Association for Information Systems
AIS Electronic Library (AISeL)

ECIS 2012 Proceedings

European Conference on Information Systems (ECIS)

5-15-2012

EMPIRICAL ASSESSMENT OF RISKS IN IS/IT PROJECTS: CHALLENGES FOR MANAGERS

Olga Rommel
European Business School London, Regent's College

Anabel Gutierrez
European Business School London, Regent's College

EMPIRICAL ASSESSMENT OF RISKS IN IS/IT PROJECTS: CHALLENGES FOR MANAGERS

Rommel, Olga, European Business School London, Regent's College, Inner Circle, Regent's Park, London NW1 4NS, UK, roolja@googlemail.com

Gutierrez, Dr, Anabel, European Business School London, Regent's College, Inner Circle, Regent's Park, London NW1 4NS, UK, gutierreza@regents.ac.uk

Abstract

Risks in IS/IT projects are considered to have decisive effects on the success of these projects. Several researchers have identified and categorised risks in IS/IT projects into six major risk dimensions. This paper assesses the validity of these risk dimensions in light of the current IS/IT developments. An additional risk dimension related to outsourcing and new technologies is investigated. The data was gathered via an online survey tool, which provided 113 valid responses. The validity and the reliability of the risk dimensions were tested using statistical methods. The results revealed that the risk factors within the seven risk dimensions are still valid and reliable. Despite the fact, that all risk dimensions are important, this paper identifies the most significant three risk dimensions using the factor analysis. These three risk dimensions are Management, External Influences and New Technology. Notwithstanding the IS/IT developments in the recent years, it appears that the so far identified risks in IS/IT projects have not been mitigated yet. The proposed simplified set of risk dimensions might be used as a guide to identify the key risk factors in IS/IT projects.

Keywords: Project Management, Risks, Information Systems, Factor Analysis.

1 Introduction

Since the discovery of desktop computers and client servers in the 1980s, the operation of Information Technology (IT) changed considerably. However, without software as an integral part of Information Systems (IS), which supports business operations and management decisions (Murthy, 2008), computers would be of no use. IT became part of a system, which comprises of many integrated parts related to each other (Lacity et al., 1995). IT is no longer a privilege for managers; moreover, IT helps skilled professionals to enhance their workflow (Yi et al., 2005). The focus of computer engineering shifted from development to maintenance and adaptation of gigantic computer eco-systems, involving people, software and hardware (Jarke et al., 2011).

The invention of the Internet caused a paradigm shift in the entire communication and the use of IT (Mohan, 2010). The explosion of the dot-com bubble in 2001 facilitated the new era of Web 2.0, enabling innovative companies to capitalise on the organic growth of the Internet (O'Reilly, 2007). Nowadays, smart phones and notebooks are common gadgets for many people and there is new space in the cloud for high-performance computing (Jarke et al., 2011). From the Web 2.0 innovation the idea of software as a service (SaaS) evolved and changed how IT and IS were implemented (O'Reilly, 2007). In 2011, the employment of SaaS is reality.

Recent developments changed the understanding of IT outsourcing and mark the turning point of traditional IT outsourcing objectives. In the past, companies tended to make outsourcing decisions based on the cost reduction motive (Lacity et al., 2009), despite the early warnings from Earl (1996) against IT outsourcing driven mainly by cost cutting, published long before the Web 2.0 era.

The velocity of technological developments puts pressure on the companies to keep up with recent developments in order to retain their competitive advantage and to minimise risks. In this paper the authors identified the need to extend previous research on IS/IT risks and to examine the validity of the six risk dimensions identified by Wallace et al. (2004) by adding a further risk dimension related to outsourcing and new technologies. Moreover, the authors not only challenge the significance of the these risk dimensions but also investigate if a simplified set of most relevant risks can be proposed to managers and academics.

2 Risk Management for IS/IT Projects

2.1 Project Management and Risk Management

According to the Project Management Institute the characteristics of a project are limited resources, execution by people, planning and control. Furthermore, projects are only temporary and have a unique character with a defined beginning and an end (Duncan, 1996). Every project differs from another project, even if they are similar (Lock, 2007). This paper investigates only large and complex IS/IT projects because such projects entail more potential risks than small projects and thus need more attention, especially with regards to their risk management (Lock, 2007).

There are diverse approaches towards defining risk. The core of any risk definition is that risk is concerned with the probability that something unfavourable will occur mostly followed by a loss. Project risk is defined as the probability to suffer harm or negative outcome (Duncan, 1996). It can be distinguished between internal and external risks: internal risks can be controlled by the internal staff such as project costs whereas external risks are those on which the internal staff has no influence, such as market disruptions (Duncan, 1996). There are many different risk types related to IS and IT, for example security issues. However, this paper focuses only on IS/IT project risks.

