management issues?
- Do public and private organizations have different views on the importance of these issues?
- Do key IS management issues in Estonia (an emerging economy) differ from those in Norway (a developed country)?

Niederman et al. (1991) note that key IS management studies are important because they provide IS/IT vendors and consultants, professional societies, educators, and researchers with useful information. Vendors and consultants can use information from such studies to improve their markets, and educators can use the information to develop and improve their curricula. New findings and cumulative knowledge enrich the IS literature and can be utilized by a country's policy planners. The Estonian government currently supports investments in the telecommunication sector (Datamonitor, 2001; Nissinen, 2002; CIA: World Factbook, 2005), possibly due to Dexter et al. (1993) study that identified "Planning and implementing telecommunication systems" as the topmost priority issue facing Estonia.

BACKGROUND

Over the past two decades, a number of studies have investigated key IS management issues (e.g., Brancheau and Wetherbe, 1987; Niederman et al., 1991; Brancheau et al., 1996; Luftman, 2005), but Pimchangthong et al. (2003) provided a description of what *key issues* are. They stated "A key issue is an opportunity, threat, or problem associated with the effective use of IT in the organization, and it is a critical success factor" (p. 28) Studies of key IS management issues began in the 1980s in the United States. The Society for Information Management (SIM) sought to identify key IS issues facing its IT executive members. Ball and Harris (1982) conducted the first survey of 18 issues, with a follow-up survey for 1983 conducted by Dickson et al. (1984) in conjunction with the MIS Research Center at the University of Minnesota. Brancheau and Wetherbe (1987), Niederman et al. (1991), and Brancheau et al. (1996), respectively conducted similar studies for 1986, 1990, and 1994. Luftman (2005) reports the latest issue in this series of publications.

Researchers in other countries and regions have replicated key IS issues studies in their own settings. For example, Dexter et al. (1993), Galliers et al. (1994), Dekleva and Zupancic (1996), Pollard and Hayne (1996), Mata and Fuerst (1997), Gottschalk et al. (2000), and Pimchangthong et al. (2003), respectively provide information for Estonia, the United Kingdom, Slovenia, Canada, Costa Rica/Guatemala, Norway, and Thailand. Due to space limitations, we cannot include all studies; however, comprehensive lists of such studies are available in the literature (see, Watson et al., 1997; Gottschalk et al., 2000; Palvia et al., 2002).

Although these studies are widely received, they are not without criticism. They often lack a theoretical basis for the selection of key IS issues (Gottschalk et al., 2000). Similarly, the classification of key IS issues is varied. Some researchers (Brancheau and Wetherbe, 1987 and Luftman, 2004) simply classified the issues as either managerial or technical/technological, while others propose other refinements. Niederman et al. (1991) classified key IS issues into the following four groups: business relationship, technology infrastructure, internal effectiveness, and technology application. Palvia et al. (2002) discuss key IS issues under these three main groups: strategic, operational, and basic infrastructural needs.

Further, the preferred methodology of such studies is the Delphi method. Some have raised questions about this method, especially for the approach that rates the scores. Gottschalk et al. (2000) state, "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)." Also, Galliers et al. (1994) indicate that there is a possibility of bias resulting from self-selected samples and personal bias from respondents.

Past studies have mainly surveyed IT professionals (managers). Khandelwal (2001) notes that of the 20 studies cited by Gottschalk et al. (2000), 16 involved IT managers, and the others included both IT and general managers. Another major concern is the lack of representation of the public sector and non-profit organizations. Again, Khandelwal (2001) asserts that it is a major omission to exclude the views of public sector organizations. As noted, the operating environments of the two sectors may differ considerably (Mansour and Watson, 1980). Finally, Palvia and Basu (1999) raised concerns about key IS issues studies and argued that the discussions of the results in such studies should not underemphasize the issue of relevance and usefulness. In our study, wherever possible we aim to address some of the limitations or criticism leveled at key IS management studies.

OVERVIEW: ESTONIA AND THE CONCEPT OF EMERGING ECONOMIES

Estonia is one of the three Baltic states in Eastern Europe with a population of about 1.4 million people and was a democracy before the Soviet Empire absorbed it in the 1940s (CIA: World Factbook, 2005; Ifinedo and Davidrajuh, 2005). Following its independence in 1991, the country underwent a turbulent period. Dexter et al. (1993) indicate that political uncertainty was palpable in the region in the 1990s among the small nations that recently left the Soviet Bloc. Today, Estonia is a European Union (EU) country, which it joined on the May 1, 2004. Dexter et al. (1993, p. 139) comment, "Many IS academics and practitioners inside and outside the region agree that effective use of IT is essential to these societies [newly liberated and emerging economies of Eastern Europe] for their successful economic transformation." These predictions have become a reality with regard to the readiness of nations for the networked world. Estonia is among the highest-ranking countries in the world and actually leads Eastern European countries despite its small size (WEF, 2004; Ifinedo

and Davidrajuh, 2005). In summary, readiness indicators include the availability and use of IT products and infrastructure for national development. Furthermore, the Eastern European region including Estonia is becoming more and more important as a major recipient of IT investments from organizations in the developed West that are looking for skilled labor and cost advantages (Carmel, 1999; Datamonitor, 2001; Nissinen, 2002; CIA: World Factbook, 2005).

