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The IJISPM publishes leading scholarly and practical research articles that aim to advance the information systems management and project management fields of knowledge, featuring state-of-the-art research, theories, approaches, methodologies, techniques, and applications.

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Editorial

The mission of the *IJISPM - International Journal of Information Systems and Project Management* is the dissemination of new scientific knowledge on information systems management and project management, encouraging further progress in theory and practice.

It is our great pleasure to bring you the fourth number of the sixth volume of IJISPM. In this issue readers will find important contributions on information systems project success, information systems backsourcing, project portfolio risk, strategic information systems planning, and software development projects.

The first article is the viewpoint of João Varajão on "The many facets of information systems (+projects) success". It is well accepted that Information Systems (IS) are critical for the competitiveness of virtually any human organization. However, IS need constant attention to fulfill their role and to keep pace with the changes of organizations. Therefore, the success of IS projects is crucial for the success of IS and, consequently, for the success of the organizations themselves since they are closely related. Given the complex nature of the participating objects and related concepts, the perspectives of success and its influencing factors can be of high complexity. This complexity comes from various aspects that need to be recognized, considered and evaluated, as well as from the multiple interactions that occur between them. This article aims to contribute with new insights and a new way of addressing the success of projects and IS, by identifying and describing various important facets of success.

The second article, "Adding experts' perceptions to complement existing research on information systems backsourcing", is authored by Benedikt von Bary, Markus Westner and Susanne Strahringer. This article extends the existing literature on IS backsourcing by the perception of practitioners. For this purpose, the authors conducted a series of qualitative, semi-structured interviews with IS sourcing experts. The interview questions focused on the participants' perceptions and experiences with the topic, on identifying reasons for and against IS backsourcing, and on revealing relevant trends pertinent to IS backsourcing. Those findings were then compared with two previously conducted comprehensive literature reviews on academic and practitioner literature on IS backsourcing. By following this approach, the article contributes to the existing research by verifying previous findings, for example, the most important reasons why companies decide in favor of IS backsourcing. Based on the findings, was created a comprehensive overview of all aspects connected to the IS backsourcing process and derived opportunities for further research to contribute to the IS backsourcing research agenda.

The title of the third article is "Project portfolio risk categorisation – factor analysis results", which is authored by Mariusz Hofman and Grzegorz Grela. Research conducted indicated categories containing the most probable and significant risks. The research described in the paper was carried out in two stages. In the first stage, the relevant literature was reviewed and the Delphi method was used to identify 36 risks specific to a project portfolio. In the second stage, project portfolio managers assessed the probability of each risk occurring and the impact of that risk on the objectives of the project portfolio. The empirical data obtained in this way made it possible to conduct an exploratory factor analysis and to identify the risk categories of project portfolios.

Raja Ali, Rosli Mohamad, Yurita Talib and Akilah Abdullah are the atuhors of the article "The roles of top management and users in strategic IS planning: a perspective of SMEs". Research on the strategic IS planning is typically concentrated on large firms. However, the outcomes of this research may not be sufficient to adequately apply to Small and Medium Enterprises (SMEs). Responding to the limited body of work in SMEs regarding to strategic IS planning, this research aims to fill the gap in the literature. Having limited resources available, financially and technically, strategic IS planning is getting more crucial for SMEs. This study contributes to research and practice by providing in-depth insights into the IS planning processes in SMEs with a particular focus on the roles of top management and users.

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As Bjørnar Tessem states in the fifth article "What causes positive customer satisfaction in an ineffectual software development project? A mechanism from a process tracing case study", the customer role is crucial in agile information systems development (ISD). There is, however, a scarceness in research on how this role is enacted, and how its practice influences project outcome. In this longitudinal case study, an agile ISD project is followed with a particular focus on the customer organization's participation, aiming to contribute to the understanding of how customers influence agile ISD projects. The analysis of the case shows that the low completion of the initial project requirements was caused by over-scoping and by an immature customer. Further, the customer's acceptance of the outcome was caused by the agile practices introduced in the project. These helped to create a high customer's sense of responsibility for the outcome, which worked as a mediator towards a positive acceptance of the delivery. The study contributes a mechanism for why agile projects may still be successful in light of low delivery.

We would like to take this opportunity to express our gratitude to the distinguished members of the Editorial Board, for their commitment and for sharing their knowledge and experience in supporting the IJISPM.

Finally, we would like to express our gratitude to all the authors who submitted their work, for their insightful visions and valuable contributions.

We hope that you, the readers, find the International Journal of Information Systems and Project Management an interesting and valuable source of information for your continued work.

The Guest Editor,

Dulce Domingos

University of Lisbon

Portugal

Dulce Domingos received the BSc in "Informática" from Faculdade de Ciências da Universidade de Lisboa, Portugal, in 1993, the MSc degree in "Engenharia Electrotécnica e de Computadores" from Instituto Superior Técnico da Universidade Técnica de Lisboa, Portugal, in 1997, and the PhD degree in "Informática" from Faculdade de Ciências da Universidade de Lisboa, Portugal, in 2005. She is professor at the Departamento de Informática, Faculdade de Ciências, Universidade de Lisboa and researcher of the Large Scale Computer Systems Laboratory (LaSIGE). Her current research interests include security, business processes, and Internet of Things (IoT). She is the coordinator of the master program in information security of Faculdade de Ciências, Universidade de Lisboa and Pró-rector at Universidade de Lisboa.

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VIEWPOINT

The many facets of information systems (+projects) success

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The many facets of information systems (+projects) success

Viewpoint

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Abstract:
It is well accepted that Information Systems (IS) are critical for the competitiveness of virtually any human organization. However, IS need constant attention to fulfill their role and to keep pace with the changes of organizations. Therefore, the success of IS projects is crucial for the success of IS and, consequently, for the success of the organizations themselves since they are closely related. Given the complex nature of the participating objects and related concepts (e.g., people, information, processes, and technology), the perspectives of success and its influencing factors can be of high complexity. This complexity comes from various aspects that need to be recognized, considered and evaluated, as well as from the multiple interactions that occur between them. This article aims to contribute with new insights and a new way of addressing the success of projects and IS, by identifying and describing various important facets of success.

Keywords:
project success; project management success; deliverables success; operations success; information systems success.

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1. Introduction

It is well accepted and somewhat consensual that information systems (IS) are critical for the development of virtually any human organization. Involving people, processes, information technology, and other organizational resources and structure, which facilitate the acquisition, storage, processing and transmission of data, information, and knowledge in an organization [1], IS require constant attention to fulfil their role adequately and to keep pace with the changes of the information and business moving needs of organizations.

Projects are the main way of structuring the activities and resources needed for improving an organizational IS. An IS project is a temporary endeavor undertaken to create a unique product, service, or result [2], and can assume many forms as the deployment of commercial-off-the-shelf applications or consultancy assignments. A main distinctive feature of IS projects is the fact of being socio-technical undertakings, carried out to improve the organization and to achieve business benefits.

Therefore, it is clear that the success of such projects is crucial for the success of IS and consequently for the success of the organizations themselves since they are closely related (an organizational IS can be seen as an abstraction of an organization, focused on the resources and activities related to information).

Given the complex nature of the participating objects and related concepts (e.g., people, information, processes, and technology), the perspectives of success and its influencing factors are also of high complexity [3]. This complexity comes from various aspects that need to be recognized, considered and evaluated, as well as from the multiple interactions that occur between them.

