



# A snapshot of key information systems (IS) issues in Estonian organizations for the 2000s

A snapshot of  
key IS issues

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## Abstract

**Purpose** – The purpose of this paper is to highlight key information system (IS) issues in Estonian organizations for the mid-2000s. This research is a follow-up to an initial effort in the country in 1993, in which a similar theme was investigated. The primary objective of this present study was to compare and contrast the findings in the previous study with the present effort.

**Design/methodology/approach** – The Delphi method was used. Viewpoints of both information technology (IT) professionals and non-IT professionals (business managers) in the country were sought across two rounds of the Delphi method.

**Findings** – The findings suggest the following: the past decade has produced salient changes in the ranking of key IS issues for Estonia; it appears that there is a convergence of opinions on key IS issues in both the Estonian public and private sectors; and there are significant differences in key IS issues across professional groupings (IT and non-IT).

**Research limitations/implications** – The ranking of issues as opposed to rating issues was used in the data analysis. Ranking items is more challenging to participants and might be a limiting factor. The sample size of this study is small and perhaps a larger sample would yield better insights.

**Practical implications** – Those in charge of IT resources in Estonian organizations, as well as policy makers in the country, may benefit from the information provided herein. Such insights may facilitate better understanding of current key IS issues in the country.

**Originality/value** – This research offers a snapshot of key IS issues in Estonian organizations for the mid-2000s. More importantly, this work complements a prior study on the same topic that was conducted in the country in the 1990s.

**Keywords** Estonia, Information management, Critical success factors, Private sector organizations, Delphi method

**Paper type** Research paper

## Introduction

As countries in Central and Eastern Europe (CEE) continue to undergo socio-economic transformations, research studies from that region have begun to appear in the literature (Meier, 2000; Tibar, 2002; Melnikas *et al.*, 2006; Alas and Vadi, 2006; Kooskora, 2008). Our study of the literature indicates that an important key resource for the survival of organizations, namely information technology (IT) systems, has not been featured prominently. This is the main motivation for this research. The use of IT and information systems (IS) has become a necessity in all modern organizations (Porter and Millar, 1985; Luftman, 2005). However, there are challenges where such systems are being used. Rapidly changing business environments are often accompanied



by the emergence of diverse technologies and focus (Cash *et al.*, 1992; Watson *et al.*, 1997; Khandelwal, 2001; Luftman, 2005). Suffice it to say that what is critical today may become irrelevant tomorrow. It is therefore imperative for those in charge of IT systems, namely IT professionals and to some extent management of organizations to be aware of trends in IT/IS (Niederman *et al.*, 1991; Brancheau *et al.*, 1996; Luftman, 2005).

Key IS issues in several countries/regions of the world have been featured in IS literature (Palvia *et al.*, 2002; Dexter *et al.*, 1993; Watson *et al.*, 1997; Gottschalk *et al.*, 2000). The literature also shows that Dexter *et al.* (1993) investigated and reported key IS issues in Estonia for the 1990s. However, a follow-up study was not conducted and their findings may now be outdated. In fact, several changes have taken place in Estonia since the work of Dexter *et al.* (1993) was published (Datamonitor, 2001; Tibar, 2002; Nissinen, 2002; Ifinedo and Davidrajuh, 2005; Alas and Vadi, 2006; WEF, 2008). It is critically important to provide new insights so as not to inadvertently mislead those unfamiliar with the country and region. Moreover, Dexter *et al.* (1993) emphasized the need to replicate their study in the future as Estonia continues to transform technologically, politically and economically.

As was noted, the country has changed sufficiently in the last decade (Alas and Vadi, 2006; Tibar, 2002; Nissinen, 2002; WEF, 2008) to warrant a new study of key IS issues in the country's organizations. Such a study will enhance the understanding of critical IT management issues from the perspective of organizations located in CEE. By focussing on this issue, our research study contributes to the literature by adding to the growing body of works that have investigated key IS issues in CEE (Dexter *et al.*, 1993; Dekleva and Zupancic, 1996). It also increases the emerging literature on topical issues concerning IT and other management issues in CEE (Tibar, 2002; Nissinen, 2002; Alas and Vadi, 2006; Melnikas *et al.*, 2006; Kooskora, 2008).