Essentially, Estonia is an emerging economy (IMF, 2000; World Bank, 2004; CIA: World Factbook, 2005). Our notion of an emerging economy comes from the World Bank's guideline that describes countries with "emerging economies" as those with higher levels of investments and industrialization compared to other developing countries (IMF, 2000). Emerging economies also have a more liberalized environment and a higher per capita GDP compared to developing countries (IMF, 2000). However, all these indicators are generally lower compared to developed nations (IMF, 2000; CIA: World Factbook, 2005). For example, the per capita GDP of Nigeria, a developing country, is US$1,000 and US$14,300 for Estonia, an emerging economy (CIA: World Factbook, 2005). In contrast, the per capita GDP of developed countries are much higher. For example, it is US$40,000 and US$40,100 for Norway and the United States, respectively (CIA: World Factbook, 2005).

METHODOLOGY

We utilized the Delphi method as was used by Dexter et al. (1993) in the previous key IS issues study in Estonia. However, because of the limitations of the rating approach, we used *ranking* of key issues in lieu of *rating*. Although other methods are available (Gottschalk et al., 2000), the Delphi method is inexpensive and appears to be the preferred and most widely used (Brancheau et al., 1996, Gottschalk et al., 2000). This method solicits opinions from numerous individuals and uses a series of linked questionnaires to stimulate reflection and movement towards consensus (Brancheau and Wetherbe, 1987).

Securing assurance of continued participation from respondents was difficult. Therefore, we had two rounds in our Delphi method compared to three for Dexter et al. (1993) and Niederman et al. (1991). Nissinen (2002) discuses the difficulty of conducting research in the region, and our experience indicates that it is hard to convince locals to participate in subsequent rounds of a Delphi method research (Ifinedo, 2005). Fortunately, a higher Kendall's *W* coefficient of concordance over the two rounds indicates our respondents moved toward consensus. Moreover, previous studies employing three rounds or more indicate negligible differences between the higher rounds (e.g., Niederman et al., 1991; Dekleva and Zupancic, 1996). Other studies have also successfully used only two rounds (e.g., Pollard and Hayne, 1996).

We mentioned earlier that previous key IS issues studies received criticism for their lack of a theoretical basis in the selection of key IS issues. While some studies have started from the scratch identifying the key IS issues in their respective countries (e.g. Dekleva and Zupancic, 1996), others simply borrowed issues from previous studies, even when the level of economic development differed (e.g., Mata and Fuerst, 1997;

Pimchangthong et al., 2003). We concur with the arguments of Dexter et al. (1993, p. 141) who state that "investigative procedure [should] allow the researcher to control for methodology, thus straightening claims that any differences observed between Estonia [or any other country] …arise solely from the environment." Therefore, we decided against borrowing key IS issues from the literature without providing a rationale. Thus, we followed the steps taken by Dexter, et al. in developing the instrument used in their study.

The questionnaire in this study was comprised of twenty-five (25) key IS issues derived from several sources. First, because one of the objectives was to compare our findings with those of previous studies for Estonia, we retained the top ten key issues from the previous work of Dexter et al. (1993). These are listed 1-11 in Table 1 below (there was a tie between the tenth and eleventh items in the Dexter et al. study).

Second, we asked four Estonian experts (IS managers and academicians) what they believed were the most important IS management issues facing Estonia over the next three to five years. They provided us with eight distinct issues among others; these are listed 12 -19 in Table 1. We articulated the issues enumerated by these four experts in tune with recognizable terms in the literature.

Third, we incorporated into our study the top ten issues from Norway, a developed country. Palvia et al. (2002) and Watson et al. (1997) suggest that culture should be accounted for in any study of key IS issues. Therefore, Norway became a natural choice because of its cultural and geographical similarities to Estonia (Ifinedo and Davidrajuh, 2005). More importantly, since key IS studies often predict future issues, the previous findings from a 2000 Norway study are suitable for our study.
The most recently published study for a developed country (the United States) is that of Luftman (2005). However, it is difficult to compare and contrast his findings with this study because of the differences in reporting styles. Luftman (2005) used two separate lists to delineate his issues into managerial and technological concerns, whereas the findings of Gottschalk et al. (2000) for Norway used a single list for all key issues, as did our study. Therefore, we obtained six issues from the Gottschalk et al. study, which are listed 20-25 in Table 1.

