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Uncertainties and Risks in the Implementation of an E-Learning Information Systems Project in a Higher-Learning Environment: Viewpoints from Estonia

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Abstract. This paper investigates the sorts of risks and uncertainties inherent in implementing an e-learning information systems project in Estonia. The study uses a variation of the Delphi study in eliciting the risk factors or items from experienced top management professionals within the organisation. The main objective of the study is to identify the uncertainties or risks in the implementation of the systems, using the viewpoint of Estonia, which is an emerging economy. The findings of the work indicate that wrong development strategy, staff volatility, change in top management and lack of funding are amongst the top risk factors in implementing e-learning in Estonia. On the other hand, risks emanating from users' involvement and commitment seem to be viewed as less critical to the success of the project.

Keywords: E-learning; risk; uncertainties; Delphi study; information systems development; Estonia.

1. Introduction

The wave of socioeconomic and political activities sweeping through Eastern Europe, including Estonia, has brought about marked changes in the lives of the peoples of the region (The World Bank Annual Report, 1998; World Bank, 2002). First, the political liberalisation that followed the break-up of the Soviet Union is noteworthy. Second, some of the Eastern European countries, including Estonia, recently joined the European Union (EU portal, 2004). Apparently, these changes support fledgling democracies, in which dependencies on, or the need to develop information systems (IS) projects for use and survival hinges. Estonia has been successful with the diffusion, deployment, adoption and use of IS (see, for example, Laur, 1999; Kalvet *et al.*, 2000; Tiits *et al.*, 2003; WEF, 2004).

Surprisingly, very little knowledge exists in IS literature with regard to the challenges facing these emerging Eastern European nations, including Estonia, with respect to the sorts of risks associated with developing or implementing IS. Against this backdrop, this present paper sets out to identify and produce a rank-order list of the typical project risk factors encountered in the course of managing the implementation of an IS project relating to e-learning systems in Estonia. The main questions that this paper aims to answer are: What are the risks or uncertainties associated with managing the implementation of an e-learning IS project in Estonia? Which risk factors are critical and which ones are not?

A review of IS literature on the issues of risk factors in IS and project management indicate that a majority of the research tends to come from the industrialised nations, with little or no information emanating from Eastern Europe. Yet, the globalisation of work activities of some major IT companies had been extended to the region (Carmel, 1999). Also, countries in the region are making progress in the use of IS/IT in linking to the increasingly networked economy (WEF, 2004). Therefore, it is hoped that the contribution of this study will widen our knowledge with respect to the sorts of risks that could be encountered as IS projects are carried out in the region, in general terms.

The rest of the paper is organised as follows: First, a review of IS risk management is discussed. Second, an overview of IT in Estonia and socioeconomic indicators of Estonia are presented. Third, the research settings, strategy and method are dealt with. Finally, the discussions and conclusion sections follow, with future research directions given.

2. Literature Review

To begin with, our notion of uncertainty or risk herein refers to an item that is said to denote a particular aspect or property of a development task, process or environment, which, if ignored, will increase the likelihood of the failure of a project (Ropponen and Lyytinen, 2000). Additionally, Barki *et al.* (1993) make no distinction

between uncertainty factors and risk factors — they are said to refer to the same notion (at least in IS literature). Thus, uncertainty and risk is used synonymously in this paper. Further, other definitions of risk amongst others include a condition that can cause threats to the completion of the development of a software or an IS project (March and Shapira, 1987). Also, Barki *et al.* 1993 explain project development risk by constructing a mathematical equation relating uncertainty associated with the project and the magnitude of potential loss with the failure of the project. In the same vein, our notion of a failed project is one in which the project does not meet its set objectives and goals, cost escalation is pervasive, end-users' satisfaction and management support is not gained, to mention but a few. Conversely, a successful project refers to an initiative where stakeholders experience significant desirable outcomes (Lyytinen, 1988; Standish Group, 2001; Heeks, 2002). The aforementioned items/factors with respect to a successful or failed project are some parameters by which any project's success or failure tales are recounted.

That said, the are inherent difficulties in managing information systems development (ISD) projects, because it is widely accepted to be a process fraught with uncertainties and risks (Alter and Ginzberg, 1978; Zmud, 1980; Beath, 1983; Nidumolu, 1995), and in serious cases, failure is the inevitable outcome (Lyytinen and Hirschheim, 1987; Lyytinen, 1988; Ewusi-Mensah and Przasnyski, 1994, 1995) when such project risk items or factors are not properly or successfully managed (Lyytinen, 1988; Charette, 1989, 1996; Boehm, 1991; Barki *et al.*, 1993). Numerous accounts in extant IS and other trade literature give account of failures of IS; and some examples include the failed Taurus project (Drummond, 1996); the failed reservation systems at French Railways (Mitev, 1996) and many more; see also Al-Karaghouli *et al.* (2000) and Lyytinen and Robey (1999). The thrust of IS research into failed ISD projects should not aim at seeing such failed projects as embarrassing incidents but as opportunities from which useful lessons could emerge (Abdel-Hamid and Madnick, 1990; Ewusi-Mensah and Przasnyski, 1995). In this regard, avoiding or reducing the impact of risks, especially those that can be managed in ISD projects, has inadvertently commanded prominent positions in IS discourse, with phases such as identification, assessment and management (Charette, 1989, 1996; Boehm, 1991) gaining prominence amongst researchers and practitioners in the software engineering and IT project management disciplines. Of note, in the theory of risk management, some commentators have noted that there are "outside" risks (those that the project manager has no control over) and "inside" risks (those that the project manager has control over and could be monitored). In the middle are those items that the project manager has limited control over; in other words, items she/he could influence to some degree (March and Shapira, 1987; Lyytinen, 1988; Powell and Klein, 1996; Keil *et al.*, 1998; Schmidt *et al.*, 2001).