Concerning works related to the theme "project success", the technical-scientific literature is vast [4], which translates into a large number of available articles focused, for example, on success factors [5] or criteria for success evaluation [6]. On the other hand, it is not always clear what should be taken into account when assessing the success of projects [7] (in its various phases), of project deliverables, of IS, or of related operations.

This article aims to contribute with new insights and a new way of addressing the success of projects and information systems, by identifying various important facets of success that are explored and described next, including: project (management) initiation success; project (management) execution success; project deliverables success; project success; project related operations success; program & portfolio success; operations success; information systems success; organizational success; and business success.

2. Information Systems Project Success

Let's consider, as an example, the case of a project for the adoption of a new ERP (Enterprise Resource Planning) system. In this example, the project arises from a company's need to update an existing ERP system which no longer responds to the information requirements of the organization. Before the project is approved for execution, it is defined and assessed for its viability (EX ANTE time in Figure 1).

Figure 1. Three moments related to the lifecycle of a project

If the project is considered feasible and is formally approved, then the project is established, and it is planned, executed, monitored and controlled, and finally closed (PROJECT time in Figure 1).

In the course of the execution of the project, there are several activities which need to be carried out such as the requirements elicitation, business modeling, gap analysis, identification of software solutions on the market, selection of software, configuration of software, development of custom features, the deployment of the solution, and training of users, among others. Once the project is completed, the new ERP goes live, and it is made available to the company, thus beginning the life cycle of the deliverables (EX POST time in Figure 1).

In summary, as shown in Figure 1, we can consider three key moments related to the typical life cycle of an IS project (as it happens in many other types of projects): EX ANTE; PROJECT; EX POST.

As shown in Figure 2, the first three facets of success to consider are related to these three moments of Figure 1: project (management) initiation success; project (management) execution success; project deliverables success.

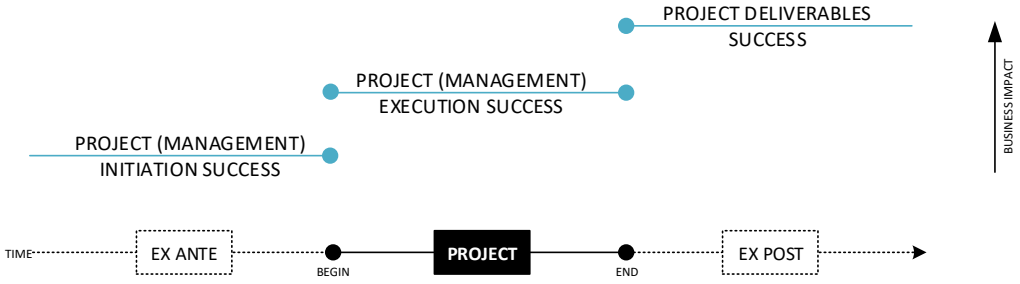

Figure 2. Project (management) initiation success, project (management) execution success and project deliverables success

Taking our example, the ERP project will be carried out if the evaluation of the idea and its feasibility is favorable. In other words, it will be executed if there is success in the project initiation phase (project (management) initiation success). One of the most important results of the project initiation (which is comprised of several project management processes) is a project charter. This is a document that after being approved, formally establishes a project and may constitute the benchmark for the evaluation of success at EX ANTE time.

For the execution of the project, targets can be set regarding scope and quality, cost, time and customer satisfaction, thus being part of the project management plan. The fulfillment of these targets can be used to evaluate the success of the execution of the project (project (management) execution success).

After executing the project, a new ERP system will be available to the organization. To assess the success of the resulting products and services (project deliverables success) can be considered the obtained business benefits (e.g., related to productivity improvement, information quality improvement, performance improvement, etc.).

However, this is a simplified representation since the deliverables of many projects are made available to the customer not only at the end of the project but also during the project (the blue dotted line represents this in Figure 3). This implies that the project deliverables success evaluation might start before the closing of the project.

Going back to our example, the ERP system can go into production in a phased way (phased rollout instead of big bang), starting, for instance, with the implementation of an accounting module, followed by a production module, then a sales module, a human resources module, and so on. In this case, the evaluation of the success of deliverables can begin upon the availability of each deliverable (in this example each ERP module) and not just at the closing phase of the project.

Many of these facets of success influence and are influenced by each other. For example, the way how stakeholders are involved and the available resources are considered at the project initiation phase (EX ANTE) may have a significant influence on the execution of the project (PROJECT). In turn, the way how end-users are involved throughout the project may also significantly influence the success of deliverables (EX POST).

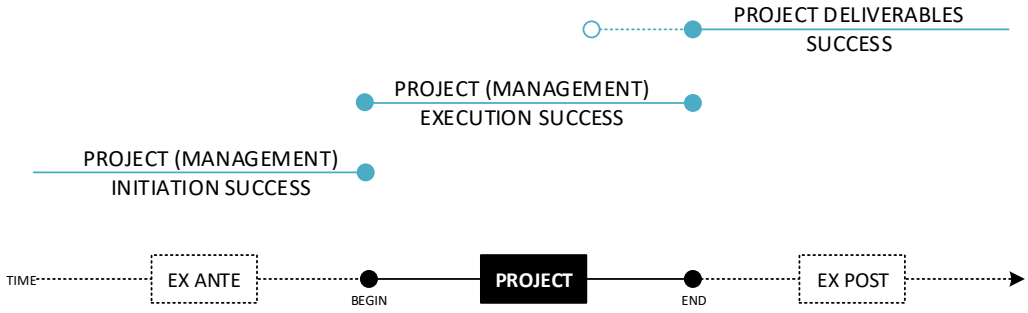

Figure 3. Project deliverables success starting before the project end date

Regarding project success, it can be defined as the project management success together with deliverables success [8]. In Figure 4, it is represented by a green line. It is important to note that was intentional to identify an end in the line. On the one hand, as the project success includes the project deliverables success, both lines should end at the same point. On the other hand, since the project deliverables may not have a finalization date set (i.e., the product lifecycle end date), it is important to define begin and end dates for project success so that a formal evaluation is possible within a given timeframe.

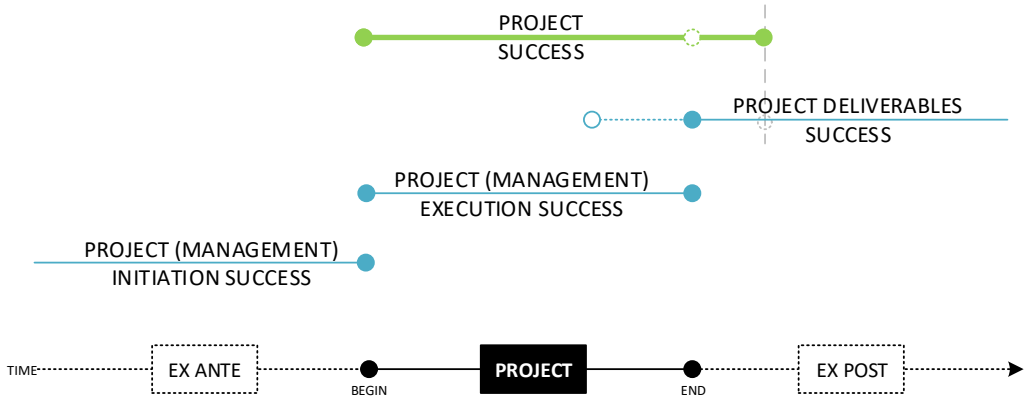

Figure 4. Project success

In the case of IS projects, the deliverables of the project are not only what determines the success of the project, but also the operations/services that will support the use of the various resulting technologies and processes made available to users. As such, a new facet of success should be taken into account: the success of the operations.