Project risk management is part of the general project management and involves risk identification, risk quantification and risk control strategies (Duncan, 1996). Proactive project risk management might prevent a negative impact on the project output (Clemens and Gido, 2009). In this paper, the focus is solely on the identification of risk factors. Risk identification is about deciding which risks

could negatively affect the project success (Duncan, 1996). Once all possible risks have been identified, the potential consequences should be determined. Project risk management is not about keeping away from all the risks at any costs, it is more about understanding potential risk factors and having a framework in place in order to deal with problems quickly (Marchewka, 2006).

2.2 IS/IT Project Risk Factors

Literature discloses numerous risk factors influencing the success of the IS/IT projects (e.g. Duncan 1996, Keil et al. 1998, Wallace et al. 2004, Lock 2007, Nelson and Jansen 2009). To understand the evolution of the investigated risk dimensions, this section presents the chronological development of the risk dimensions.

In 1980s, researchers investigated risk factors (e.g. Zmud 1980, Davis 1982, Beath 1983, Bernier 1989) related mainly to software development risks. However, the findings were not very well categorised and mainly based on assumptions. Barki et al. (1993) were the first to provide a formal definition of software development risks and arranged the most significant risk factors systematically, based on empirical research justified with statistical tests.

Barki et al. (1993) identified 35 risk factors related to software development risks. They collected data from 120 projects and tested the validity of their survey construct. Furthermore, based on the results of factor analysis, the authors were able to extract from the proposed 35 risk factors 23 statistically most significant risk factors, which were arranged into five risk dimensions: "characteristics of the application", "future users", "development team", "automated tasks" and "organisational characteristics". The first four dimensions were mainly based on the risk factors from the research conducted by Davis (1982) and the fifth dimension was based on the findings of Zmud (1980), Beath (1983) and Bernier (1989). The research of Barki et al. (1993) contributed significantly to the understanding of the software development risks. Developing these findings further, one decade later Wallace et al. (2004) based their investigations on these risk dimensions and defined six risk dimensions presented in Table 1 below.

Dimensions	Risk Factors
Team	Frequent conflicts between development team members Frequent Turnover within the project team Team members not familiar with the tasks being automated Team members lack specialized skills required by the project Inadequately trained development team members Lack of commitment to the project among development team members Inexperienced team members
Organisational environment	Lack of top management support for the project Change in organisational management during the project Organization undergoing restructuring during the projects Unstable organisational environment Corporate politics with negative effect on project Resources shifted away from the project because of changes in organisational priorities
Requirements	Incorrect system requirements Users lack understanding of system capabilities and limitations Undefined project success criteria Conflicting system requirements Difficulty in defining the inputs and outputs of the system Unclear system requirements System requirements not adequately identified Continually changing system requirements
Planning and control	Project milestones not clearly defined Project progress not monitored closely enough Lack of an effective project management methodology

	Inexperienced project manager Poor project planning Lack of "people skills" in project leadership Ineffective communication Inadequate estimation of required resources Inadequate estimation of project schedule
User	Lack of cooperation from users Users resistant to change Users not committed toward the project Lack of users participation Conflict between users Users with negative attitudes toward the projects
Project complexity	Project involves use of technology that has not been used in prior projects Large number of links to other systems required High level of technical complexity One of the largest projects attempted by the organization Project involved the use of new technology Many external suppliers involved in the development project Immature technology Highly complex task being automated

Table 1. Six Risk Dimensions identified by Wallace et al. (2004)

In comparison to Barki et al. (1993), Wallace et al. (2004) not only extended the number of risk dimensions from five to six, but moreover they added new risk factors ending with 44 risk factors in total. Wallace et al. (2004) tested the six risk dimensions in light of their strategic orientation, project scope and sourcing arrangement. The authors concluded that the project managers should focus on complexity reduction and pay more attention to strategic projects with high risk involvement. Wallace et al. (2004) found out that for high risk projects the risk dimension perceived as the most risky was "requirements", followed by "planning and control" and the risk dimension perceived as the least risky was "team".

Han and Huang (2006) extended the research of Wallace et al. (2004) by including the relationship between software risks and their influence on the project output. The findings of their research confirmed that the two risk dimensions "requirements" and "planning and control" were still the risk dimensions imposing greatest threats on projects.