To this end, the objective of this work is not to deliberate upon the theories of risk management in ISD; rather it sets out on the path of identifying risk factors in implementing and managing e-learning IS for higher learning in Estonia. We are not directly concerned with the investigation of the management strategies used to ameliorate such uncertainties; our concern is on the initial step in risk management, which is risk identification. Keil *et al.* (1998) stated, "One explanation for the high failure rate is that managers are not taking prudent measures to assess and manage the risks involved in these projects". To this end, this present study attempts to identify the sorts of risks that might be encountered in implementing IS systems within a higher-learning (university) environment.

Interestingly, within higher-learning (university) environments, uncertainties and risk have been discussed in the context of implementing IS systems in the developed world. In fact, several researchers in developed countries have documented instances where a variety of risks and uncertainties are reported to plague the development and implementation of IS projects within university ambience. For example, the sort of problems encountered in deploying enterprise resource planning (ERP) systems in Cleveland State University, U.S.A., is one example (Stedman, 1999). Other cases could be gleaned from studies by Davidson and Burrow (1990), Sieber *et al.* (1999) and Walko (1999). By the same token, some U.K. researchers have come up with a framework for managing IS projects in higher education (Anonymous, 2002). Realistically, such an effort might have been done in the context of that society — highly developed. However, it may be worthwhile to argue that using such a framework for regions whose IS project risk factors (including those peculiar to higher-learning environment) have not been adequately researched may bring no good at all. Sadly, very limited information exists with regard to the sorts of risks that might be encountered in the course of developing IS projects for universities in emerging economies in Eastern Europe. On the other hand, in the context of a developing country, Nwamarah (2002) and Ifinedo and Uwadia (submitted) find out that the lack of funds, insufficient commitment from top university administrators and lack of infrastructure are some of the risks or uncertainty factors that could impede the success of IS project implementation within the higher-learning environment.

Furthermore, several IS researchers have identified factors and risk items impacting upon the success of

ISD projects (Alter and Ginzberg, 1978; Lyytinen, 1988; Boehm, 1991; Barki *et al.* 1993, 2001; Flowers, 1996; Moynihan, 1997; Ropponen and Lyytinen, 2000). Such risk factors are wide ranging, and in IS literature more often than not differ in taxonomical arrangement, in the sense that risk factors are classified under multifarious headings. Proposed classifications of risk factors in IS and software development projects include those of Barki *et al.* (1993, 2001); Boehm (1991), Keil *et al.* (1998), Ropponen and Lyytinen (1997, 2000), Schmidt *et al.* (2001), Willcocks and Margetts (1994), Kemerer and Sosa (1991), McFarlan (1982), Fairley (1994) and Lyytinen *et al.* (1996). Importantly, this research chooses to report ISD project risks along the patterns and refinements proffered by Schmidt *et al.* (2001), which to a large extent, compares with other mentioned researchers' classifications. The risk-factor list of Schmidt *et al.* (2001) is chosen for its simplicity and understandability.

In particular, risk factors or items leading to IS project failures can be traceable to a variety of parameters spanning the nature of IT (McFarlan, 1981, 1982), lack of users' skills (Alter and Ginzberg, 1978), late delivery, resource insufficiency, user's support, apprehension and support; lack of top management commitment, conflicts, etc. (Schmitt and Kozar, 1978; Boehm, 1991; von Genuchten, 1991; Ewusi-Mensah and Przasnyski, 1994). Other causes of failure in IS projects resulting from risk items include missed schedule (Glaser, 1984), cost overruns (Johnson, 1995) and operational issues (Lyytinen and Hirschheim, 1987). A comprehensive list of risk factors in IS project can be found in the works of Barki *et al.* (1993) and Wallace and Keil (2004). Also, remedies for the risk items that have been advanced, including the use of risk management techniques, effective management skills, users' participation, project management tools, the need to learn from postmortems of failed projects, their management and so forth (Land and Somogyi, 1987; Lyytinen, 1987; Fairley, 1994; Ewusi-Mensah and Przasnyski, 1995; Barki *et al.*, 2001). Yet, other measures include the need to focus on the project critical success factors (Boehm, 1991), effective coordination, formal planning and so forth (Alter and Ginzberg, 1978; Beath, 1983; Nidumolu, 1995; Lyytinen and Robey, 1999).