Specifically, this research aims at providing a snapshot of key IS issues in Estonia for the mid-2000s. In this regard, the primary objective of this study is to provide answers to the following questions:

- What are the key IS issues in Estonian organizations for the mid-2000s?
- How do key IS issues in this study compare with those previously reported for Estonia?
- How do the issues compare across work sectors and professions?

Admittedly, studies of key IS issues around the world have been criticised for their lack of theoretical frameworks (Gottschalk *et al.*, 2000). Nonetheless, insights from such studies may serve as input for decision making at macro and micro levels of an economy. Likewise, academicians with interests in critical IT issues in a country or region may find such studies useful.

### Overview of the related literature

Researchers (Brancheau and Wetherbe, 1987; Niederman *et al.*, 1991; Brancheau *et al.*, 1996; Pimchangthong *et al.*, 2003; Luftman, 2005) around the globe have investigated and reported key IS issues in their countries/regions. 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). Put differently, key IS issues encompass threats and/or problems

that may hamper the use of IT in organizations. Knowledge of such issues is important for those in charge of IT resources.

Studies of key IS issues began in the 1980s in the USA. The Society for Information Management sought to identify key IS issues facing its executive members. Ball and Harris (1982) conducted the first survey of 18 issues, with a follow-up survey in 1983. The uncovered key IS concerns included “Using IT to satisfy the needs of users and the organization”, “Improving information security and control”, and “Improving link between IS strategy and business strategy”, among others. On reporting the latest issues in the USA, Luftman (2005) commented that some of the key issues that were first mentioned in the 1980s continue to be relevant even after two decades.

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), Gottschalk *et al.* (2000), and Pimchangthong *et al.* (2003), respectively, provide information for Estonia, the UK, Slovenia, Norway and Thailand. It is important to point out that the study by Watson *et al.* (1997) showed that perceptions of key IT issues vary by country/region. They suggested that such differences may be linked to socio-cultural and economic differences. Thus, generalizing results across countries may be misleading. The foregoing reality is the motivation for this study that investigates key IS issues in Estonia, an emerging society.

Differing approaches have been used to investigate the issues. For example, Niederman *et al.* (1991) classified key IS issues into the following four groups: business relationships, 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. With respect to research methodology, the most popular approach for such studies is the Delphi method (Brancheau *et al.*, 1996; Gottschalk *et al.*, 2000).

It has been argued that better insights into key IS issues could emerge when the views of both IT professionals and business professionals are enlisted (Ward and Peppard, 1999; Senn, 2003). To that end, Gottschalk *et al.* (2000) and Khandelwal (2001) included both IT professionals and business managers in their work. We intend to do likewise in this study. Others have levelled further criticisms at key IS issues studies as well (Gottschalk *et al.*, 2000; Palvia *et al.*, 2002; Ifinedo, 2006). Khandelwal (2001) asserts that it is a major omission to exclude the views of public sector organizations. He noted that the operating environments in the private and the public sectors differ considerably from each other (Mansour and Watson, 1980). In this light, studies relying solely on data from one sector may not be representative. Furthermore, in a study of key IS issues in Canada, Pollard and Hayne (1996, p. 74) state that “the largest number of significant differences occurred between public and private firms”. Our study intends to include views from both the public and the private sectors.

### Background information: Estonia

Estonia is one of the Baltic states with a population of about 1.3 million people and was a democracy before the Soviet Empire absorbed it in the 1940s (Ifinedo and Davidrajuh, 2005; *CIA World Factbook*, 2008). It is an emerging economy in CEE (*CIA World Factbook*, 2008). 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 other small nations that recently left the Soviet Bloc. Recently, Estonia is a European Union (EU) country, which joined on 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 (Ifinedo and Davidrajuh, 2005; WEF, 2008). In summary, readiness indicators include the availability and use of IT products and infrastructure for national development. Furthermore, countries in CEE, including Estonia are becoming more and more important as major recipients of IT investments from organizations in the developed West that are looking for skilled labor and cost advantages (Carmel, 1999; Datamonitor, 2001; Nissinen, 2002; Melnikas *et al.*, 2008).

### Research methodology

This study used the Delphi method also used by Dexter *et al.* (1993) in the previous key IS issues study in Estonia. The Delphi method is inexpensive and appears to be the preferred and most widely used approach to research (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). We discovered that securing assurance of continued participation from our respondents was becoming difficult. As a consequence, we had two rounds in our Delphi method instead of the three rounds that Dexter *et al.* (1993) used. Nissinen (2002) discusses 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 Delphi method research (Ifinedo, 2005).