In Figure 5, the project related operations success is represented by a yellow line. As it occurs with the project deliverables success, the evaluation of operations success can start before the project ends (yellow dotted line). In the example of a new ERP system adoption, before the implementation of the first module, it may be necessary to change the existing infrastructure and to create a new helpdesk service (which may be out of the scope of the project). This ensures that a fully functional end-users support service is established when the first module goes live. If this is not taken into account, there is the risk of a project fail due to external factors to project.

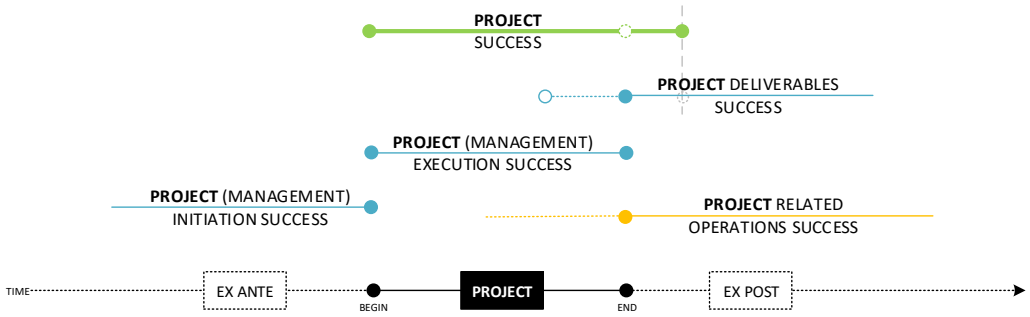

Figure 5. Project related operations success

3. Information Systems Success and Other Facets of Success

Changing the focus of attention, as shown in Figure 6, the evaluation of the success of the project-related information system should begin to be measured from the time applications and operations become available to the organization for its use. In the ERP example, this success can be measured considering the quality of the new software system, of the information and the new IT-enabled business processes, as well as the quality of the related service (operations).

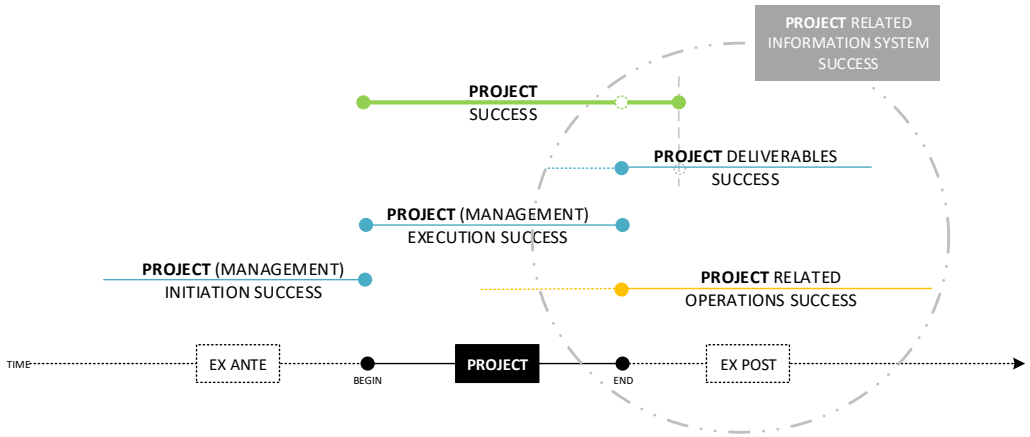

Figure 6. Project related information system success

So far, the discussion of the various facets of success has been made from the project's point of view; however, projects are not isolated in time and space. They are performed in a given organizational environment and conjuncture that influences and is also influenced by these various facets of success.

Figure 7, shows other strands of success related to IS projects that need to be seen in a continuum of time. Some of these facets of success are circumstantial and context-dependent (e.g., the program & portfolio success) while others can be identified in all organizations (e.g., the information systems success).

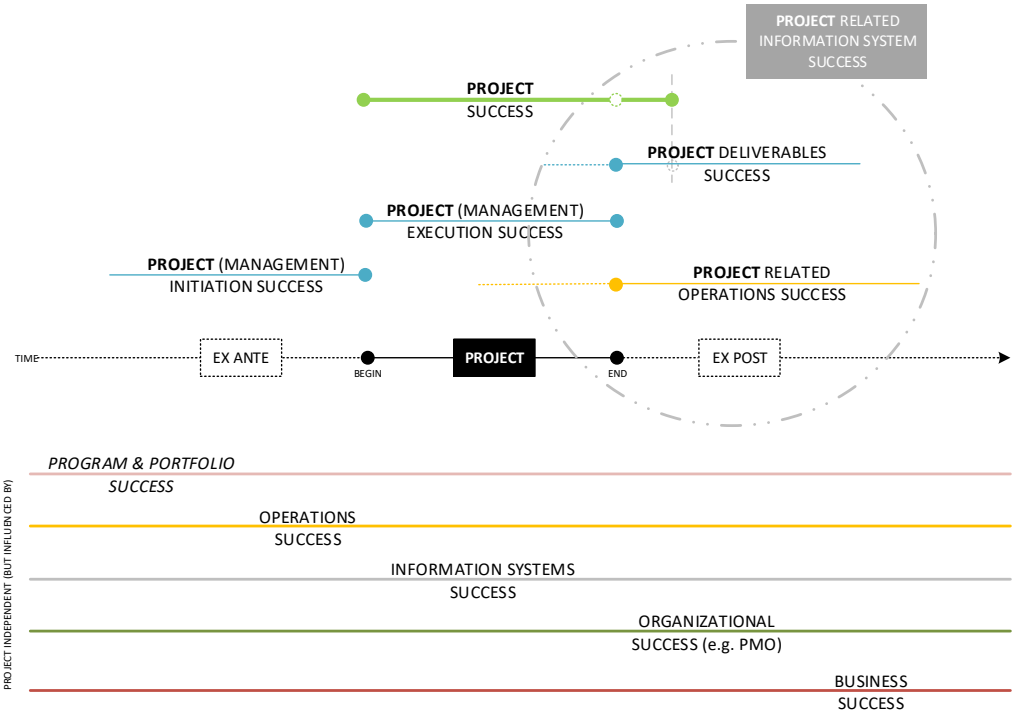

Figure 7. Program & portfolio success, operations success, information systems success, organizational success and business success

In the case of our project example, adopting a new ERP system, it can be part of a program (and/or a portfolio) that includes several related projects (one of them being the adoption of the ERP). Inevitably, if the ERP project fails (project (management) execution success and project deliverables success), this will influence the success of the program it belongs to (program & portfolio success).

As previously described in our example of the ERP project, new help desk operations will be required. If there is a help desk service in the organization beforehand, the new service related to the project may be affected either positively or negatively (project related operations success) by the existing service (operations success).

The same is true concerning to the part of the IS affected by the project (project related information system success), and to the status of the existing IS before the project (information systems success).

There may also be organizational structures whose success is directly influenced by the success of projects. This is the case, for example, of Project Management Offices (PMO), which are organizational units that support projects and

project management [9]. Ultimately, the success of a PMO will result from the success of the projects under its control. The Information Systems Function is also another good example in this case.