Survey Administration and Validity Issues

The 25 key IS issues were translated into Estonian with the English meanings retained. Brislin (1986) recommends this approach for research conducted in a different cultural environment, and Dexter, et al. used a similar approach. Three Estonian professionals, including two IT professionals and one business manager, reviewed the questionnaire. They first checked the language of the questionnaire, and then checked the scope and depth of the listed items. They were satisfied with the selected items, and their comments regarding the questionnaire's language (Estonian) helped improve its quality. Confident of the face and content validity of the issues, the 25 key IS issues were listed in random order and delivered to the participants.

Table 1. The Key IS issues in the Research Instrument

No.	Key Issue	Source
1	Planning and implementing telecommunication systems	Dexter et al. (1993)
2	Promoting standards for hardware, software and data	"
3	Implementing and improving computer networks	"
4	Using IT to satisfy the needs of users and the organization	"
5	Improving information security and control	"
6	Building and maintaining reliable information systems	"
7	Alliances and linkages with other Western (EU) organizations	"
8	Developing an information architecture	"
9	Ensuring the physical security of computer systems	"
10	Making effective use of data resource	"
11	Legislating software copyright protection	"
12	Enterprise Systems e.g. Electronic data interchange (EDI) and enterprise resource planning (ERP)	Estonian experts
13	Implementing IT for e-commerce and e-government	"
14	Loss of skilled IT workers to foreign countries	"
15	Improving the general IT skills of end-users	"
16	IT awareness among top management/leaders of enterprises	"
17	Keeping update with new trends in IT	"
18	Measuring IS effectiveness and productivity	"
19	Organizational learning and the use of IS technologies	"
20	Improving link between IS strategy and business strategy	Gottschalk et al. (2000)
21	Using IT for competitive advantage	"
22	Improving inter-organizational IS planning	"
23	Recruiting and developing IS human resource	"
24	Assuring software quality	"
25	Building and controlling a responsive IS infrastructure	"

Round One

Round One was conducted between August and December 2004, and we enlisted participants for the survey from different sources. First, this researcher had resided in the country seven years and used his network of associates to solicit participation in the study. Second, since about 50% of Estonians reside in Tallinn, the nation's capital, the researcher selected participants from that city. Requests for participation in the

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study were made to IS/IT managers and other key management personnel. Respondents completed the self-administered questionnaires and returned them to us (in some cases to contacts). Third, it was important to sample the views of at least one professional IS society in the country as recommended by Dexter et al. We chose the Estonian Information Technology Society (EITS), which is the most popular and influential and is known to contribute to IT development issues in the country (Ifinedo, 2005). Their member list of 103 academia and industry IT professionals is available on their web site: http://www.eits.ee/. We selected 53 members for participation by choosing every odd-numbered name on the list. Each participant from this group received an e-mail that included the questionnaire (attached as an MSWord file) and a cover letter explaining the purpose of the research.

Participants were asked to identify the most important IS issues facing Estonian organizations over the next three to five years. They were asked to rank these issues from (1) to (25), with (1) being the most important item deserving of attention and resource investment. The participants were encouraged to add any issues they thought were important. We decided to include in the results any additional issue submitted by three or more respondents. Of 135 questionnaires administered or e-mailed, 60 were returned, with a response rate of 44.4%. Table 2 lists the ranking order, mean, and standard deviation for Round One.

Round Two

The participants in Round One were again contacted. We sent them a summary of the results. The summary included their personal responses and the results of the 60 participants. The issues were ranked in order of importance, from the highest to lowest mean ranking, which provided a baseline for comparison. No additional issues met our criteria for inclusion on the list, and we did not eliminate any of the Round One issues. Using the same procedures used in Round One, we conducted Round Two between July and September 2005.

We sent Round Two questionnaires to 34 participants from the first round. Assurances for further participation in the study were not obtained from the others. However, in an effort to boost the response rate, we selected all the 103 EITS members this time. We developed a webpage for the questionnaire and sent each participant an email explaining the purpose of the study. We gave additional information about the study to those who did not participate in Round One. The webpage summarized results from Round One. In addition, using contacts, we enlisted 25 new participants, including IT professionals and business managers who did not participate in Round One. We gave the new participants a summary of Round One results and a letter explaining the purpose of the study. As in Round One, all participants were asked to rank the issues from (1) to (25). Round Two yielded 47 responses with an effective response rate of 30.1%. Also, Table 2 shows the results of Round Two.

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Table 2. Ranking of the Key IS issues for Round One and Round Two