Some researchers have raised questions about the ranking and rating of scores in Delphi methods. 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).

The previous statement provided the information on which our decision to use the ranking approach in our study was based. It is also a practice among key IS studies researchers to use Kendall's *W* coefficient of concordance to assess consensus across rounds. Fortunately, a higher Kendall's *W* coefficient of concordance over the two rounds in our study indicates our respondents moved toward consensus. It is worth noting that previous studies employing three rounds or more indicate negligible differences between the higher rounds (Niederman *et al.*, 1991; Dekleva and Zupancic, 1996). Other studies have also successfully used only two rounds (Dekleva and Zupancic, 1996).

While some studies have started from scratch, identifying key IS issues in their respective countries (Dekleva and Zupancic, 1996), others simply borrowed issues from previous studies, even when the level of economic development differed (Pimchangthong *et al.*, 2003). The questionnaire used in this study consisted of 25 key IS issues derived from three main sources. First, because one of the objectives was to compare our findings with those of previous studies of Estonia, we retained the top ten

key issues from the previous work of Dexter *et al.* (1993). These are listed 1-11 in Table I below (there was a tie between the tenth and 11th items in the Dexter *et al.* study). Others (Luftman, 2005) provide support for this exercise. For example, Luftman (2005) found that the items related to “IT strategy planning” and “Attracting and retaining IT professionals” made the top ten list for 24 years in the USA.

Next, we asked four Estonian experts (IS managers and academicians) what they believed were the most important IS issues facing Estonian organizations over the next three to five years. They provided us with eight distinct issues among others; these are listed 12-19 in Table I. This method of eliciting views from professionals is consistent with key IS management studies (Ball and Harris, 1982; Brancheau and Wetherbe, 1987; Niederman *et al.*, 1991; Dexter *et al.*, 1993).

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. Accordingly, Norway became a natural choice because of its cultural and geographical similarities to Estonia (Ifinedo and Davidrajuh, 2005). Since key IS studies often predict future issues, the previous findings from a 2000 Norway study are suitable for our study. Therefore, we obtained six issues from the Gottschalk *et al.* study, which are listed 20-25 in Table I. There is a possibility of bias resulting from the list of issues derived; nonetheless, we are confident that the main research objective of presenting a snapshot of IT concerns in Estonian organizations for the time frame will be met.

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

**Table I.**  
The key IS issues  
included in the study

Of note is the fact that 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. The issues were listed in random order and delivered to the participants.

#### *The first round*

The first round enlisted participants for the survey from different sources. A network of associates was used to solicit participation in the study. Requests for participation in the study were made to IS/IT managers and other key management personnel. Respondents completed the self-administered questionnaires and returned them. Dexter *et al.* recommended sampling the views of at least one professional IS society in the country. To that end, 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 is available on their web site: [www.eits.ee/](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 issues submitted by three or more respondents. Of 135 questionnaires administered or e-mailed, 60 were returned, with a response rate of 44.4 per cent. Table II lists the ranking order, mean and standard deviation for round one.

#### *The second round*

Again, we contacted the participants from the first round. We sent them a summary of the results. This 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. 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 e-mail explaining the purpose of the study. We gave additional information about the study to those who had not participated in round one. The webpage summarized results from round one. Again using contacts, we enlisted 25 new participants, including IT professionals and business managers who had not participated in round one. We gave the new participants a summary of the 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.

Key IS issue	Round one			Round two		
	Rank	Mean	SD	Rank	Mean	SD
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 ISs	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

**Table II.**  
Ranking of the key IS  
issues for rounds  
one and two

The second round yielded 47 responses with an effective response rate of 30.1 per cent. Table II shows the results of round two.

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. Kendall's  $W$  ranges from 0 to 1 (1 – complete agreement and 0 – complete disagreement). Kendall's  $W$  was 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." Another plausible reason for differences across the two rounds might be attributed to the changing profile of participants in our study. Confident of an improved consensus over the rounds, we will now use the results from the second round to discuss our findings.