The question arises, whether the risk dimensions proposed by Wallace et al. (2004) are still relevant in the current IS/IT environment. If so, what are the highest perceived risks in IS/IT projects in light of the current technology trends? Can a simplified set of risks be proposed? Software development changed significantly since these six risk dimensions were proposed. Therefore, this paper explores if factors of the additional risk dimension related to outsourcing and the latest technologies might impose additional threat to IS/IT projects.

Recognising this issue, this paper extends the research of Wallace et al. (2004) by adding the seventh risk dimension related to outsourcing and the latest technologies, based on Lacity et al. (2009) results. Lacity et al. (2009) examined 34 papers associated with IT outsourcing risks, from which they summarised 28 most common IT risk factors, which are shown in Table 2.

Backlash from internal IT staff	Loss of in-house capability
Biased portrayal by vendor	No overall cost savings
Breach of contract by the vendor	Perceived as unpatriotic (offshore)
Cultural differences between client and supplier	Poor supplier capability, service, financial stability, cultural fit
Difficulty in managing remote teams	Security/privacy breech
Excessive transaction costs	Supplier employee turnover/burnout
Hidden costs	Supplier employees are inexperienced
Inability to manage supplier relationship	

Inflexible contracts	Supplier employees have poor communication skills
Infringement of IP rights	Supplier goes out of business
Lack of trust	Supplier has too much power over the customer
Loss of autonomy and control over IT decision	Transition failure
Loss of control of data	Treating IT as an undifferentiated commodity
Loss of control over vendor	Uncontrollable contract growth
	Vendor lock-in (high switching costs)

Table 2. Common IT outsourcing risk factors identified by Lacity et al. (2009)

When it comes to outsourcing decisions, it is important that the IT management is competent and understands what is going on (Earl, 1996). This trivial suggestion appears to be important in the light of the phenomenon that some organisations tend to outsource with the common flow, without really understanding the actual benefits and potential risks. Willcocks (2011) examined the learning curves of the clients related to outsourcing. There were four stages companies go through, from naïve "following with the hype" to "taking mature strategic outsourcing decisions" (Willcocks, 2011), as shown in Figure 1.

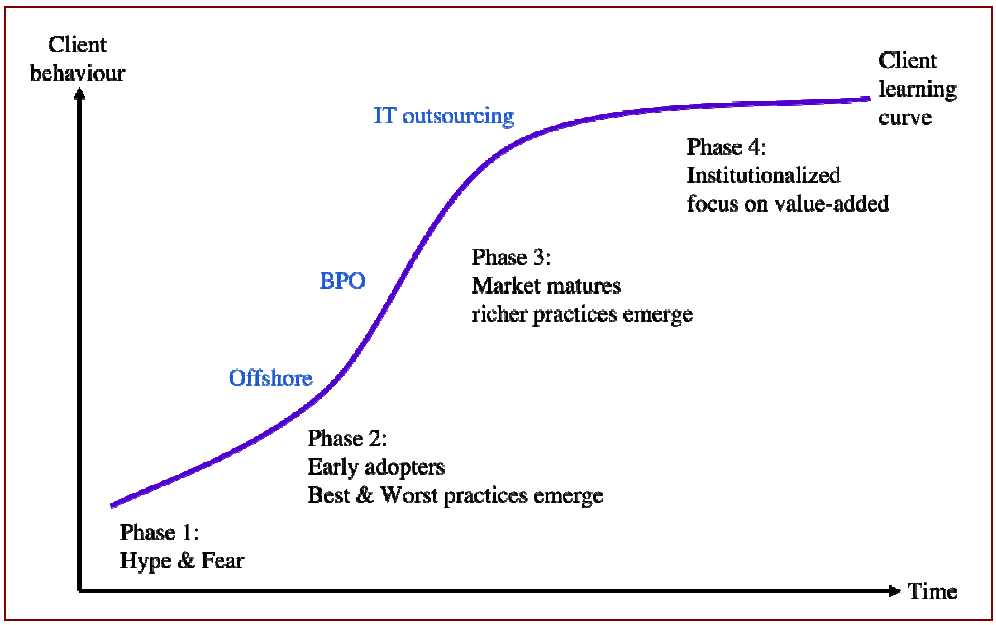

Figure 1. Learning curve of the clients identified by Willcocks (2011)

In the hype phase, clients either rely on the marketing strategy of the vendor and believe everything or have fear to implement. Cost cuttings drive outsourcing decisions in the second phase and the clients outsource approximately 20% of their IT budgets. Through these two phases, clients are able to learn and make conclusions for the next outsourcing phases. Only these companies, who take lessons from the first two phases are able to get to the next two levels. Wise clients are those who found the right balance between business process outsourcing (BPO) and internal IT department as well as those who focus on putting enough weight on the relationships with the vendors. Willcocks (2011) concluded that by the year 2010 just a few companies reached the last level.