Key IS issue	Round One			Round Two		
	Rank	Mean	Std. Dev.	Rank	Mean	Std. Dev.
Improving information security and control	1	7.38	5.97	1	6.21	5.32
Making effective use of data resource	2	8.65	5.23	2	7.06	4.93
Building and maintaining reliable information systems	3	9.07	6.62	3	7.26	6.06
Assuring software quality	4	11.5	6.11	4	8.85	6.15
Enterprise systems e.g. ERP and EDI	5	11.7	6.39	7	10.74	6.20
Promoting standards for hardware, software and data	6	11.9	6.85	9	11.70	6.53
Using IT satisfy the needs of users and organizations	7	11.9	6.85	8	11.15	7.40
IT awareness among top management/leaders	8	12.0	7.08	5	10.02	6.39
Improving the general IT skills of end-users	9	12.2	7.12	6	10.60	6.68
Improving inter-organizational IS planning	10	12.5	6.85	13	12.66	6.26
Recruiting and developing IS human resource	11	12.7	6.82	10	12.28	5.80
Keeping update with new trends in IT	12	12.8	7.08	12	12.66	6.54
Improving link between IS strategy and business strategy	13	13.2	6.10	14	13.34	5.51
Implementing IT for e-commerce/e-government	14	13.4	7.52	11	12.34	6.93
Measuring IS effectiveness and productivity	15	13.6	6.85	19	15.04	5.22
Ensuring the physical security of computer systems	16	13.7	6.87	17	14.57	6.42
Implementing and improving computer networks	17	14.0	8.10	15	14.17	6.61
Using IT for competitive advantage	18	14.1	7.14	18	14.60	6.34
Organizational learning and the use of IS technologies	19	14.2	6.27	16	14.47	6.57
Planning and implementing a telecommunication systems	20	14.4	6.09	21	16.19	5.99
Developing an information architecture	21	14.6	7.20	20	15.79	7.06
Alliances and linkages with other Western (EU) organizations	22	15.3	7.90	22	16.87	7.53
Legislating software copyright protection	23	15.5	7.40	23	17.47	6.86
Building and controlling a responsive IS infrastructure	24	15.6	6.57	24	17.68	6.98
Loss of skilled IT workers to foreign countries	25	19.2	6.87	25	21.17	5.78

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Further, the level of agreement on the final ranking was computed statistically using Kendall's Coefficient of Concordance (W), which is a coefficient of agreement among respondents who rate or rank items. The Kendall's W ranges from 0 to 1 (1 = complete agreement and 0 = complete disagreement). In this study, the Kendall's W is 0.107 for Round One, and 0.240 for Round Two. Brancheau and Wetherbe (1987, p. 29) state, "Perfect consensus would probably never have been achieved." Confident of an improved consensus over the rounds, we will now use the results from Round Two to discuss our findings.

The Profile of the Respondents: Round Two

Thirty-three respondents were male (70.2%), and 70% of the sample population was between 20 and 49 years of age. Over 90% of them were university graduates. For simplicity, we classified their professions into these two main groups: IT professionals and Non-IT professionals. Respondents classified as IT professionals include IT managers, IT directors, IT lecturers, and software developers. The Non-IT professionals include accountants, department managers, directors, project managers, and others. Although most of the participants were middle (or functional) managers, we also received responses from several management executives, including five chief executive officers (CEOs). Table 3 shows the distribution of the respondents by sector, profession, and industry.

Table 3. The Respondents' Profile

Variable	Frequency	Percentage
Sector		
Public	17	36.2
Private	29	61.7
Others	1	2.1
Total	47	100.0
Profession		
IT	20	42.6
Non-IT	27	57.4
Total	47	100.0
Industry type		
Financial institutions	5	10.6
Education (Tertiary)	10	21.3
Government ministries and agencies	9	19.1
Health services	2	4.2
Information Technology (IT) firms	10	21.3
Logistics	1	2.1
Manufacturing	2	4.3
Marketing/Sales/Advertising	5	10.6
Real Estate	1	2.1
Telecommunications	2	4.3
Total	47	100.0

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ANALYSES AND DISCUSSION

Table 2 shows the rankings of the key IS issues over the next three to five years for Estonia. Except for a few, all the key issues change places sparingly over the rounds. "Measuring IS effectiveness and productivity" dropped from 15th to 19th place in Round Two, and for the top ten issues, "Improving inter-organizational IS planning" dropped from 10th to 13th place. "Recruiting and developing IS human resource" moved from 11th place into the top ten. The top ten issues for Estonia appear to be operational in nature following the classification proposed by Palvia et al. (2002).

Issues that ranked among the least important for Estonia in Round One remained that way for Round Two. The standard deviation for the top ten issues generally decreased, which indicates less disagreement over the issues. We will now provide an in-depth discussion of the top ten issues for Estonia, as also listed in Table 4.

Improving Information Security and Control

Respondents ranked "Improving information security and control" as the most important key IS issue for Estonia over the next three to five years. This issue relates to the protection of data stored in databases from alteration, damage, unauthorized disclosure, or theft. As Estonia changes, both the private and public sector will continue to store data in computers (IT systems), and use it to provide services to clients as well as improve their organizational processes. There is a need to properly monitor the security and control of the stored data, and the respondents in this study believe this will be the most important IS issue in Estonia over the next few years.

Making Effective Use of Data Resource

The second most important issue in the top ten list is "Making effective use of data resource." Clearly, the participants indicated the least disagreement on this issue (please see the standard deviation in Table 2). As more and more organizations realize the importance of using information as a competitive tool (Porter and Millar, 1985; Cash et al., 1992), the question arises as to how to use this resource effectively. The participants are convinced that finding ways of using organizational data effectively will continue to be paramount in the coming years for Estonia.