Finally, we can mention the business success, which is strongly influenced by the success of the projects carried out in the organization. In the case of IS, this is noticeably evident.

4. Influences of Success and Conclusion

Figure 8 aims to illustrate that in an organization there are typically several projects being carried out over a period (often simultaneously) that influence each other (and not only in the case of programmes & portfolios), and influence the success of IS and the organization. It is equally important to note the influences that occur between "program & portfolio success", "operations success", "information systems success", "organizational success" and "business success". Figure 9 presents a theoretical model that synthesizes the diverse influences observed between the several "facets" of success. Program & Portfolio success was intentionally not included to improve the readability of the model.

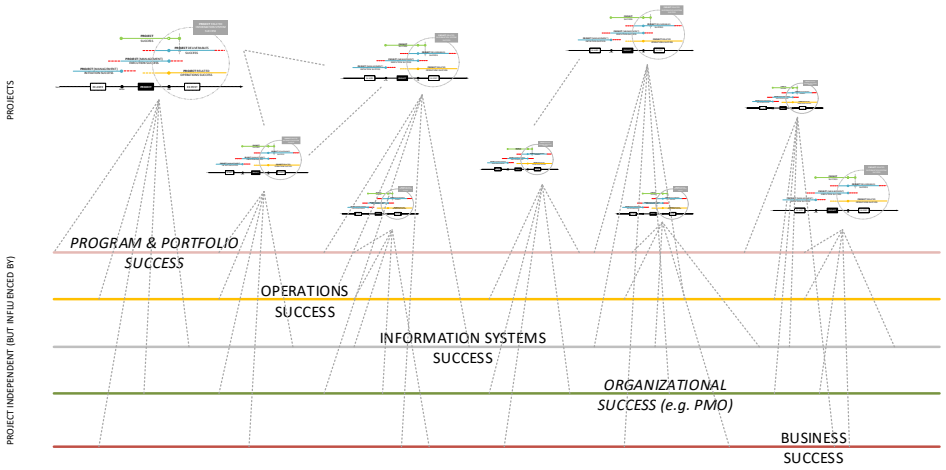

Figure 8. Influences of projects' success in program & portfolio success, operations success, information systems success, organizational success and business success

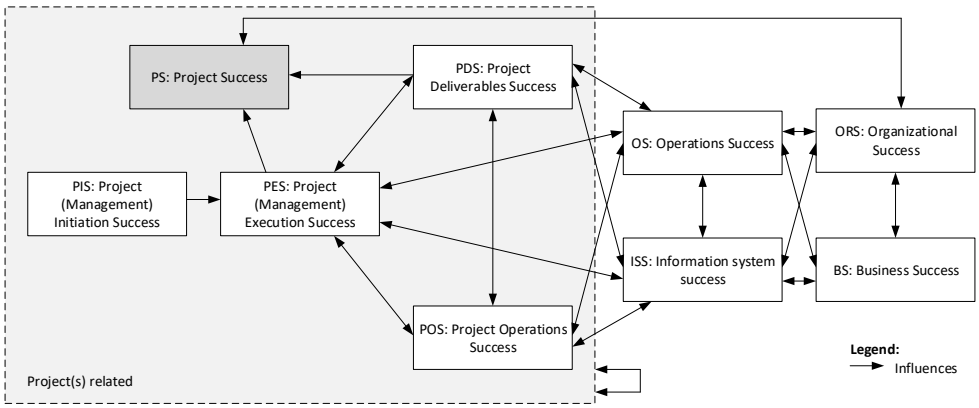

Figure 9. Theoretical model of information systems (projects) success

Therefore, we can conclude that there are several facets of success in IS that should be considered. To be aware of it is fundamental to establish systematic processes for evaluating performance and results, based on well-defined criteria and on the notion of their time frame and relative importance for the different stakeholders involved.

In fact, organizations need to define efficient and effective success management [10] processes for systematizing the definition, evaluation, and reporting of success [11]. However, the evaluation of projects success seems to be currently an informal and rudimentary process mainly focused on the success of project management and not on the success of the projects' deliverables [12].

Undoubtedly, there is the need of a continuous effort to improve performance and, without a good understanding of the different facets of success this is not possible in full extent.

References

[1] K. Pearlson, C. Saunders and D. Galletta, Managing and Using Information Systems, 6th ed., Wiley, 2016.

[2] PMI, A Guide to the Project Management Body of Knowledge (PMBoK® Guide), 6th ed., Project Management Institute, 2017.

[3] J. Varajão and A. Trigo, "Evaluation of IS project success in InfSysMakers: an exploratory case study," in Proceedings of the International Conference on Information Systems (ICIS), Dublin, Ireland, 2016.

[4] L. McLeod, B. Doolin and S. MacDonell, "A Perspective-Based Understanding of Project Success," Project Management Journal, vol. 43, no. 5, pp. 68-86, 2012.

[5] N. Cerpa and J. Verner, "Why did your project fail?," Communications of the ACM, vol. 52, no. 12, pp. 130-134, 2009.

[6] R. Turner and R. Zolin, "Forecasting Success on Large Projects: Developing Reliable Scales to Predict Multiple Perspectives by Multiple Stakeholders Over Multiple Time Frames," Project Management Journal, vol. 43, no. 5, pp. 87-99, 2012.

[7] D. Cecez-Kecmanovic, K. Kautz and R. Abrahall, "Reframing success and failure on information systems: a performative perspective," MIS Quarterly, vol. 38, no. 2, pp. 561-588, 2014.

[8] D. Baccarini, "The logical framework method for defining project success," Project management journal, vol. 30, no. 4, pp. 25-32, 1999.

[9] F. Pansini, M. Terzieva and V. Morabito, "The path towards discovering PMO: an exploratory analysis of the Italian banking sector," International Journal of Information Systems and Project Management, vol. 2, no. 2, pp. 27-40, 2014.

[10] J. Varajão, "Success Management as a PM knowledge area - work-in-progress," Procedia Computer Science, Elsevier, vol. 100, pp. 1095-1102, 2016.

[11] J. Varajão, "A new process for success management - bringing order to a typically ad-hoc area," Journal of Modern Project Management, vol. 5, no. 3, pp. 94-99, 2018.

[12] J. Varajão and J.A. Carvalho, "Evaluating the Success of IS/IT Projects: How Are Companies Doing It?," in 13th International Research Workshop on IT Project Management (pre-ICIS workshop), San Francisco, USA, 2018.

Biographical notes

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João Varajão is currently professor of information systems and project management at the *University of Minho*. He is also a researcher of the *Centro Algoritmi* at the *University of Minho*. Born and raised in Portugal, he attended the *University of Minho*, earning his Undergraduate (1995), Masters (1997) and Doctorate (2003) degrees in Technologies and Information Systems. In 2012, he received his Habilitation degree from the *University of Trás-os-Montes e Alto Douro*. His current main research interests are in Information Systems Management and Information Systems Project Management. Before joining academia, he worked as an IT/IS consultant, project manager, information systems analyst and software developer, for private companies and public institutions. He has supervised more than 100 Masters and Doctoral dissertations in the Information Systems field. He has published over 300 works, including refereed publications, authored books, edited books, as well as book chapters and communications at international conferences. He serves as editor-in-chief, associate editor and member of the editorial board for international journals and has served in numerous committees of international conferences and workshops. He is co-founder of CENTERIS – Conference on ENTERprise Information Systems and of ProjMAN – International Conference on Project MANagement.