Despite the plurality of research on risk factors in ISD, projects still continue to generate mixed results — sometimes favourable and at times not. It is sad to note that more negative statistics abound. For example, Ward (1994) provides information regarding these chronic occurrences in systems developments where up to 25 percent of large projects got cancelled, 60 percent experienced cost overruns, 75 percent had quality problems and less than 1 percent of all the systems development projects studied met schedule. The Standish Chaos report (2001) is even grimmer. To militate against the ugly trends, several studies in IS project risk management have surfaced; however, it is regrettable that such studies tend to be centred on mostly western and developed countries, though the problems of failed IS projects is in fact global (Lyytinen and Robey, 1999; Al-Karaghouli *et al.*, 2000).

3. Background of IT and Socioeconomic Conditions in Estonia

Estonia has a population of about 1.4 million (CIA: World Factbook, 2004). Internet penetration in Estonia is amongst the highest in the world. "Estonia has in a short time caught up with advanced countries in terms of information and communication technology (ICT) infrastructure and in the use of ICT in society" (Estonian Embassy, 2004). This is a far cry from the early 1990s where planning and implementing a telecommunication system ranked as the topmost concern on the list of the key issues in IS (Dexter *et al.*, 1993). Estonia has the most advanced information infrastructure compared to any of the former communist eastern European states, and 40 percent of Estonians have computers at home, with online access for businesses put at 80 percent (Anonymous, 2003; WEF, 2004). There are several IT-related projects being initiated by government, putting the country on the path to becoming a full information society (Laur, 1999; UN Chronicle, 2000; Estonian Embassy, 2004). Estonia is a new democracy. Estonia is an upper middle income country with Gross National Income (GNI) per capita of U.S.$ 4140, and Estonia joined the European Union (EU) on 1 May 2004. The economy benefits from strong electronics and telecoms sectors. The economy is influenced by developments in Finland, Sweden and Germany — three major trading partners (CIA World Fact, 2004).

Interestingly, some researchers have called for cross-cultural research into IT in Eastern European and the defunct Soviet Union countries (McHenry *et al.*, 1990); quite a handful of studies exist where attention is focused primarily on the issues of IS and technology in Eastern European countries. The existing few examples, which include the studies of IS/IT in the region (Bahr, 1990; Dexter *et al.* 1993), are dated. Dexter *et al.* (1993) primarily focused on issues of IT in Estonia. However, it has to be noted that a majority of the forgoing examples follow the "Key issues in IS". None of the aforementioned studies deliberated upon the nature of uncertainties and risks in IT project management, *per se.* In light of the current trends in IS/IT in Estonia (Laur, 1999; UN Chronicle, 2000; Tiits *et al.*, 2003) and other comparable countries in

the region, attention is needed in broadening our knowledge in IS-related issues as they unfold. It is needless to say that variations of, or all, the risk factors discussed above afflict IS projects regardless of geography or economy.

4. Research Methodology

Basically, the phenomenon under investigation concerns the identification of risk factors in implementing an e-learning IS project in Estonia. The variation of the Delphi study was used in eliciting viewpoints of participants (Kendall, 1977; Schmidt, 1997). The study was stopped after the second round because assurance of continuity from the expert panel was becoming difficult to secure. The advantages of the Delphi method include its inexpensive nature and ease of use; its encouragement of reflections and enhancement of consensus, which is measured by a statistical measure, i.e., Kendall W, measure the degree of concordance.

4.1. *Research participants and the context*

Four participants agreed to take part in the study, and participated keenly. They are influential functionaries within the organisation with several years of experience in project management and IT. Their average age is 41 years. The participants include three males and a female. They hold the following job posts: Director, Chief Information Officer, IT Project Manager and Project Manager. It is not uncommon for the viewpoints of a small group of experts to be sought on certain matters. It was decided that the anonymity of the organisation and the names of the participants would be maintained. The participants hold university degrees. First, data collection commenced with semi-structured interviews with each of the participants. The participants were asked to enumerate risk factors impacting negatively upon there IS project implementation, which if ignored could lead to the failure of the project. English was used because all the participants are fluent in the language. This method of eliciting information is akin to brainstorming in similar work; see Schmidt *et al.* (2001) and Mursu *et al.* (2000). The participants were given the freedom of choosing their own risk factors based on their experiences and encounters in their job/tasks with the project; rather than having them rank or rate a prepared list items on a questionnaire, at the first meetings. Their responses/answers were tape-recorded. And, after transcribing the recorded information, 14 different project risk factors emerged, which were painstakingly collated. These uncovered risk factors got delineated — where possible — in accordance with the risk factors/items produced by Schmidt *et al.* (2001). Ten other risk factors not mentioned by the participants were added to a new list prepared for the participants. Four risk factors came from Finland — a neighbouring country — from the work of Schmidt *et al.* (2001) and one (erratic telecommunication network) from the work of Dexter *et al.* (1993) and the other four risk items associated with project management in the Standish Group report (2001). The selected risk factors not mentioned by our panelists are marked with an asterisk in Table 1. All the risk items were well-shuffled and then re-administered to the participants. Importantly, a similar approach of elongating a list meant for respondents to rank by Estonian respondents was used by Dexter *et al.* (1993). Lastly, the final list given to the expert panel to rank had 24 risk factors. The participants were asked to rank the risk factors from the most negative factor (1) to the success of their IS project to the least significant risk factor (24). The four participants returned their rank-order instrument, which was keyed into SPSS 10.0 software and relevant statistical analysis performed.