Building and Maintaining Reliable Information Systems

"Building and maintaining reliable information systems" ranked third. This issue relates to the most important item on the list. It is vital that IT systems are reliable and adequately maintained in order to maximize gains. Estonia continues to receive investments in the information and communication technology (ICT) sectors from developed countries (Nissinen, 2002; CIA: World Factbook, 2005), which indicates that perhaps the country has limited resources in these areas. Building and maintaining IT systems in Estonia will be important during the next three to five years.

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Assuring Software Quality

The fourth most important issue is "Assuring software quality." Estonia, like most countries in Eastern and Central Europe, is flooded with pirated software. According to reports by Datamonitor (2001, p. 2) "69% of software in Estonia is pirated". Our respondents indicate that the lack of software quality will be an important issue for organizations during the next few years. It should be noted, however, that various efforts have been initiated to curb the sale and procurement of pirated software in the country (Estonian Ministry of Foreign Affairs, 2003).

IT Awareness Among Top Management/Leaders

"IT awareness among top management/leaders" is the fifth key IS issue for Estonia. Its appearance in the top signifies that those at the top of the organizational hierarchy in the country need to be more aware of IT issues. The need for IT knowledge and awareness by top management has been widely discussed in the literature of the developed countries (Ward and Peppard, 1999; Khandelwal, 2001; Senn, 2003). Our respondents believe that educating Estonia's top management over the next three to five years will benefit IT professionals, end-users, and the organization as a whole.

Improving the General IT Skills of End-Users

In sixth place is "Improving the general IT skills of end-users." It is an operational issue and is closely related to the preceding key IS issue of "IT awareness of top management." To reap the benefits of IT investments, end-users must possess general IT skills (Igbaria, 1990). The lack of end-user skills will result in poor use of acquired IT systems (Cash et al., 1992). Our findings indicate that the level of IT skills of Estonian end-users over the next three to five years must increase. Although Estonia ranks high as one of the most "ready" countries for "a networked world," (WEF, 2004; Ifinedo and Davidrajuh, 2005), our study suggests that Estonian professionals (IT and Non-IT) believe there is a need to improve the general IT skills of end-users.

Enterprise Systems e.g., ERP and EDI

In seventh place is "Enterprises systems and applications" such as enterprise resource planning systems (ERP) and electronic data interchange (EDI), which are becoming increasingly important in the operations of Estonian organizations (Ifinedo, 2006). Enterprise systems, such as ERP and EDI permit the enterprise (organization) to use such systems to become more efficient and effective. Essentially, ERP are useful in integrating and maintaining disparate data and information across the enterprise. Using specified formats, EDI is a technology that facilitates the transfer of information from the enterprise to its partners. ERP vendors are targeting for business the emerging economies of Eastern Europe (Clouther, 2004; Ifinedo, 2006), and the Estonian government is vigorously promoting EDI use among businesses in the country (Estonian Statistics Office, 2003). The issue of enterprise systems in the top ten indicates that Estonian organizations realize the need to integrate their operations

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both internally and externally and that it will be an important issue over the next few years.

Using IT to Satisfy the Needs of Users and Organizations

"Using IT to satisfy the needs of users and organizations" ranks number eight and, in some respects, relates to the issue in sixth place. The purpose of IT systems is to satisfy the needs of both the organization and its users (e.g., Porter and Millar, 1985; Igbaria, 1990; Cash et al., 1992). Once achieved, it will help ensure the success of any adopted or implemented IT system (Igbaria, 1990). The importance accorded to this issue suggests that those in charge of IT issues in Estonian must heed it.

Promoting Standards for Hardware, Software, and Data

In ninth place, "Promoting standards for hardware, software, and data" relates to the fourth ranked issue, i.e., "Assuring Software Quality". In other respects, its appearance in the top ten suggests that Estonia still has problems associated with hardware and software incompatibility seen in the 1990s (resulting in a second place ranking by Dexter et al.). Our respondents affirm that standards for hardware and data need to be enforced. The few IT experts in the country with whom the researcher had informal discussions indicated this issue was one demanding urgent attention.

Recruiting and Developing IS Human Resources

This issue ranks tenth in our study. Our participants suggest that over the next three to five years, organizations in Estonia may have difficulty recruiting and developing IS human resources. A trend has emerged where skilled IT experts move from the poorly remunerated public sector to the higher paying private sector, and in some cases IT professionals seek better offers abroad (Nissinen, 2002; Ifinedo, 2005). This issue must receive the time and resources necessary to keep Estonia among the most "ready" countries for a networked world, where IT skills and resources are the major criteria for higher ranking.