Lacity et al. (2009) found out that the most common motivations for outsourcing were cost reduction and focus on core activities. Linking this result with the findings of Willcocks (2011), it might be assumed that those companies were probably in the second phase of their learning process.

3 Research Strategy

A survey was found to be the most appropriate tool for data collection as standardised questions might be interpreted in the same way by all respondents (Saunders et al., 2009). The online survey technique

was chosen since it is easier to access a large audience and also provides an efficient way of collecting responses from organisations located in different geographical areas.

3.1 Survey Design

After conducting a pilot survey, the final survey consisted of five main sections with 21 questions. Section 1 investigated the demographics of the company with five questions. Section 2 included four questions about the participating person and section 3 asked the participants to provide information regarding their most recent IS/IT project. Section 4 consisted of seven questions in total, addressing the seven risk dimensions "project team", "environment of the organisation", "user requirements", "planning and control", "user acceptance", "complexity" and "outsourcing risk components". There were 43 risk factors to evaluate in total. The last section included acknowledgements as well as provided space for personal details if the participants wished to receive the results.

In Section 4, the participants were asked to rate each risk factor of the seven risk dimensions on a Likert scale from 1 (very low risk) to 5 (very high risk), having in mind their most recent IS/IT project experience. The first 6 out of 7 risk dimensions were based on the survey construct used by Wallace et al. (2004). The original six risk dimensions introduced by Wallace et al. (2004) were rephrased and refined according to the feedback collected from the pilot survey. The final risk dimensions were: 1. Project Team, 2. Environment of the organisation, 3. Requirements, 4. Planning and control, 5. User Acceptance, 6. Complexity.

The first risk dimension "project team" had 6 risk factors though the original survey conducted by Wallace et al. (2004) had 7 risk factors. The participants of the pilot survey mentioned that the original 7 risk factors were too similar. The second risk dimension "environment of the organisation" had 4 instead of 6 risk factors due to redundancies discovered by the pilot survey participants. Furthermore, there was an additional fifth risk factor "Lack of organisation-wide IS/IT policy", based on the proposals of Serafeimidis and Smithson (2003), who highlighted that organisational issues should be in line with other business processes. Furthermore, Marston et al. (2011) recommend the implementation of organisation-wide IS policies. The third dimension "requirements" consisted of 4 instead of 8 risk factors due to comments submitted by the pilot survey participants. The fourth dimension "planning and control" had 7 out of 9 original risk factors and the fifth dimension "user acceptance" had 5 out of 6 risk factors. The sixth dimension "complexity" consisted of 8 risk factors.

The seventh risk dimension "outsourcing risk components" which is proposed in this paper based on the findings of Lacity et al. (2009) as shown previously in Table 2. After conducting a pilot study of the 28 risk factors only 8 risk factors were selected, which are shown in Table 3.

Risk Dimension	Risk Factors
7. Outsourcing risk components	Strong negative reaction from the internal staff towards the external staff Breach of contract by the external party Cultural differences among the company and the external party Inflexible contracts between the company and the external party Lack of trust towards capabilities of the external party Loss of in-house capability Poor communication skills of the internal staff Insufficient experience of the external party

Table 3. IT risk factors related to outsourcing and new technologies based on the findings of Lacity et al. (2009)

3.2 Data Collection and Analysis

The link for the final online survey was sent to 227 people via email, split over two days. The 227 participants were selected based on their involvement in IS/IT projects. The participants were also asked to forward the link to people who might have experience in this field. Furthermore, the link was

placed in 18 different groups of interests on professional networking websites, such as linkedin.com and xing.com. The survey was designed in English. The survey participants were not allowed to participate more than once.

To assess the research question: "What are the highest perceived risks in IS/IT projects in light of the current technology trends?" one-way analysis of variance (ANOVA) was used to compare the means of the risk dimensions. The reliability of the construct was validated by measuring the intra-class correlation (Cronbach's alpha) of the risk factors. After data screening 113 valid answers were extracted for further analysis in SPSS.