The organisation used in the study is an IT-based institution that specialises in delivering web-based education and other IT-related services in Estonia, has a workforce of about 35 employees. It was founded by a principal information technology body in the country, alongside inputs from the local academia. Network Academy (not the true identity; confidentiality was promised) is essentially an outfit supported by influential entities within the country for the purpose of diversifying learning and higher education for the country. One of the projects of Network Academy is to create a functioning electronic learning environment; namely an e-academy operational on WebCT platform where higher-education level courses could be done by local tertiary students and so on. The project e-academy costs about 400,000 US dollars and one-third is completed.

5. Data Analysis and Results

Kendall's W coefficient of concordance for the Estonian participants is 0.594, which is an acceptable value for this type of study (Schmidt *et al.*, 2001). Each of the top 10 ISD project risk factors in Table 1 is discussed succinctly; so as to shed light on the critical risk factors in implementing the e-learning IS project in the country.

The Standish Group (2001) Chaos report has "formal methodology" as among the top 10 factors that could determine the success of a project. Similarly, Keil *et al.* (1998) and Ewusi-Mensah and Przasnyski (1994) have noted the import of technical expertise in IS project's success. In Estonia, the risk factor of *wrong development*

Table 1. Ranking and the relative importance of risk factors in the Estonian IS project.

Risk item/factor	Rank	Mean	Std. Dev.
Wrong development strategy (e.g., prototyping)	1	2.00	0.82
Staff turnover/volatility	2	5.50	5.20
Change in top management	3	5.75	2.06
Unclear or misunderstood scope of project objectives	4	6.00	6.22
Huge capital requirement/insufficient resources	5	6.25	3.77
Lack of top management support/commitment	6	7.25	6.29
Lack of effective project management skills	7	7.75	6.40
Poor/non-existent control of project	8	8.00	2.58
* Lack of cooperation from users	9	10.50	3.42
Conflicts between departments within the organisation	10	12.50	7.55
Changing requirements, scope and objectives	11	12.75	5.74
* Lack of required IT skills in the development team	12	13.50	5.07
Lack of "people skills" management	13	13.50	6.35
Conflicts among stakeholders	14	14.00	5.83
* Misunderstanding user's needs/requirements	15	14.00	8.41
* Artificial deadlines (unrealistic deadlines)	16	14.50	5.51
* Failure to gain user's commitment	17	15.50	3.42
Lack of effective development in the project	18	16.25	8.54
Inappropriate staffing	19	16.75	4.79
* Trying new development methods	20	18.25	4.03
* Failure to manage end-user's expectations	21	18.50	2.89
* Lack of adequate user involvement	22	18.50	1.73
* Inadequate user's training	23	18.75	3.59
* Erratic and unreliable telecommunication network	24	23.75	0.50

strategy and development approach ranked highest perhaps in the context of the level of IT skills available in the country (Laur, 1999; Bogdanowicz *et al.*, 2003). Moreover, others have noted similar observations; for example, Braliev and Kalvet (2002) quotes the words of an Estonian government official: "In the process of the fast increase in IT business, Estonia continues to lack IT specialists". This risk is within the control of the project manager.

Staff turnover/volatility came in next to the first uncertainty or risk. Estonia is a small country whose economy is linked largely with those of its main trading partners (Bogdanowicz *et al.*, 2003). Workers have been known to migrate abroad in search of greener pastures or change jobs frequently within the country. Invariably, this may affect the continuity, stability and camaraderie within project teams when new hands are engaged, in the middle of a project. Inadvertently, 50 percent of the panelists in the study have less than a 2 year tenure within the organisation. This is a social problem in the country, in spite of its small population size; Estonia is witnessing a negative migration rate, i.e., −0.71 migrant(s)/1000 in 2003 (CIA: World Factbook, 2004). In the same vein, Dexter *et al.* (1993) listed this item among the key issues in Estonia in 1993. There is nothing the project manager can do with this risk item.

Change in top management is the third in the ranking order. The country is witnessing dramatic changes politically, socially and economically. More important, considering the fact that Network Academy was founded by a conglomerate of partners from differing interests groups, it might be that changes at top management of the organisation is susceptible to political and power manoeuvering. Though, the interviewees were not asked if changes at the top occur many a times, the relative position of this item might warrant such a speculative conjecture. Controlling changes and movement of top management is outside the influence of the project manager.