Comparison with the Previous by Dexter et al. (1993)

There is a significant statistical difference between the ranking orders of our study compared to Dexter et al. (1993). The Kendall Tau-b Coefficient (T^b), significant at 0.05, compared the ranking order of the 20 issues common to both studies yielded the following results. $T^b = 0.617$, Value (V) = 0.095, significant (p) = 0.537, which suggests no relationship in the ranking order of the two studies. Particularly, the low V indicates a weak relationship between the two studies. Inspection of both ranking orders produces a few salient points. Table 4 shows five of the top ten issues in the previous study were retained. This is consistent with the findings of others, where certain issues appear in the top ten for several years. For example, Luftman (2005) notes that two issues, "IT strategy planning" and "Attracting and retaining IT professionals," made the top ten list for 24 years in the United States. That said, we

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could say that 50% of the top ten key issues in the 1990s remain critical for Estonia in the 2000s. It is important to point out that, as in the previous study, most of these recurring issues are operational in nature.

Table 4. Comparison of the Ranking of the Current Study with the Previous Study

Key IS issue	Current Study Rank	Dexter et al. (1993) Rank
Improving information security and control	1	5
Making effective use of data resource	2	10
Building and maintaining reliable information systems	3	6
Assuring software quality	4	
Enterprise systems e.g. ERP and EDI	5	
Promoting standards for hardware, software and data	6	2
Using IT satisfy the needs of users/organizations	7	4
IT awareness among top management/leaders	8	
Improving the general IT skills of end-users	9	21
Improving inter-organizational IS planning	10	19
Recruiting and developing IS human resource	11	16
Keeping update with new trends in IT	12	29
Improving link between IS strategy and business strategy	13	26
Implementing IT for e-commerce/e-government	14	
Measuring IS effectiveness and productivity	15	24
Ensuring the physical security of computer systems	16	9
Implementing and improving computer networks	17	3
Using IT for competitive advantage	18	23
Organizational learning and the use of IS technologies	19	13
Planning and implementing a telecommunication systems	20	1
Developing an information architecture	21	8
Alliances and linkages with other Western (EU) organizations	22	7
Legislating software copyright protection	23	11
Building and controlling a responsive IS infrastructure	24	
Loss of skilled IT workers to foreign countries	25	27

"Planning and implementing telecommunication systems," ranked as the most important issue for Estonia in the 1990s, but moved to the 20[th.] place in the 2000s. Similarly, "Implementing and improving computer networks" ranked 3[rd.] in the previous study and 17[th.] in the current study. These two foregoing issues and other similar issues indicate that as Estonia changes socio-economically (IMF, 2000; HDR, 2003), issues of basic infrastructural needs such as the availability of

telecommunication systems that Palvia et al. (2002) commented dominate key IS issues for developing countries become less important to the country.

Other noticeable details include the almost static nature of certain issues. For example, "Loss of skilled IT workers to foreign countries" maintained its relative positions in the bottom half of the important issues to IS management in Estonia, issues such as "Organizational learning and the use of IS technologies," "Measuring IS effectiveness and productivity," Using IT for competitive advantage also remained in the bottom half of the list. However, as Estonia became integrated politically into the Western European system, issues such as "Alliances and linkages with other Western (EU) organizations" disappeared from the top ten and ranks 22nd in this study. Finally, three new issues suggested by our local experts, which were not included in the previous study (i.e., "IT awareness among top management," "Improving the general IT skills of end-users," and "Enterprises Systems"), ranked high and made our top ten list. This affirms the current and future relevance of these new issues.

Comparison between IT Professionals and Non-IT Professionals

The results of the Kendall Tau-b Coefficient test, significant at p> 0.05, indicate there are significant differences between the two groups of professionals regarding the ranking of key issues. Using the Mann-Whitney U-test, we compared the issues across the two groups individually. Table 5 presents only the issues on the top ten list on which there were diverging views. It is worth noting that there were disagreements on some other issues as well, including "Improving inter-organizational IS planning", "Implementing and improving computer networks", "Planning and implementing a telecommunication systems", and the four least ranking issues in the current study in Table 4. Having said that, the Estonian IT professionals in this study, though fewer in number than their non-IT counterparts, ranked issues related to IT skills acquisition by end-users and top management awareness higher than non-IT professionals did. This is consistent with other studies, which suggest that IT professionals and their non-IT colleagues have differing views on key IS issues, especially when the amount of IT knowledge, awareness, and skills possessed by the other have been investigated (Galliers et al., 1994; Khandelwal, 2001; Senn, 2003).