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Adding experts' perceptions to complement existing research on information systems backsourcing

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Adding experts' perceptions to complement existing research on information systems backsourcing

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Abstract:
This paper extends the existing literature on information systems (IS) backsourcing by the perception of practitioners. For this purpose, we conducted a series of qualitative, semi-structured interviews with IS sourcing experts. The interview questions focused on the participants' perceptions and experiences with the topic, on identifying reasons for and against IS backsourcing, and on revealing relevant trends pertinent to IS backsourcing. We then compared those findings with two previously conducted comprehensive literature reviews on academic and practitioner literature on IS backsourcing. By following this approach, we contribute to the existing research by verifying previous findings, for example, the most important reasons why companies decide in favor of IS backsourcing. Additionally, we were able to enhance previous contributions as we highlight the significance of differentiating between the scope of IS backsourcing by looking at the underlying services which are potentially backsourced. Further, we identified the importance of managers' personal preferences as an additional reason for IS backsourcing, for example, based on personal experiences or a perceived need for change. Based on our findings, we created a comprehensive overview of all aspects connected to the IS backsourcing process and derived opportunities for further research to contribute to the IS backsourcing research agenda.

Keywords:
backsourcing; insourcing; back in-house; information systems; expert interviews; academic literature.

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1. Introduction

Recently, the large German industry company thyssenkrupp decided to terminate its large-scale outsourcing contract with T-Systems [1]. Instead of jointly standardizing the information systems (IS) landscape and moving server capacity as planned to T-Systems' data centers, approximately 100 employees who were originally transferred to T-Systems were transferred back to thyssenkrupp [2]. According to press reports, the key reason for terminating the contract were collaboration issues between the two companies [1]. This recent example shows that the common practice of IS outsourcing does not always lead to the desired success [3], and companies decide to backsource IS services - a theme that could already be observed in previous cases [4]. In combination with the increase in digitalization and adoption of agile forms of collaboration over the recent years [5] and their impact on management control [6], this might be a sign towards a shift in the IS sourcing behavior. This motivated us to contribute to the emerging research area of IS backsourcing [7, 8] by conducting qualitative interviews with IS sourcing experts to discuss their perception on IS backsourcing and compare this to previous research in this field. By following this approach, we aim to provide insights into experts' perceptions and thus increase the connection between academic literature and the community of IS practitioners as suggested by several researchers [9]. This could also increase the practical relevance of IS research, which is an often discussed shortcoming of academic research [10].

The first academics to introduce the concept of IS backsourcing were Hirschheim and Lacity [11] and subsequently Lacity and Willcocks [12]. They defined it as the transition of those assets, activities, and skills required to perform IS services back in-house, which had been outsourced previously to one or multiple vendors. We observe that researchers use synonyms for the word backsourcing, for example, backshoring, reshoring, or relocating, to describe the transfer of value creating activities to the home country or at least to a neighboring country [8]. Therefore, we follow Nujen et al. [13] and highlight the change in ownership back to the mother organization as the distinctive characteristic of the term backsourcing. Consequently, backsourcing can also be combined with a change in location, for example, back to the country or region of the client organization. However, a location change is not a necessary condition for speaking of backsourcing [14]. The introduced definition of backsourcing naturally implies that the services in scope have been outsourced before [8]. Outsourcing is defined in the academic literature as transferring IS service provision to one or more third party vendors which represent over 80% of the IS budget [15, 16]. In contrast, academic literature defines insourcing as retaining 80% or more of the IS budget internally after having considered a potential outsourcing option [16]. Therefore, insourcing can be considered as a static state characterized by the internal provision of IS services, whereas backsourcing describes the process of transferring IS services back in house [14].

The paper is structured as follows. In section 2, we introduce our research approach. Here, we also introduce the addressed research questions. In section 3, we present both methodology and findings from related academic and practitioner literature. Subsequently, section 4 discusses the expert interviews by first introducing the applied methodology and then by presenting the findings in detail. Section 5 compares findings from all three sources of data before we will discuss the results in section 6. The final section concludes the paper.

2. Research approach

Within this paper, we are drawing on three major sources of data, (1) academic literature, (2) practitioner literature, and (3) expert interviews. Fig. 1 visualizes these three sources and how they will be used in the paper at hand. By combining publications for different target audiences and by applying different methods, namely literature reviews and expert interviews, we aim to increase rigor and relevance of our findings.

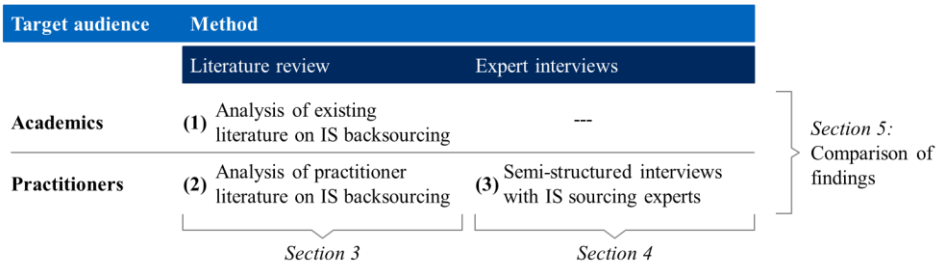

Fig. 1: Visualization of research approach

(1) Academic literature: Academic writing aims to develop theories or concepts to explain complex circumstances for a group of scholarly experts [17, 18]. Therefore, academic literature focuses on the justification of arguments, placing a special emphasis on rigor and completeness [19]. Academic contributions are precise, impersonal, and objective pieces of research, aiming to create a balanced discussion of different standpoints [17]. Also, academic literature builds upon the work of previous scholars and provides incremental knowledge within its field of research [20]. The paper at hand also falls in this type of publications.

(2) Practitioner literature: This type of literature aims at providing information to professionals working in the respective field [21]. Practitioner literature is influencing actions of its audience [22] and supports individuals and organizations to evaluate the relevance and applicability of different trends and corporate practices [23]. Literature focused on practitioners reflects their interests and standpoints [23], since in general, media is supporting the beliefs of its target audience [24]. Therefore, the analysis of practitioner literature is considered as well suited for IS researchers to identify and understand topics of relevance to practitioners [9]. Additionally, to increase the relevance of IS research for practitioners, Marrone and Hammerle [10] suggest to intensify the connections with practitioners, for example by identifying topics of relevance for them and by generating discussions on core research issues.

(3) Expert interviews: Conducting qualitative interviews can function as an additional source to gather data about a research topic [25]. We are focusing on interviewing selected experts, who can be considered as gatekeepers to relevant knowledge and insights for our research topic. Due to their exposure to different organizations within their professional career, we are able to discuss our research topic without having access to the members of the organizations themselves. Different types of techniques for conducting qualitative interviews exist, for example, structured interviews, unstructured, semi-structured, or group interviews [26]. Qualitative interviews are a widely used research method within IS research [25]. In the paper at hand, the expert interviews can complement the written practitioner publications by adding another perspective, for example when experts state opinions more openly than they would do in written articles.

By combining and triangulating these three sources of data, we aim to answer two research questions (RQ) within the field of IS backsourcing:

(RQ1) To what extent do the perceptions of sourcing experts on IS backsourcing and the existing academic and practitioner literature match?