#### *Respondents' profile: the second round*

A total of 33 respondents were male (70.2 per cent), and 70 per cent of the sample population was between 20 and 49 years of age. Over 90 per cent of them were university graduates. For simplicity, we classified their professions into two main groups: IT professionals and non-IT professionals. Respondents classified as IT professionals included IT managers, IT directors, IT lecturers and software developers. The non-IT professionals included 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. Table III shows the distribution of the respondents by sector, profession and industry.

### Discussions

The rankings of the key IS issues in Estonian organizations for the 2000s is shown in Table I. With the exception of a few issues, all the key issues change places sparingly over the rounds. 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. Next, we will briefly discuss the top ten issues in Estonian organizations, as listed in Table IV.

#### *Improving information security and control*

The objective of this study was not to uncover why certain issues ranked highly and others, lowly. That being said, issues related to IS security control and software piracy concerns were reported to be major threats to Estonian organizations in the mid-2000s (Estonian Ministry of Foreign Affairs, 2003). Perhaps, the number one item in this study affirms that reality. The respondents in our study 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.

Variable	Frequency	Percentage
<i>Sector</i>		
Public	17	36.2
Private	29	61.7
Others	1	2.1
Total	47	100.0
<i>Profession</i>		
IT	20	42.6
Non-IT	27	57.4
Total	47	100.0
<i>Industry type</i>		
Financial institutions	5	10.6
Education (tertiary)	10	21.3
Government ministries and agencies	9	19.1
Health services	2	4.2
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

**Table III.**  
The respondents' profile



Key IS issue	Current study Rank	Dexter <i>et al.</i> (1993) Rank
Improving information security and control	1	5
Making effective use of data resource	2	10
Building and maintaining reliable ISs	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

**Table IV.**  
Comparison of the  
ranking of the current  
study with the previous

### *Making effective use of data resource*

The second most important issue is “Making effective use of data resource.” Clearly, the results indicated the least disagreement on this issue (please see the standard deviation in Table II). 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 Estonian organizations. This suggests that as Estonian organizations transit from a state-run, closed system to an open one in which information and data are vital, the need to effectively use such resource may become more cogent.

### *Building and maintaining reliable ISs*

“Building and maintaining reliable ISs” ranked third in the order of importance. This key issue is related to the most important item on the top ten 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*, 2008), 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.

*Assuring software quality*

The fourth most important issue is “Assuring software quality.” Our respondents indicated that the lack of software quality will be an important issue for organizations during the next few years. In the course of discussions with some of the IT professional interviewed, we noticed that this issue was continually mentioned as one deserving of attention. This permits us to suggest that Estonian organizations have started to accord quality and standards issues more attention, perhaps more than they did during the Soviet era (Dexter *et al.*, 1993; Nissinen, 2002; Alas and Vadi, 2006). The appearance of this item as the fourth most important issue underscores its significance among experts in the country.

*IT awareness among top management/leaders*

The fifth most important key IS issue for Estonian organizations is: “IT awareness among top management/leaders”. Its appearance in the top ten 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 literature put forth by 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. Evidence in support of the foregoing statement is available in the literature (Nissinen, 2002; Ifinedo and Davidrajuh, 2005; *CIA World Factbook*, 2008).

*Improving the general IT skills of end-users*

In sixth place is “Improving the general IT skills of end-users.” This is an operational issue which is closely related to the preceding key IS issue of “IT awareness of top management.” This is consistent with the following rationale: as the population becomes exposed to new ways of life and thinking, the need to develop and improve their skill levels is apparent. 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.

*Enterprise systems, e.g. ERP and EDI*

In seventh place is “Enterprises systems and applications” such as ERPs and EDI, which are becoming increasingly important in the operations of Estonian organizations (Ifinedo, 2008). ERP vendors are targeting the emerging economies of Eastern Europe for business (Clouther, 2004; Ifinedo, 2008), 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 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 (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 organizations must heed it. Needless to say users of IT in post-Communist Estonia would expect such resources to meet and satisfy their personal and organizational needs (Nissinen, 2002; Ifinedo, 2005; 2006); thus we can say, the occurrence of this item in the top ten list is consistent with realities in the country (Nissinen, 2002; Tibar, 2002; Ifinedo and Davidrajuh, 2005; Melnikas *et al.*, 2006).