Unclear or misunderstood scope of project objectives has been noted by several researchers in the developed countries as a source of project failures (Ewusi-Mensah and Przasnyski, 1995; Keil *et al.*, 1998; Barki *et al.*, 2001; Schmidt *et al.*, 2001; Standish Group, 2001; Wallace and Keil, 2004). Our Estonian panelists rank this factor high *vis-à-vis* implementing these e-learning IS projects. The project can control this uncertainty.

Due to the middle-income nature of Estonia, it is not surprising that the issue of *funding* of the ISD project ranked highest in the minds of the participants. Insufficient funding of a project can cause the project to be ended abruptly. Resource constraints in ISD projects is discussed by Boehm (1991); in the words of one

interviewee: "... Funding is a big issue to the success of this project. We have to ensure that all avenues for financial resources are always open, in tune with our budgets; otherwise the project might not see the light of day". In order to supplement local funding, efforts are made by the management of the organisation towards securing foreign partners so as to ensure the continuity of the project, which is planned for a 4-year period. When asked why the need for huge capital, the interviewee retorted saying, the equipment and related components are quite expensive to procure and maintain. The issue of foreign aid as a cushion to Estonia was noted in the work of Dexter *et al.* (1993). The project manager may have little or no influence on the issue relating to securing funds for the project.

The lack of commitment and support from the top executives as a risk factor in IS projects' implementation has been discussed in the developed economies (see, for example, Beath, 1983; Keil *et al.*, 1998). The Estonians in our study equally attached significance to this item as a risk factor that needs to be addressed in order to ensure success in their e-learning IS project. One of the interviewees commented that: "One's efforts and achievements is almost a threat to those high above; this makes requesting for and getting support from higher authorities a Herculean endeavour". In fact, it is the most important risk factor among the set of risks that Keil *et al.* (1998) contend as having universal relevance. The Estonian project manger may have limited control with this risk.

Lack of effective project management skills in the project constituted a threat. One interviewee commented: "Before I took this job, I was surprised to find that there were no project management tools and techniques being used for the activities in my department. This is unhelpful". The inability to effectively manage or coordinate activities or tasks in ISD projects is inimical and may threaten the success of the project (Alter and Ginzberg, 1978; Beath, 1983; Boehm, 1991; Nidumolu, 1995; Ropponen and Lyytinen, 2000). In today's management of IS projects, the understandability in planning, scheduling and controlling project resources makes a world of difference. Proper project management skills are beneficial and critical to an ISD project (Land and Somogyi, 1987; Boehm, 1991). Perhaps the lesson is beginning to dawn on practitioners in Estonia. However, the Project Manager proudly informed that the e-academy project currently utilises one of the off-shell projects tools. It is worth noting that the same problem plagues the public sector of Estonia (Laur, 1999).

Poor and non-existent control of project is closely linked with the lack of effective project management skills already discussed above. The rating of this factor among the top risk factors for ISD projects in this organisation highlights the significance attached to the need for using relevant tools, methodology and techniques in managing ISD projects (Kydd, 1989). One of the interviewees opines that in order for success to be guaranteed the organisation must devise efficient means of controlling resources. The particular interviewee felt that the current practice leaves too much to be desired. The need for training of Estonian IT professionals on similar issues was discussed by Laur (1999). On the whole, project managers do have control over issues directly relating to the project and its management.

Lack of cooperation from users has been a recurring theme in many studies pertaining to the success of IS projects (Keil *et al.*, 1998; Standish Group, 2001). Our panelists rank the uncertainties associated with users among the top 10 items.

Conflict between departments within organisation was ranked among the top risk factors, perhaps against the backdrop of the issues of funding for the ISD project or interpersonal conflicts (Casher, 1984). It would be expected that scarcity of resources would create an atmosphere of disharmony resulting from one department trying to secure whatever is open for grabs.

5.1. *Summary of 11th to 24th (non-critical) risk factors*

This group of risk factors relate mainly to users' involvement in the IS project, and other sorts of risks that might ensue from their participation in the project. Incidentally, such items ranked lowly with the Estonian panelists in this study. Further, the nature of communication networks risk factor ranked the least. This is a marked change in comparison to findings Dexter *et al.* (1993) on the key issues of IT in Estonia in the 1990s, wherein this item ranked highest with IT professionals surveyed then. With the benefit of hindsight, implementing telecommunication systems, which was seen to be poor and frustrating in those early periods, i.e., post-independence (Watson *et al.*, 1997), came in as the least risky item that can be associated with implementing the e-learning IS project in Estonia. On the other hand, such factors rank highly with IS project development and implementation in developing countries (Mursu *et al.*, 2000; Ifinedo and Uwadia, submitted). On the whole, a majority of items relating to "users" were not considered critical to the success of the e-learning IS project, bearing in mind that it is they, the users, who would eventually determine the ultimate success of the project. Laur (1999) to some extent give an indication to the place of the users in her article,

where issues relating to them are pushed to the background. In a nutshell, a majority of the uncertainties or risks ranked 11th to 24th can be controlled or influenced by the Estonian project manager.