Factor analysis was conducted to answer the two research questions: "Are the proposed risk factors from the past still significant? Can a simplified set of risks be proposed?" To test the significance of the risk factors, for the initial factor extraction method the principal axis factoring was used and for the factor rotation the OBLIM rotation option was used. In order to get a simplified set of the most relevant risk dimensions, for the factor extraction method the principal component analysis was used as well as the VARIMAX rotation. To measure the adequacy of the sample, the Kaiser-Meyer-Olkin (KMO) measure and the Bartlett's test of sphericity, generated in the course of the factor analysis, were interpreted.

4 Results and Discussion

Of the 113 valid answers, 87% of the participants were male and almost 50% of all participants were acting as project managers in their most recent IS/IT project. The participants were from 20 countries with the majority from Germany (31%), the United Kingdom (19%) and Belgium (12%). In their most recent IS/IT project, less then 50% of all participants had experience with implementing technologies such as ERP, cloud computing, business intelligence or CRM.

4.1 Relevance of Risk Dimensions

The results of the one-way ANOVA analysis (Table 4) revealed that the risk dimension "user requirements" is still perceived as the most risky dimension, which is in accordance with the findings of Wallace et al. (2004) and Han and Huang (2006). Surprisingly, the newly introduced seventh risk dimension "outsourcing risk components" was regarded as the least risky one. A possible explanation for this result might be that large organisations targeted in this research, mainly financial institutions, might have evolved on their outsourcing learning curve (Willcocks, 2011) and therefore participants perceive the outsourcing factors as less risky. Another explanation might be that the project participants face the user requirements first, which seems to be difficult to determine properly from the very beginning, since probably everybody has different understanding of the same things. For more evidence, both explanations should be examined in future research.

Risk Dimensions	One-way ANOVA mean	Cronbach's Alpha	Cronbach's Alpha (Wallace et. al, 2004)
1. Project team	2.935	0.596	0.810
2. Environment of the organisation	3.040	0.757	0.790
3. Requirements	3.395	0.803	0.890
4. Planning and control	3.108	0.864	0.920
5. User acceptance	3.078	0.894	0.880
6. Complexity	3.026	0.806	0.760
7. Outsourcing risk components	2.763	0.877	NA

Table 4. One-way ANOVA and Cronbach's Alpha Results

Despite the Cronbach's alpha results are congruent with the findings of Wallace et al. (2004) for risk dimensions "project team", "environment of the organisation", "requirements" and "planning and

control" the Cronbach's alpha of the survey was slightly below the results of Wallace et al. (2004) (Table 4). However, for risk dimensions "user acceptance" and "complexity" the Cronbach's alpha of this survey was above their results. Except for the risk dimension "project team" the Cronbach's alphas were above 0.7 and represent a good result for reliability of this survey constructs as well as the adequacy of the sample size. The last risk dimension "outsourcing risk components" was not part of the empirical research of Wallace et al. (2004) and was tested empirically for the first time in this paper. This dimension had the Cronbach's alpha of 0.877, which indicates a very good internal consistency and therefore appears to be reliable.

4.2 Factor Analysis

The Kaiser-Meyer-Olkin (KMO) values were above 0.5 for all dimensions as shown in Table 5, what means that the sample size of the collected data was adequate and valid. Hence, using the factor analysis was appropriate for this sample.

Risk Dimensions	Kaiser-Meyer-Olkin (KMO)
1. Project team	0.570
2. Environment of the organisation	0.773
3. Requirements	0.753
4. Planning and control	0.881
5. User acceptance	0.865
6. Complexity	0.786
7. Outsourcing risk components	0.887

Table 5. Kaiser-Meyer-Olkin (KMO)

Furthermore, all correlation coefficients were less than 0.9 for all seven risk dimensions and there is no determinant smaller then 0.00001. Thus, there is no multicollinearity among the risk factors and it can be concluded that there is no overlap of the risk factors; hence each risk factor has unique contribution to the appropriate risk dimension.

The Bartlett's test of sphericity revealed that all dimensions have significance level less then 0.05, which means that meaningful relationships between the risk factors exist, which is another evidence that the factor analysis was an appropriate analytical tool for this sample. The factor analysis revealed correlations between several risk factors in each risk dimension consistent with the results found in the literature review. Though all those risk factors are still valid, the authors make an attempt to better understand the nature of the dimensions' construct and reduce the number of significant risk factors by conducting further factor rotations and extractions. In the factor extraction and rotation, all 43 risk factors were dismantled and then put together into similar dimensions, which measure similar risks. In total nine iterations were conducted, using the principal component analysis extraction method and VARIMAX rotation. In each iteration factors were removed consecutively after the examination of the respective correlation matrix, the rotated component matrix as well as the scree plot and the same test was run again. After nine iterations, 11 factors were grouped into 3 dimensions, explaining almost 70% of the variance (Figure 2).