RQ1 is of special interest, since it increases the connection between academic literature and the community of IS practitioners. Several academics have raised the topic of limited relevance of IS research for practitioners, and thus this research can provide insights into the perceptions from experts to the academic community [9]. Further, RQ1 addresses the potential research limitation identified by von Bary et al. [27], who only relied on published literature to determine the topics of relevance for practitioners without conducting additional interviews.

If triangulation of these three sources of data results in either consistent or complementary views, the potential for aggregating the findings from academic literature and practitioners into a coherent framework might be given.

(RQ2) How can a comprehensive IS backsourcing framework look like, spanning from the original (out-)sourcing decision to the successful repatriation of the services?

RQ2 is of special interest to extend the existing research stream by a comprehensive overview of all elements connected to the IS backsourcing transition. In particular, we aim to include elements like the influence of the original (out-) sourcing decision, influencing factors during the sourcing relationship, the decision to backsource, and subsequent elements like success factors. This overview can provide future researchers with suggestions to identify suitable research topics. Additionally, it can serve as a structuring element to categorize further research and complement previously introduced backsourcing process frameworks.

3. Literature analysis

3.1 Methodology

Within this paper, we draw upon two literature reviews, in which we have previously examined both academic [8] and practitioner literature [27] on IS backsourcing. We will first introduce the methodology applied in the literature reviews in this section and present our results in the subsequent section. Both literature reviews follow a systematic, reproducible method to first search and select the available literature, followed by a synthesis of the outcomes and key statements of each identified publication [28].

For the *academic literature* review [8], we searched for peer-reviewed journals or conference proceedings published over the last 20 years (1997 – 2017), written in German or English, which contained one of the following keywords; backsourc*, backshor*, resourci*, reshori*, insourc*, inshori*, relocati*, re-outsourc*; and in addition either the term information systems or information technology [8]. The search terms were applied to title, abstract, and keywords in all commonly used databases for IS literature, for example Business Source Complete, ProQuest – ABI/INFORM Complete and Science direct (Elsevier) for journals or AIS Electronic Library and Digital Library at IEEE for conference proceedings [29]. To achieve exhaustiveness, a forward and backward reference search and author search using Google Scholar was performed [29, 30]. Over the literature search and analysis process, over 100 academic literature items were studied [8]. Altogether, we identified 31 relevant publications on the topic of IS backsourcing, most of them published in journals (22 publications; 73%), which were quite evenly distributed over the search period [8].

Following a similar approach to retrieve relevant *practitioner literature* on IS backsourcing [27], we searched for English and German publications containing one of the keywords backsourcing, insourcing, or back in-house, and filtered for information technology, information systems, and/or IT as subject [27]. To retrieve German publications, we additionally searched for the three German keywords "Eingliederung" (integration), "Zurückholen" (bringing back), and "Rückverlagerung" (backsourcing). The search was conducted for publications over the last 20 years (1997 – 2017). Following recommendations by [10], this literature review has chosen Factiva, one of the leading databases for news sources, and additionally EBSCO to increase coverage of trade publications and business journals. For German literature, the search was extended to the German-focused press databases WISO and GENIOS. Over the literature search and analysis process, over 650 practitioner literature items were studied [27]. In the subsequent step, a practical screening was performed to identify all non-relevant publications [31]. After removal of duplicates within the retrieved articles, we have identified a total of 148 English and 25 German practitioner-focused publications [27].

3.2 Findings from the literature reviews

Academic literature

Looking at the research type of the analyzed academic publications, we observed that almost half of the publications are formulative and thus aim to develop a model, guideline, or similar artefact [32], followed by explanatory-interpretive and confirmatory publications [8]. Further, when analyzing the applied reference theories, we identified two main

theories to interpret backsourcing decisions, namely Transaction Cost Economics and Agency Theory [8]. Other theories included Organizational Learning, the Knowledge-Based View of the firm, and Intellectual Capital [8].

Since there was no exhaustive literature review of the state of the research available yet, the aim of the academic literature review [8] was to explore and synthesize the existing literature on IS backsourcing. Therefore, we identified three major research themes which were frequently discussed within the retrieved academic literature, namely (1) motivators for backsourcing, (2) decision factors, and (3) implementation success factors [8]. Those research themes can be located along the different steps of the backsourcing process. Based on the findings from the literature analysis and by adapting previous contributions by McLaughlin and Peppard [33] and Veltri et al. [4], we introduced a backsourcing process which is displayed in Fig. 2 [8]. In the following, we want to discuss the elements of the research themes in more detail.

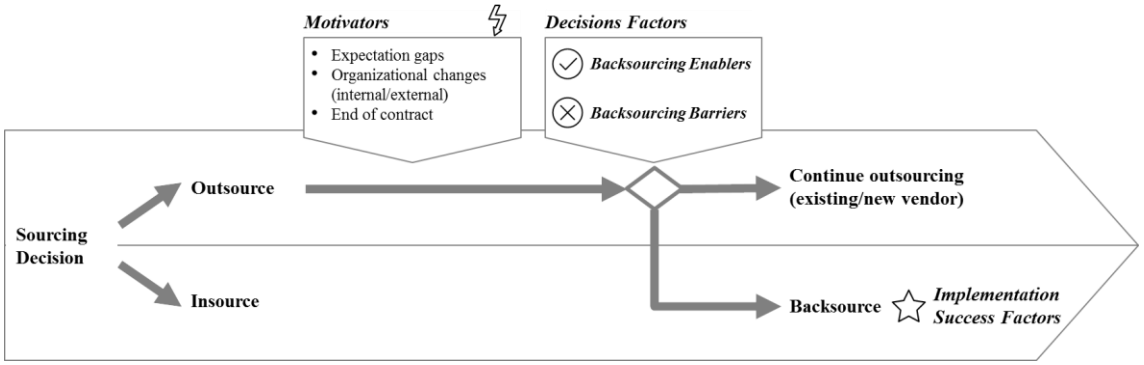

Fig. 2 Backsourcing process introduced in our academic literature review [8]

Following the categorization presented by Veltri et al. [4] and Wong [34], the motivators for backsourcing decisions can be classified into (1) expectations gaps, (2) internal organizational changes, and (3) external organizational changes. For completeness, (4) end of contract can be added as an additional motivator [8]. The first category, expectation gaps, contains the most frequently discussed reasons why companies are considering a backsourcing decision, for example, dissatisfaction with the service quality, higher than expected costs, loss of control, missing access to latest technology, or general contract problems [8]. The second category contains reasons like changes in management or a new, more strategic role for IS [8]. External organizational changes can be represented, for example, by changes in the vendor organization or structural changes [8].

If one or more of the introduced motivators triggered a re-consideration of the outsourcing relationship, several decision factors can influence the decision. Backsourcing enablers support a decision to backsource, while backsourcing barriers lead to a continuation of outsourcing with the existing or a new vendor [8]. Identified examples for backsourcing enablers are, for example, incorporated reversibility to facilitate a backsourcing transition, the availability of internal IS capabilities, or the presence of an organizational crisis within the company [8]. In contrast, barriers for backsourcing can be represented by lock-in and switching costs and IS knowledge and resource gaps within the company [8].

Lastly, in our previously conducted academic literature review [8], we subsumed six implementation success factors based on the existing academic literature: (1) project management, e.g., existence of a dedicated project team and project plan; (2) employee (re-)hiring strategy to ensure resource availability; (3) communication between all stakeholders; (4) strategic orientation, e.g., a clear fit into the overall IS strategy for the company; (5) continuity of operations without interruption of day-to-day operations; and (6) knowledge transfer to successfully re-integrate the previously outsourced knowledge back into the company again.