6. Discussion

This paper has investigated the uncertainties or risks associated with implementing an e-learning IS project in Estonia. In general, the sorts of risk items elicited from and ranked by our experienced panelists do not seem to indicate dissimilarities with others findings from other regions; though it has to be said that this study focuses on a case organisation within Estonia.

Our Estonians panelists ranked issues relating to project management — wrong development strategy — the highest. This is consistent with other observations. Project management has been recognised as an area in which Estonian organisations lack appropriate expertise (Laur, 1999). For instance, Bogdanowicz *et al.* (2003) writes that "Estonian IT companies, for example, are becoming more and more integrated into the supply chains of their Nordic counterparts — thus getting leading edge know-how and project management expertise". Likewise, staff and management volatility ranked highly as an uncertainty with our panelists as they implement their e-learning IS project. Furthermore, funding or capital resource requirement was considered a factor that could kill the project. In the same vein, the support of top management is considered crucial. Additionally, conflicts between departments within the organisation and the lack of "people skills" management ranked high as well. A majority of the risks that could emerge from users' involvement and participation in the ISD project ranked relatively low in this study. This is consistent with the views of Laur (1999) in which she disclosed users' involvement in systems development activities in the public sector are among less demanding issues, whilst project management, strategic planning, IT management issues are considered more pressing. The participants seem not to perceive any threats from the users' attitudes constituting a risk to the ISD project. On the contrary, IS research from the developed world seems to be at variance with such perceptions (McFarlan, 1981; Beath, 1983). It is, however, worthwhile to clearly point out that the findings of this particular endeavour may, in fact, have a strong bearing on the nature of organisation being studied; rather than propose a generic conclusion on the issue of users' expectations, involvement and commitment as not being important for Estonian IS project management and implementation.

Thus, the limitations to this research study relate to the representativeness of the findings in this study *vis-à-vis* the general viewpoint of all Estonian IS projects. Despite enlisting the viewpoints of knowledgeable, it might as well be that the project risk factors enumerated are organisational specific. The sample size of the panelists used may be another factor. Arguably, the sample size of this study is not inconsistent with Schmidt *et al.*'s work. The United States with a population of over 300 million had 19 panelists. Four highly educated and experienced participants representing about 10 percent were used in this study for Estonia, which has a population of about 1 million. In addition, the organisation is not very large; as such, one cannot discount that respondents' responses bias might not have been introduced.

The implication of this study lies in the fact that risk factors associated with implementing an e-learning IS project from the viewpoint of an eastern European and emerging economy is explored and presented. Consequently, the uncovered risk factors presented in this work may serve as a tool in focusing the attention of practitioners in similar settings on critical items that may endanger the success of these IS project implementations. Broadly, the findings of the study adds to the body of knowledge in the IS risk management theory in the sense that risks or uncertainty factors from a region of the world that has not been studied is presented. This perhaps will make the job of local IS practitioners easier in adopting or adapting strategies developed in the west for managing or attenuating such risks, be they in the wider IS project management field or specifically for higher-learning environments.

7. Concluding Remarks

The implementation of any information systems including those pertaining to e-learning has many risk factors associated with it. Some of such risks have been presented in this article as it relates to an emerging economy in Eastern Europe, namely Estonia. The findings of this study are useful in enhancing our knowledge of IS project uncertainties or risk factors from the region, in general and concerning the effort of implementing an IS project within the higher-learning environment in particular. Identifying risks is the initial positive step in the eventual monitoring and controlling of IS projects, especially for those risks items/factors that are within the purview of the project manager. In this study, development strategy, staff and management changes, resource (funding) and effective project management were viewed as critical to the success of IS project implementation, whilst factors relating to the users were deemed less significant to the success of the project. Unreliable communication network,

ranked topmost among the key issues in Estonia in the 1990s, ranked least to our Estonian panelists. However, further research will be needed in expanding the scope of the study. For example, the viewpoints of the users of the e-learning IS would provide additional insights and comparable studies in similar countries of the region could be beneficial.

References

Abdel-Hamid, TK and SE Madnick (1990). The elusive silver lining: how we fail to learn from software development failures. *Sloan Management Review*, 32(1), 39–48.

Al-Karaghouli, W, S Al Shawi and M Elstob (1999). Enhancing the understanding of customers requirements in business software engineering. In *Academy of Business and Administration Sciences International Conference*, 12–14 July, Barcelona.

Al-Karaghouli, W, S Al Shawi and G Fitzgerald (2000). Negotiating and understanding systems requirements: the use of set diagrams. *Requirements Engineering*, 5, 93–102.

Alter, S and M Ginzberg (1978). Managing uncertainty in MIS implementation. *Sloan Management Review*, 20(1), 23–31.

Anonymous (2002). Project Management for Information Systems in Higher Education (PMFISHE), University of Newcastle, School of Management, Information Development Service, April, http://www.ncl.ac.uk/mids/PMF.pdf [1 February 2004].