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.594	41.764	41.764	4.594	41.764	41.764	3.126	28.419	28.419
2	1.655	15.041	56.805	1.655	15.041	56.805	2.768	25.162	53.581
3	1.393	12.660	69.465	1.393	12.660	69.465	1.747	15.884	69.465
4	.636	5.779	75.244						
5	.597	5.423	80.667						
6	.518	4.707	85.374						
7	.394	3.580	88.954						
8	.375	3.412	92.366						
9	.352	3.202	95.568						
10	.277	2.517	98.085						
11	.211	1.915	100.000						

Extraction Method: Principal Component Analysis.

Figure 2. Total variance explained after final iteration

The Cronbach's alpha for the simplified risk dimensions was 0.817 and the Bartlett's test of sphericity was significant and therefore a simplified framework of risk dimensions is proposed in the following section.

4.3 Simplified Risk Dimensions: 3MEN

The factor analysis appears to be valid and reliable. It reveals that even though the risk factors are still significant their total number could be reduced from the initially proposed 43 risk factors to 11 statistically most significant risk factors. These risk factors can be bundled into three main risk dimensions, namely "management", "external influences" and "new technology" (3MEN) as presented in Table 6.

Dimensions	Risk Factors
Management Dimension	Inadequate estimation of project schedule
	Inadequate estimation of required resources
	Lack of effective project management methodology
	Project progress not monitored closely enough
	Project milestones not clearly defined
External Influences Dimension	Inflexible contracts between the company and the external company
	Breach of contract by the external party
	Insufficient experience of the external party
	Cultural differences among the company and the external party
New Technology Dimension	Project involves the use of new technology
	Project involves use of technology that has not been used in prior projects

Table 6. Risk Dimensions 3MEN

The risk dimension "management" combines all risk factors that relate to general project management. The results of this empirical research suggest that project management is still the most important area in IS/IT projects in the modern technological environment.

The risk dimension "external influences" deals with the management of contract design, experience of the external party and cultural differences between the parties. In light of the presented IS/IT developments, outsourcing patterns changed and it can be suggested that managers might consider the risk factors as shown in Table 6 as potentially significant threats when outsourcing IS/IT projects.

Despite the fact, that the risk dimension "new technologies" results in only two risk factors and the one-way ANOVA did not reveal this dimension as risky, factor analysis identified this risk dimension as statistically significant. This paper interprets globally new technology as riskier than technology, which is only new for the company, because in the latter case the company might ask external parties for advice. The results deliver empirical indication that new technologies might impose great risk on IS/IT projects as this will increase the risks from outsourcing the areas where those new technologies are required.

In the risk dimension "management" the correlation between resource allocation and schedule estimation ($r = 0.628$) suggests that manager should have in mind that those two aspects, though at the first glance probably looking trivial, might put IS/IT projects at risk. Furthermore, the relationship between management methodology and project progress monitoring ($r=0.595$) suggests that if an effective project management methodology is missing, it is likely that the project progress will not be monitored closely enough, which might lead to wrong schedule estimations ($r=0.585$). Here, the vicious circle closes, suggesting that wrong schedules might be the result of missing project management methodology ($r=0.539$). These results are depicted graphically in Figure 3 (left hand).

Thus, managers might allocate sufficient time to forecast as neatly as possible the expected resources needed for a particular IS/IT project, to make careful estimations of the project duration, to establish good working project progress monitoring and to set up an effective project management methodology.

In the risk dimension "external influences", the relationship between contracts, their violation and cultural differences among the parties indicates that inflexible contracts between the parties might lead to a breach of the contract (r=0.691). However, breach of contracts might also be the result of cultural differences between the involved parties (r=0.678). Cultural differences between the parties might also be the reason, why the contracts are too rigid (r=0.516). The vicious circle for this risk dimension is shown in Figure 3 (right hand). Hence, managers of IS/IT projects might spend sufficient time on drafting case-relevant contracts with external parties, rather then using standard contracts, keeping in mind, that too tight contracts might lead to their breach. When developing the contracts, the managers might consider not only the culture of the own organisation, but also the culture of the external party.