Practitioner literature

During the analysis of practitioner literature on IS backsourcing, we followed an inductive approach towards literature coding to identify the topics of relevance to practitioners without testing predetermined themes [10, 27, 35]. Additionally, we classified each publication based on its topic, article type, publication type, and further information. Table 1 displays the dimensions within each category which were used to analyze practitioner literature [27].

Table 1: Applied categories for structuring the practitioner literature analysis [27]

Category	Dimensions					
(1) Topic of the Article	Discussion of individual backsourcing case	Discussion of industry trend	Presentation of survey results	Report on individual backsourcing case	Vendor perspective	N/A
(2) Article Type	Editorial/comment	Feature/background article	News article	Press release	Recommendations/ practitioner guide	Other
(3) Publication Type	National newspaper	News agency	Periodical	Regional newspaper	Trade journals	Other
(4) Applied Terminology	Back in-house	Backsourcing	Insourcing	Eingliederung[1]	Rückverlagerung[1]	Zurückholen[1]
(5) Additional Information	Company name (if applicable)	Country	Journal name	Publication year	N/A	N/A

1 German publications only

Most of the analyzed publications are either news articles or feature/background articles (83%), followed by editorials/comments [27]. The majority of publications were released in trade journals (80%). Regarding the year of publication, there is a peak around the year 2005 in both English and German publications triggered by prominent backsourcing cases (e.g., JP Morgan Chase, Sainsbury's), and afterwards a relatively constant number of publications per year [27]. When analyzing the applied terminology, we observed that most practitioner publications utilize the term back in-house, followed by the term insourcing [27]. At the same time, the word backsourcing is used occasionally. This leads to the interesting observation that the terminology applied in practitioner literature does not correspond to the terminology applied in academic literature. We concluded that this could limit the relevance of each group's contribution for each other [9], since it potentially leads to confusion or ambiguity in the communication between both groups [27].

Looking at the topics of the publications while conducting the literature review, we observed that most publications take a descriptive approach by either discussing or reporting about cases of IS backsourcing [27]. Other publications complement by either presenting survey results or discussing backsourcing as a larger industry trend. Within these practitioner-focused publications, four general themes could be identified, namely (1) reasons for backsourcing, (2) presentation of survey results, (3) discussion of industry trends, and (4) backsourcing success stories [27].

Of those four themes, the discussion of reasons why companies have backsourced is by far the most prominent theme. Within the analyzed practitioner literature, over 50% of all publications and over 60% of the publications presenting individual backsourcing cases are stating reasons behind a backsourcing decision [27]. Especially, three major reasons could be identified: cost savings, quality improvements, and increase in control or flexibility [27].

4. Expert interviews

4.1 Methodology

Our objective behind conducting expert interviews was to gain deeper insights into the practical relevance and current trends linked to the topic of IS backsourcing. Before presenting the interview findings, we will first discuss the applied methodology. The selection of participants was carried out via the professional career networks LinkedIn and Xing. While the first shows a more global coverage, the latter focuses on German-speaking countries [36]. In the first step, we searched for keywords like backsourcing, sourcing, and insourcing in combination with IT or information technology to identify relevant candidates. We then reviewed candidates' profiles to determine their experience in the respective field, for example, based on the current and previous roles, realized projects, and professional tenure. Thus, we compiled a list of 60 potential interviewees. The identified experts represent a broad spectrum of geographies (e.g., North America, multiple European countries) and job profiles (e.g., consultants at IS consulting companies, independent IS advisors, or employees responsible for IS sourcing at large companies). Conducting multiple interviews with different experts allows us to cover a broad spectrum of different experiences and perspective on the research topic. Subsequently, we contacted all candidates via the integrated mail function from LinkedIn/Xing, and asked them to participate in a telephone interview on the topic of IS backsourcing.

Following our aim to gain deeper understanding into the perspective from practitioners on the topic of IS backsourcing, we selected a qualitative research approach without testing predetermined themes [9, 10, 37]. Therefore, we used semi-structured interviews with open questions, giving the participants the flexibility to express their opinions and to share their experiences in the field of IS backsourcing [25, 37]. To increase the acceptance of the selected candidates to participate in the interviews, we chose to ask for interview slots of 20 minutes. The questions focused on 1) discussing the participants perceptions and experiences with IS backsourcing, 2) identifying reasons for and against IS backsourcing; and 3) revealing trends and topics of relevance pertinent to the topic of IS backsourcing. For additional follow-up questions while discussing the pre-defined topics, we used listening methods and improvisation as recommended by Myers and Newman [25]. Due to the differences in terminology applied in practice [27], we defined the term backsourcing at the beginning of each interview. This approach reduces the risk associated with the ambiguity of terms in order to avoid that the interview partner might not completely understand the questions or used terminology [25]. For every interview the interviewer created detailed minutes and analyzed subsequently to summarize key arguments and opinions.

4.2 Findings

To structure the findings from the interviews, we applied the same set of three categories used to conduct the interviews. Of the identified and contacted participants, 16 (27%) accepted to participate in an interview, which were scheduled between February and April 2018. Most of the participants were consultants, either employed at IS consulting companies or working as independent advisors. The sample of participating experts underlies a certain bias based on the individual's interest to participate in the interviews. This might partially explain the high share of consultants within the participants, and potentially also the Europe-focused selection of experts. Table 2 shows the geographic background, field of work, and job profile of the interview participants.

Table 2. Interview participants and their background

ID	Region	Country	Field of work	Job profile
P01	Europe	Germany	Consultant	Leading position at IS consulting company
P02	Europe	United Kingdom	Consultant	Leading position at IS consulting company
P03	NAFTA	Canada	Consultant	Independent IS sourcing advisor

ID	Region	Country	Field of work	Job profile
P04	Europe	Germany	Consultant	Leading position at IS consulting company
P05	Europe	United Kingdom	Consultant	Independent IS sourcing advisor
P06	Europe	Germany	Consultant	Leading position at large consulting company, focusing on IS
P07	Europe	Netherlands	Industry company	IS sourcing manager at industry company
P08	Europe	Italy	Consultant	Independent IS sourcing advisor
P09	Europe	Germany	Consultant	Independent IS sourcing advisor
P10	Europe	Austria	Consultant	Independent IS sourcing advisor
P11	Europe	Germany	Consultant	IS sourcing manager at industry company
P12	Europe	Netherlands	Consultant	Independent IS sourcing advisor
P13	Europe	Germany	Consultant	Senior manager at large consulting company, focusing on IS
P14	Europe	Netherlands	Consultant	Freelance IS sourcing project manager
P15	Europe	Germany	Consultant	Independent IS sourcing advisor
P16	Europe	Germany	Consultant	Leading position at IS consulting company

Perceptions on IS backsourcing

Participants' personnel perceptions of IS backsourcing were either based on individual experiences from supporting backsourcing projects in various industries, e.g., banking, retail, or automotive sector, or from closely following industry discussions and trends. While conducting the interviews, we observed clear differences between the experts' opinions, from strong supporters of backsourcing ("if you are big enough, you should be good enough to do it inhouse") to sceptics ("backsourcing is backward-looking"; "rather fix the problems of your outsourcing relationship").