#### *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”. Our respondents affirm that standards for hardware and data need to be enforced. The few IT experts in the country with whom the researchers 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 suggested 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 is one of the major problems facing post-Communist Estonia. Unlike the Soviet era where mobility of labor was severely restricted, skilled IS professionals in modern Estonia have the liberty to immigrate to greener pastures. In fact, The *CIA World Factbook* (2008) continues to report a negative migration rate for the country, perhaps due in part to the aforementioned issue. The country has to face up to the challenge of recruiting, developing, and retaining its skilled labor especially those in the IS/IT sector.

#### *Comparison with the previous study by Dexter *et al.* (1993)*

Our study shows 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 20 issues common to both studies and 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. Inspection of both ranking orders produces a few salient points. Table IV 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 (Luftman, 2005). In this study, 50 per cent of the top ten key issues in the 1990s remain critical for Estonia in the 2000s. It is important to point out that most of these recurring issues are operational in nature.

“Planning and implementing telecommunication systems,” ranked as the most important issue for Estonia in the 1990s, but moved to 20th place in the 2000s. Similarly, “Implementing and improving computer networks” ranked 3rd in the previous study and 17th in the current study. These two aforementioned issues and other similar issues indicate that as Estonia changes socio-economically (HDR, 2008), 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 position 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” and “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 list 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*

Using the Mann-Whitney *U*-test, we compared the issues across the two groups individually. Table V presents only the issues in 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 lowest ranking issues in the current study in Table IV. 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.

*Comparison between public and private sectors*

Data analysis using the Kendall Tau-*b* Coefficient test, which is significant at  $p > 0.05$ , showed a slight difference of opinion between the public and private sectors in Estonia. Of note is the fact 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” presented 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

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

**Table V.** Differences between Estonian IT and non-IT professionals on three top ten issues

issue than 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. In fact, the operating environment of public organizations differs significantly from private organizations (Mansour and Watson, 1980).

### Conclusion

This study provides a snapshot of the key IS issues in Estonian organizations for the 2000s. As the country transits from Communism to the capitalism, the use of IS resources and their management would become more pervasive. New problems and challenges would confront those in charge of IT resources in Estonian organizations. Studies focusing on IT issues in the Baltic region are sparse in the literature. To that end, this present effort would be well received by managers and academics wishing to gain a better understanding of current critical IS issues in Estonian organizations.

We found that many of the higher-ranking issues in the top ten list were operational in nature. Our study permits us to suggest 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. We found that top management and end-users of IT systems may need to update their general IT system skills levels. Furthermore, educators in Estonia may find the information in this study useful as they provide needed skills for a rapidly changing economy. The findings in this study ties in with results from other works indicating that the highly ranked key IS issues in developing and transiting economies, tend to be of operational imperative (Palvia *et al.*, 2002; Pimchangthong *et al.*, 2003). This is in contrast to the strategic concerns that top the list for more advanced countries (Watson *et al.*, 1997; Palvia *et al.*, 2002; Lufman, 2005). We contend that key IT concerns in Estonia would mirror those in more advanced nations as the country rapidly develops (see Ifinedo and Davidrajuh, 2005 for more detail).

Our data suggest continued cooperation between Estonian IT professionals and their non-IT counterparts is needed to bridge any cultural gaps that may ensue between the two (Ward and Peppard, 1999). The Government of Estonia may also benefit from 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. Policy making in the country benefits from knowing the critical areas deserving of attention over the coming years.

With respect to research, this is the second effort to publish key IS issues in Estonia. Our findings indicate that key IS/IT management issues in a country might change as the country's economic development or status changes. This insight may provide a base for future inquiry. Our results lend credence to the view that a cultural gap exists between IT and non-IT professionals (Galliers *et al.*, 1994; Ward and Peppard, 1999; Khandelwal, 2001; Senn, 2003). In fact, we noticed that this accounted for the largest divergence of views among our respondents. The body of knowledge in this area of study benefits from our findings in this regard.

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, industries 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. The sample size of this study is small, and perhaps a larger sample would yield better results. It is possible that certain issues are over-represented, and others might be under-represented due to reporting styles. Caution must be exercised in generalizing the study's finding to the latter part of the decade. Advances on the IT fronts, especially those appearing in the latter part of the decade, are not included in this work. Future studies in Estonia should endeavor to update the key IS issues study at regular intervals. Studies of this nature in the country should be conducted at short intervals. An interval of a decade as occurred between the current study and the previous one may not permit useful insights.

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