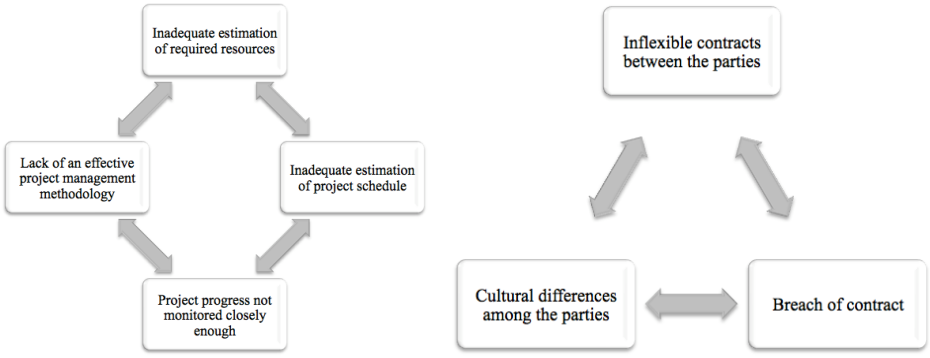

Figure 3. Vicious circle risk dimension "management" (left) and "external influences"(right)

The relationship in the third dimension "new technology" proposes, that when projects involve the use of new technology it is likely that this technology has not been used in prior projects, which might be risky (r=0.651). The authors interpret this relationship as follows: when there is new technology, which is new to all market participants and it is implemented in an IS/IT project for the first time in an organisation, then it is very likely, that this IS/IT project carries substantial risks and needs a closer examination or monitoring. The relationship is depicted in Figure 4. Having this correlation in mind, the managers might allocate respective resources for the investigation of potential risks connected with the implementation of new technologies.

Figure 4. Relationship risk dimension "new technology"

Concluding the recommendations, the managers might use the 11 risk factors for a quick evaluation of the current IS/IT projects or to develop risk assessment methodologies based on these 11 risk factors, until future research reveals in greater detail how the 11 risk factors might be tackled and mitigated.

Although the results from the one-way ANOVA indicated that outsourcing was not perceived as the highest risk, the factor analysis revealed that almost 70% of the risks are measured by risk factors related to project management, external influences and new technology.

The two statistical tests, ANOVA and factor analysis, delivered two different results: on the one hand, the simple comparison of the means of the seven risk dimensions generated by the one-way ANOVA significance test marked the risk dimension "requirements" as the most risky dimension with the highest mean and the risk dimension "outsourcing risk components" as the least risky one with the lowest mean (Table 4). On the other hand, the 3MEN simplified risk dimensions (Table 6) extracted

using factor analysis, do not include any of the risk factors from the risk dimension “requirements” but they do include the risk factors from the risk dimension “outsourcing risk components”.

A possible explanation for this phenomenon might be that factor analysis is a more complex test and reveals patterns, which are at the first glance less obvious, but which have very significant factor loadings. The one-way ANOVA on the other hand, shows a simple comparison between the means within a group of factors. The reason why the risk factors of the risk dimension “requirements” are perceived as the most risky one might be that these risk factors can be easily observed by the project participants, no matter which role in the IS/IT project they have. However, further research is required in this field to shed light on this unexpected result.

5 Conclusions and Further Research

The paper highlighted the importance of IS/IT project risk management in light of the latest IS/IT trends. Latest IS and IT trends suggest the possible need to expand the six risk dimensions identified by Wallace et al. (2004) by adding an additional risk dimension related to outsourcing and new technologies. The paper shows the chronological development of these risk dimensions and how the six risk dimensions evolved over time. Furthermore, the additional risk factors related to outsourcing and new technologies are introduced, as identified by Lacity et al. (2009).

In an online survey, the proposed seven risk dimensions were tested with the one-way ANOVA and the factor analysis. The one-way ANOVA revealed that the risk dimension “user requirements” was perceived as the most risky one, which is in line with the results of Wallace et al. (2004). The introduced risk dimension “outsourcing risk components” was perceived as the least risky one according to the one-way ANOVA results. This might result from the fact that the participants worked for the banking industry, which evolved on their learning curve as defined by Willcocks (2011) and hence, the participants did not see any significant outsourcing problems.

Furthermore, several statistical tests revealed that the 43 risk factors are valid and reliable. However, in order to reduce complexity, the factor analysis was conducted. In the course of the factor analysis, a simplified set of IS/IT project risks has been proposed. According to the results of the factor analysis, there were 11 most statistically significant risk factors, bundled into three risk dimensions, which are labelled as 3MEN: “management”, “external influences” and “new technology”. The results generated through the one-way ANOVA and factor analysis had different conclusions.