Anonymous (2003). Estonia Embraces Cyberspace, *Information Management Journal*, July/August, 2003 [3 February 2004].

Barki, H, S Rivard and J Talbot (1993). Toward an assessment of software development risk. *Journal of Management Information Systems*, 10(2), 203–225.

Barki, H, S Rivard and J Talbot (2001). An integrative contingency model of software project risk management. *Journal of Management Information Systems*, 17(4), 37–69.

Bahr, FM (1990). Perspectives on East–West relations in economics and information. *Information Software Technology*, 32(59), 330–336.

Beath, CM (1983). Strategies for managing MIS: a transaction cost approach. In *Proceeding of the 4th International Conference on Information Systems, ACM/SIGBDP*, December.

Boehm, BW (1991). Software risk management: Principles and practices. *IEEE Software*, 8(1), 32–41.

Bogdanowicz, M, J Burgelman, C Centeno, E Gourova and G Carat (2003). Factors of regional/national success in information society developments: information society strategies for candidate countries. *FirstMonday*, 8(10) [13 July 2004].

Brailev, A and T Klavet (2002). Country report. In *The Global Information Technology Report 2001–2002. Readiness for the Networked World*, G Kirkman, PK Cornelius, JD Sachs and K Schwab (eds.), pp. 200–201. Oxford: Oxford University Press.

Casher, JD (1984). How to control risk and effectively reduce the chance of failure. *Management Review*, 73(3), 50–54.

Carmel, E (ed.) (1999). *Global Software Teams: Collaborating across Borders and Time Zones*. Englewood Cliffs, NJ: Prentice Hall.

CIA: World Factbook. (2004). Country Report. http://www.cia.gov/cia/ [1 February 2004].

Charette, RN (ed.) (1989). *Software Engineering Risk Analysis and Management*. New York: Intertext Publications.

Charette, R (1996). The mechanics of managing IT risk. *Journal of Information Technology*, 11, 373–378.

Davidson, PH and DG Burrow (1990). Distributed support model for implementation of library automation (IO) at Indiana University. In *Proceedings of the 18th annual ACM SIGUCCS Conference on User services*, ACM Digital library [4 March 2004].

Drummond, H (1996). The politics of risk: trials and tribulations of the Taurus project. *Journal of Information Technology*, 11, 347–357.

Estonian Embassy, London (2004). Online. http://www.estonia.gov.uk/ [9 March 2004].

Ewusi-Mensah, K and ZH Przasnyski (1994). Factors contributing to the abandonment of information systems development projects. *Journal of Information Technology*, 9, 185–201.

Ewusi-Mensah, K and ZH Przasnyski (1995). Learning from abandoned information systems development projects. *Journal of Information Technology*, 10, 3–14.

EU Portal (2004). http://www.europa.eu.int. [4 May 2004].

Fairley, R (1994). Risk management for software projects. *IEEE Software*, 14(3), 57–67.

Flowers, S (ed.) (1996). *Software Failures: Management Failure*. Sussex: John Wiley and Sons Ltd.

Glaser, G (1984). Managing projects in the computer industry, *Computer*, 17, 45–53.

Heeks, R (2002). Failure, success and improvisation of information systems projects in developing countries. Paper No. 11, Institute for Development Policy and Management, University of Manchester, UK.

Ifinedo, P and C Uwadia. Identifying risk factors in information systems development projects within university environments: perspectives from Estonia and Nigeria. *International Journal of Information Management*. In press.

Johnson, J (1995). Chaos: the dollar drain of IT project failures. *Application Development Trends*, 2(1), 41–47.

Kalvet, T, T Pihl and M Tiits (2000). *Analysis of the Estonian ICT Sector Innovation System.* Tartu, Estonia: Archimedes Foundation.

Keil, M, P Cule, K Lyytinen and R Schmidt (1998). A framework for identifying software project risks. *Communications of the ACM*, 41(11), 76–83.

Kemerer, C and C Sosa (1991). Systems development risks in strategic information systems, *Information and Software Technology*, 33(3), 212–223.

Kendall, JW (1977). Variations of Delphi. *Technological Forecasting and Social Change*, 11, 78–85.

Kydd, CT (1989). Understanding the information content in MIS management tools. *MIS Quarterly*, 13(3), 277–290.

Kumar, RL (2002). Managing risk in IT projects: an option perspective. *Information and Management*, 40, 63–74.

Land, F and EK Somogyi (1987). Project management as an integral part of the management of information systems. In *Infotech State of the Art Report*, pp. 39–57. Maidenhead: Pergamon Infotech Ltd.

Laur, Ü (1999). Trends of IS Development in the Estonian Government agencies. In *Proceedings of the Information Technologies and Telecommunications in the Baltic States, Baltic IT&T '99*, 28–30 April 1999. Riga Congress. http://www.datorpasaule.lv/bitt/conference/friday30.html [2 March, 2004].

Lyytinen, K (1987). Different perspective on information systems: problems and solutions. *ACM Computing Surveys*, 19, 5–46.