Table 5. Differences between Estonian IT and Non-IT Professionals on Three Top-10 issues

Key Issue	IT professionals (Mean ranking)	Non-IT professionals (Mean ranking)	Mann-Whitney U-Test statistic	Significance (2-tailed)
- Using IT to satisfying the needs of users and organizations - IT awareness among top management/leaders - Improving the general IT skills of end-users	7.95 7.25 8.15	13.52 12.07 12.41	169.5 162.5 178.5	0.030 0.020 0.048

Comparison between Public and Private Sectors

Using the Kendall Tau-b Coefficient test, which is significant at p> 0.05, we found there is a slight difference of opinion between the public and private sector in Estonia. It is worthwhile to stress that the classification of our responses by sectors produced the least disagreement between our respondents. Using the Mann-Whitney U-Test we compared all the key IS issues across the two sectors individually, and found that only on *one* issue: "Using IT to satisfy the needs of users and organizations" was there was a significant difference. The Mann-Whitney U-Test statistic is 145, significance (p) = 0.021. Respondents from the private sector in our study attached greater importance to this issue than do their counterparts in the public sector. The mean ranking for the former is 9.45, and 14.35 for the latter. This is consistent with reasoning, because business organizations usually procure IT systems to satisfy their needs and to ensure their survival (Porter and Millar, 1985; Cash et al., 1992; Khandelwal, 2001). In fact, the operating environment of public organizations differs significantly from private organizations (Mansour and Watson, 1980).

The issue of IT and socio-cultural development in Estonia must be discussed when interpreting this finding. The apparent consensus between the two sectors in Estonia might be attributable to the cooperation between the private and public sectors on IT development issues (e.g., Ifinedo, 2005). The Estonian government takes IT issues very seriously and has stated "IT/Internet is a human right" (Meier, 2000). It is not surprising that both the private and public sector hold similar views regarding key IS issues. This revelation in Estonia, however, is inconsistent with the findings in Canada as reported by Pollard and Hayne (1996).

Comparison between Estonia and Norway

As noted, we incorporated top six (6) issues from Gottschalk et al.'s 2000 work for Norway, and it is interesting to see how both economy types compare. The seventeen (17) key issues in which the two countries/economies are compared are shown in Table 6. Test results using Kendall Tau-b (T^b) Coefficient yielded T^b = -.978, *V* = -.125, p = 0.231. The test results indicated a significant statistical difference in the ranking orders of the two countries. Clearly, there is a negative relationship in the ranking orders of comparable key issues for both countries (economy types). This suggests that Estonia, an emerging economy, might rank key IS management issues in the opposite direction as do Norway, a developed economy (Watson et al., 1997; Mata and Fuerst, 1997; Gottschalk et al., 2000; Palvia et al., 2002).

A closer look at Table 6 indicates that operational issues ranked higher for Estonia, while issues of a strategic nature ranked higher for Norway (Mata and Fuerst, 1997; Palvia et al., 2002). Only four issues from the Norwegian study appear in the top ten list for Estonia. More importantly, almost all the higher rated issues in Norway, such as "Using IT for competitive advantage," ranked lower in Estonia. The ranking of a

few issues, including the assurance of software quality, promotion of quality software, and the development of national networks coincide with each other in both countries. Overall, our findings validate other studies in the IS domain, which have suggested that the level of economic development across countries may have a bearing on how key IS management issues are valued internationally (Watson et al., 1997; Mata and Fuerst, 1997; Palvia et al., 2002).

Table 6. Comparison of the Ranking of Issues for Estonia and Norway

	Current Study	Gottschalk et al. (2000)
	Rank	Rank
Improving information security and control	1	14
Making effective use of data resource	2	10
Building and maintaining reliable information systems	3	8
Assuring software quality	4	7
Enterprise systems e.g. ERP and EDI	5	
Promoting standards for hardware, software and data	6	19
Using IT satisfy the needs of users and organizations	7	
IT awareness among top management/leaders	8	
Improving the general IT skills of end-users	9	23
Improving inter-organizational IS planning	10	3
Recruiting and developing IS human resource	11	6
Keeping update with new trends in IT	12	24
Improving link between IS strategy and business strategy	13	3
Implementing IT for e-commerce/e-government	14	20
Measuring IS effectiveness and productivity	15	11
Ensuring the physical security of computer systems	16	
Implementing and improving computer networks	17	15
Using IT for competitive advantage	18	2
Organizational learning and the use of IS technologies	19	
Planning and implementing a telecommunication systems	20	21
Developing an information architecture	21	4
Alliances and linkages with other Western (EU) organizations	22	
Legislating software copyright protection	23	
Building and controlling a responsive IS infrastructure	24	5
Loss of skilled IT workers to foreign countries	25	

Implications for Practice

Having updated the previous study conducted over a decade ago, we no longer need to rely on those findings for Estonia by Dexter and colleagues. IT professionals and their counterparts in management positions can now gain a better understanding of current critical issues in the country. In many respects, our study has contributed to practice by discussing the critical issues facing the country during the next three to five years. We found that half the critical issues in the 1990 studies, such as "Improving information security and control," "Building and maintaining reliable information systems," and "Promoting standards for hardware, software and data" are important for the 2000s as well. This might suggest that little attention were given to these issues following the previous publication, or perhaps more effort is required to reduce their critical "key IS issue" status. Maybe these issues are simply here to stay.