This research shows that risk factors evolve over time and further research should be undertaken to analyse the specific loading patterns shown, taking into consideration different criteria such as industry and project size. Additionally, the risk mitigation strategies should firsthand focus on the 11 most important risk factors as proposed in 3MEN and managers are advised to concentrate on risk mitigation strategies to tackle these risks. Finally, another interesting line of research could be to investigate the outsourcing learning stage of the companies connected to new technologies.

Despite recent IS/IT developments, the risk factors, which were already identified several decades ago, still remain prominent and should not be underestimated. Managers still should pay attention to these risks and also examine potential threats, especially when they plan to adapt new technologies.

References

Barki, H., Rivard, S. and Talbot, J. (1993). Toward an Assessment of Software Development Risk. Journal of Management Information Systems, Vol. 10, pp. 203-225.

Beath, C.M. (1983). Strategies for managing MIS: a transaction cost approach. Proceedings of the Fourth International Conference of Information Systems, Houston, ACM/SIGBDP.

Bernier, C. (1989). Etude des relations entre l'environnement, l'incertitude environnementale perçue et la mode de gestion dans les projets de développement de systèmes d'information. Ph.D. dissertation, École des Hautes Études Commerciales, Montréal, Québec.

Clemens, J.P. and Gido, J. (2009). Effective Project Management, 4th edn. Mason, OH: South-Western CENGAGE Learning.

Davis, G.B. (1982). Strategies for information requirements determination. IBM Systems Journal, 21, pp. 4-30.

Duncan, W.R. (1996). A guide to the Project Management Body of Knowledge. [online] Project Management Institute. Available at: <http://www.unipi.gr/akad_tmhm/biom_dioik_tech/files/pmbok.pdf> [Accessed 29 August 2011].

Earl, M. (1996). The risks of outsourcing IT. Sloan Management Review, Vol. 37, pp. 26–32.

Han, W.-M. and Huang, S.-J. (2006). An empirical analysis of risk components and performance on software projects. The Journal of Systems and Software, Vol. 80, pp. 42-50.

Jarke, M., Loucoloulos, P., Lyytinen, K., Mylodoulos, J. and Robinson, W. (2011). The brave new world of design requirements. Information Systems. Vol. 36, pp. 992-1008.

Keil, M., Cule, P.E., Lyytinen, K. and Schmidt, R.C. (1998). A framework for indentifying software project risks. Communications of the ACM. Vol. 41, pp. 76-83.

Lacity, M.C., Khan, S.A. and Willcocks, L.P. (2009). A review of the IT outsourcing literature: Insights for practice. Journal of Strategic Systems, Vol. 18, pp. 130-146.

Lacity, M. C., Willcocks, L. P., Feeny, D. F. (1995). IT Outsourcing: Maximize Flexibility and Control. Harvard Business Review, Vol. 73, pp.

Lock, D. (2007). Project Management, 9th edn., Hampshire: GOWER.

Marchewka, J.T. (2006). Information Technology Project Management, 2nd edn., New York: John Wiley & Sons.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J. and Ghalsasi, A. (2011). Cloud computing – The business perspective. Decision Support Systems, Vol. 51, pp. 176-189.

Mohan, P. (2010). Fundamentals of Information Technology. Mumbai: Himalaya Publishing House.

Murthy, C.S.V. (2008). Enterprise Resource Planning and Management of Information System. Mumbai: Himalaya Publishing House.

Nelson, R.R. and Jansen, K.J. (2009). Mapping and Managing Momentum in IT Projects. MIS Quarterly, Vol. 8, pp. 141- 148.

O'Reilly, T. (2007). What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software. Communication& Strategies, Vol. 65, pp. 17-37.

Saunders, M., Lewis, P. and Thornhill, A. (2009). Research Methods for Business Students. 5th edn., FT Prentice Hall.

Serafeimidis, V., Smithson, S. (2003). Information systems evaluation as an organizational institution – experience from a case study. Information Systems Journal, Vol. 13, pp. 251-274.

Wallace, L., Keil, M. and Rai, A. (2004). Understanding software project risk: a cluster analysis. Information & Management, Vol. 42, pp. 115-125.

Willcocks, L. (2011). INDUSTRY VIEWPOINT: Machaivelli, management and outsourcing: still on the learning curve. Strategic Outsourcing: An International Journal, Vol. 4, pp. 5-12.

Yi, M.Y., Jackson, J.D., Park, J.S. and Probst, J.C. (2005). Understanding information technology acceptance by individual professionals: Toward an integrative view. Information & Management, Vol. 43, pp. 350-363.

Zmud, R.W. (1980). Management of large software development efforts. MIS Quarterly, Vol. 4, pp. 45-55.