Lyytinen, K (1988). Expectation failure concept and systems analyst's view of information systems failures: results from of an exploratory study. *Information and Management*, 14, 45–56.

Lyytinen, K and R Hirschheim (1987). Information systems failures — a survey and classification of the empirical literature. In *Oxfords Surveys in Information Technology*, Vol. 4, pp. 257–309.

Lyytinen, K and D Robey (1999). Learning failures in information systems development. *Information Systems Journal*, 9, 85–101.

Lyytinen, K, L Mathiassen and J Ropponen (1996). A framework for software risk management. *Journal of Information Technology*, 11, 275–285.

March, J and Z Shapira (1987). Managerial perspective on risks and risk taking. *Management Science*, 33(11), 1404–1418.

McHenry, WK, J Snyder and K Lynch (1990). Cross-cultural information technology research: the case of Eastern Europe and the USSR. In *Proceedings of the Eleventh International Conference on Information Systems*, Denmark, 16–19th December, pp. 73–85.

McFarlan, W (1982). Portfolio approach to information systems. *Journal of Systems Management*, 33(1), 12–19.

McFarlan, W (1981). Portfolio approach to information systems. *Harvard Business Review*, 59(5), 142–150.

Mitev, NN (1996). More than a failure? The computerized reservation systems at French Railways. *Information, Technology and People*, 9(4), 8–19.

Moynihan, T (1997). How experienced project managers assess risk. *IEEE Software*, 14, 3.

Mursu, A, K Olufokunbi, HA Soriyan and M Korpela (2000). Information systems development in a developing country: theoretical analysis of special requirements in Nigeria and Africa. In *Proceedings of the 33rd Hawaii International Conference on Systems Sciences.*

Nidumolu, S (1995). The effect of coordination and uncertainty on software project performance: residual performance risk as an intervening variable. *Information System Research*, 6(3), 191–219.

Nwamarah, GM (2002). Networking the Nigerian University Systems: The UNN Experience. http://www.widernet.org/TripReports/February2002/Jos02/jos/Docs/ [12 July 2004].

Powell, PL and JH Klein (1996). Risk management for information systems development. *Journal of Information Technology*, 11, 309–319.

Robey, D, DL Farrow and DR Franz (1989). Group process and conflict in systems development. *Management Sciences*, 35(10), 1172–1191.

Ropponen, J and K Lyytinen (1997). Can software risk management improve systems development: An exploratory study. *European Journal of Information Systems*, 6, 41–50.

Ropponen, J and K Lyytinen (2000). Components of software development risk: How to address them? A project manager survey. *IEEE Transactions on Software Engineering*, 26(2), 98–112.

Sieber, T, K Siau, F Nah and M Sieber (1999). Implementing SAP R/3 at the University of Nebraska. In *Proceeding of the 20th international conference on Information Systems.* ACM Digital Library [4 May 2004].

Schmidt, R (1997). Managing Delphi surveys using nonparametric statistical techniques. *Decision Sciences*, 28(3), 763–774.

Schmidt, R, K Lyytinen, M Keil and P Cule (2001). Identifying software project risks: an international Delphi study. *Journal of Management Information Systems*, 17(4), 5–36.

Schmitt, JW and KA Kozar (1978). Management's role in information systems development: A case study. *MIS Quarterly*, 2, 7–16.

Standish Group (2001). Extreme Chaos. http://www.standishgroup.com [5 July 2004].

Stedman, C (1999). ERP problems plague college: Cleveland State can't process financial aid using PeopleSoft applications. *Computerworld*, 33(47), 4.

Tiits, M, R Kattel, T Kalvet and R Kaarli (2003). Competitiveness and Future Outlooks of the Estonian

Economy: R&D and Innovation Policy Review. Secretariat of the Research and Development Council State Chancellery, Tallinn, Estonia.

The World Bank Annual Report (1998). http://www.worldbank.com [5 February 2004].

von Genuchten, M (1991). Why is software late? An empirical study of the reason for delay in software development. *IEEE Transactions on Software Engineering*, 17(6), 582–590.

Wallace, L and M Keil (2004). Software project risks and their effects on outcomes. *Communications of the ACM*, 47(4), 68–73.

Ward, JA (1994). Productivity through project management: controlling the project variables. *Information Systems Management*, 11, 16–21.

Watson, RT, GG Kelly, RD Galliers and JC Brancheau (1997). Key issues in information management: an international perspective. *Journal of Management Information Systems*, 13(4), 91–115.

World Economic Forum (WEF) (2004). The Networked Readiness Index Rankings 2003. http://www.weforum.org/ [5 October 2004].

Willcocks, L and H Margetts (1994). Risk assessment and information systems. *European Journal of Information Systems*, 3(2), 127–138.

World Bank (2002). *Transition: The First Ten Years. Analysis and Lessons for Eastern Europe and the Former Soviet Union*. Washington, DC: The World Bank.

Zmud, RW (1980). Management of large scale software development. *MIS Quarterly*, 4(2), 45–55.

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