Many of the higher-ranking issues in the top ten list for Estonia are operational in nature, which might be a reflection of the country's economic development level. Our study suggests that over the next few years, Estonian organizations will continue to grapple with operational issues pertaining to IT systems. This information might be a blessing for IS/IT vendors and consultants who can better serve Estonian organizations as promotional opportunities for IT systems emerge. Our study suggests that top management and end-users of IT systems may need to update their IT system skills. Educators in Estonia may find the information in this study useful as they train skilled IT professionals for its rapidly changing economy. Our data suggests continued cooperation between Estonian IT professionals and their non-IT counterparts in order to bridge any cultural gaps that may ensue (Ward and Peppard, 1999). Finally, the government of Estonia may also benefit knowing that organizations across both sectors of the economy hold comparable views regarding key IS management issues. This would suggest that efforts to support the development of IT issues have spread across all sectors of the economy and should continue.

Implications for Research

This is the *second* effort to publish key IS management issues in Estonia. The IS research community benefits from the cumulative knowledge from this current study (Berthon et al., 2002). Our findings are valuable for researchers interested in the management of global IT issues (Palvia et al., 2002) and we concur with others that key IS management issues, though universal in nature, should not overlook the level of economic development for individual nations (Watson et al., 1997; Mata and Fuerst, 1997; Gottschalk et al., 2000; Palvia et al., 2002). Our study found that such distinctions are relevant in the way key IS management issues are discussed or valued nationally. For example, the data used for Norway (a developed economy) and Estonia (an emerging economy) indicated a clear distinction between the two countries (economy types). Further, our findings permit us to suggest that key IS issues of a country might change as the country's economic development or status changes. Estonia was struggling economically in the early 1900s, and infrastructural

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issues (such as the provision of telecommunication systems) ranked higher. These issues are less important today probably because of greater wealth and better integration within the EU economy (IMF, 2000; WEF, 2004; CIA: World Factbook, 2005; Ifinedo and Davidrajuh, 2005). Accordingly, we should direct research efforts toward investigating this proposition in the context of other rapidly developing nations in the Baltic region or elsewhere.

Evidence from our study supports the notion that a cultural gap exists between IT and non-IT professionals (Galliers et al., 1994; Ward and Peppard, 1999; Khandelwal, 2001; Senn, 2003). We found that this accounted for the largest divergence of views among our respondents. Further, our finding indicates a consensus relating to key IS issues may exist among respondents in countries where the level of cooperation between the private and public sector is high, as is the case in Estonia. This area is open for further research.

Limitations of the Study and Future Research

It is important to note that there are limitations to this study. As with most key IS issues, our sample is convenient and self-selected. Although we attempted to enlist a variety of opinions from different sectors, industry, and professions, it is possible that our selection of participants is biased. The Delphi method we used involves ranking (as opposed to rating) issues, and perhaps this approach is more challenging to respondents and might be a limiting factor. Because of differences in methodology, our decision to use data from Norway might have caused limitations. The sample size of this study is small, and perhaps a larger sample would yield better results. However, in the context of this research setting (Estonia has a population of about 1 million); the final sample of 47 participants incorporating a wide range of views and is adequate in comparison to similar studies.

We limited the number of issues to 25, because ranking more issues would be difficult. We merged issues (ERP and EDI) that appear to be unrelated. This may have produced a flaw in our study, and these two issues could rank differently if separated. However, we found similar rankings of these issues and comparable technologies in Luftman's (2005) work. It is possible that certain issues are over-represented, and others might be under-represented due to reporting styles. Palvia and Basu (1999) suggested placing issues into higher-order factors, to include similar or related issues. We did not use this approach, because we compared our results with studies that used similar reporting methods as ours.

Future studies in Estonia should endeavor to update the key IS issues study at regular intervals. An interval of a decade between the current study and the previous may not permit useful insights. The example set by the SIM is worthy of emulation. Also, more insight regarding key IS issues may surface through case interviews with Estonian organizations and follow-up interviews with participants. Future studies should consider these approaches. Additionally, we recommend dividing issues into "application and technological development issues" and "managerial concerns," as

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seen in Luftman's (2005) work, and the grouping of related issues into higher-order issues may be enriching (Palvia and Basu, 1999). Also, this study suggests a need for further inquiry to be made regarding how Estonian organizations can bridge the reported diverging views between IT professionals and their business colleagues.

CONCLUDING REMARKS

Researchers and practitioners can benefit from this study. The updated information of the key IS issues for Estonia will provide the IS research community and both local and foreign IT practitioners with relevant information regarding critical IS management issues facing Estonia over the next three to five years. Policy makers in Estonia can use the information to identity critical areas requiring urgent attention over the coming years. Given the increasing relevance of the country and region regarding ICT investments, and related issues, we hoped this endeavor adds to the body of knowledge on IS issues in the literature, for the region. Lastly, although some new issues emerged in the current study and a few of those ranked highly, there is no evidence to suggest that the key issues for Estonia are unique to its environment. In fact, the issues are universal in nature. On the other hand, the priority accorded key IS issues is what appears to differ; and this information would be valuable to global IT management and research.

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