To contextualize a potential backsourcing trend, the interviewed experts often referred to first generation outsourcing contracts, when companies outsourced large parts or their entire IS operations to IS vendors, often within joint-ventures or in separate organizations. These transitions often came with shortcomings, for example, badly designed contracts, the reduction of internal control and governance structures, and unrealistic business case expectations [4, 34]. This led to some large backsourcing events (e.g., JP Morgan Chase and Sainsbury's in 2005), and correspondingly an increase in public attention about this topic [38, 39]. According to the interview participants, the general trend towards outsourcing of IS services however was not changed by these lighthouse cases.

Based on the experts' perceptions, many companies have learned from their initial mistakes, and have subsequently created more robust outsourcing relationships, e.g., with termination clauses, shorter contract durations, and stricter and more clearly defined SLAs (Service Level Agreements). Also, they created more realistic business cases and at the same time improved their internal governance, for example, with an efficient retained organization to manage and control their IS vendors.

According to the experience of the interviewees who have supported or implemented backsourcing transitions, many companies decide to first repatriate the previously outsourced services after terminating the outsourcing contract, often accompanied by much press attention. Then, they selectively outsource parts of the backsourced services afterwards to other IS vendors. Especially generic functions, for example, datacenter or network operations, are often outsourced again afterwards, while more strategic, business-critical functions are kept in-house. This also connects to arguments stated by the experts which emphasized the conscious differentiation between services suitable to be outsourced and services to perform in-house.

Reasons for and against IS backsourcing

All interviewed experts had their clear perspective on reasons why companies decide for or against backsourcing their IS services. Depending on their general attitude towards the topic, either the reasons for or against dominated in the answers. Fig. 3 provides an overview of the stated arguments, which will be discussed in the following. The numbers in brackets indicate the number of experts who mentioned the respective reasons based on their general experience from supporting backsourcing decision processes during their professional career. Corresponding to the aim of our research to gain a better understanding into the general perspective from practitioners on the topic of IS backsourcing, at this stage of our research we did not focus on specific projects, but rather on the overall perception of the research topic.

(1) Reasons for backsourcing	(2) Reasons against backsourcing
▪ **Cost savings** (12) ▪ **Better quality** (12) ▪ **Improved collaboration** (10) ▪ **Personal preferences** (7) ▪ **Compliance with regulatory requirements** (5)	▪ **Missing staff** (internal/external) (12) ▪ **Lack of relevant IS knowledge** (12) ▪ **High switching costs** (5) ▪ **Missing support from the provider** (5)

Fig. 3: Reasons for and against backsourcing as mentioned by interviewed experts

(1) Reasons for backsourcing: Based on the conducted interviews, we could identify five key reasons why companies decide in favor of backsourcing. First, companies aim to achieve *cost savings*, which are justified for example by possibilities to increase efficiency and automation when performing the services in-house. Also, experts stated the high costs associated with change requests, e.g., for software maintenance and development, leading to higher than expected costs within the outsourcing setting. Additionally, companies could avoid paying for the additional profit margin obtained by the IS vendor. A second reason is the aspiration to *increase quality* or performance of the IS services, which is often based on a dissatisfaction with the status quo. Third, companies are trying to *improve the collaboration* between IS and business departments, for example, the service orientation, or the control over the IS processes. Fourthly, the interviewed experts highlighted the importance of decision makers' *personal preferences* in the decision. According to their experience from supporting backsourcing projects, decisions are often motivated by previous experience, personal attitudes, or also a perceived need from the management to demonstrate change within the organization. This reason was stressed by many experts as very important, since it might bias decision makers' perception of the significance of other reasons. Lastly, *regulatory requirements* can drive companies towards bringing their IS back in-house, for example to comply with stricter data privacy laws.

(2) Reasons against backsourcing: From the interviews, we synthesized four reasons often preventing companies from backsourcing. First, *missing staff* often forms a large obstacle for companies, since they do not have the required staff inside their organization, and since they also have difficulties in recruiting the required resources on the labor market. Often, companies already struggle to replace retiring employees and are thus reluctant to aim for further growth of their IS workforce. Second, companies *lack relevant IS knowledge*, and thus are not able to properly define their future IS sourcing strategy or have troubles in managing the transition. A third reason are *high switching costs* related with the backsourcing decision, for example, to build up own infrastructure, or to cover arising contract penalties. Lastly, *missing support from the provider* can prevent companies from backsourcing, for example due to a lack of documentation, or a non-cooperative behavior regarding the know-how transfer.

Adjacent trends and topics

To expand our focus and to identify links with adjacent research fields, we additionally asked the interviewed experts about current trends and topics pertinent to the sourcing of IS. Based on the responses in the interviews, we could identify five emerging themes which we will introduce in the following. While conducting the interviews, we observed a high concordance of the experts' answers towards these five themes. While those trends do not create a holistic overview of all trends within the IS sourcing landscape, we argue that they provide a helpful overview for other researchers.

Selective sourcing: Companies are more frequently sourcing smaller IS work packages from an increasing number of IS vendors. This is often driven by business departments, which aim for specialized vendors for each functionality, and are less concerned about the overall IS supplier landscape of the company. This trend consequently reduces the incidents of large outsourcing contracts with one vendor responsible for provisioning the majority of IS related services, which can be observed in the practice [40].

Challenge of service integration: Connected to the growth in selective sourcing, companies are facing an increased challenge of successful service integration. Due to the multitude of interfaces between IS vendors, applications, and involved business departments, companies must carefully manage the integration of all services. In the past, when the company had one or few large outsourcing vendors, this role often was fulfilled by them as part of their contractual scope. Therefore, the experts observe that many companies are building up their service integration capabilities in-house to cope with this challenge and facilitate a more selective sourcing strategy.

Standardization/move towards the cloud: The interviewed experts all stated an increase in standardization of software products, often accompanied by a move towards the cloud. This leads to a fundamental change of the application landscape at large companies. Experts observe an increased implementation of standardized software solutions developed by large software companies (e.g., Salesforce, Oracle) often delivered from a cloud infrastructure, and a further decrease in special software applications developed to the requirements from individual companies. For companies, this approach usually offers faster roll-out times and facilitates access to best-in-class technology.

Choice of location: During the interviews, many experts indicated that companies who had outsourced their IS provisioning to offshore locations, for example India, are often reconsidering their choice of sourcing location in subsequent sourcing decisions. Unsatisfying experiences, for example, due to cultural differences or large time differences, often combined with unrealistic expectations from the outsourcing companies lead to preferences to sourcing in nearshore countries, or even onsite locations [41]. In many cases, nearshore countries still offer advantages like lower labor costs than those in the home country, but overcome potential disadvantages of the offshore locations. This also matches arguments seen in the academic literature [42].

Increase in agile development: Experts also discussed IS sourcing in the context of the continuing increase in implementing agile software development methods. Since this requires a closer collaboration between the business departments as product owners or sponsors and developers, some companies are repatriating their IS to allow for more agile development, especially in strategically important functions. However, the experts stated that in practice, agile development was also successfully implemented in outsourcing settings, when companies avoid common pitfalls like a mismatch between the commissioned scope of the outsourcer and needed capabilities on the project, or missing interfaces with the business departments.

5. Comparison of findings

After separately introducing the findings from each source of data, namely academic literature, practitioner literature, and expert interviews, we will now compare the findings. We will especially focus on three main categories, (1) scope of (back-)sourcing, (2) reasons for backsourcing, and (3) reasons against backsourcing. Table 3 displays the three categories and main aspects which we will discuss in the following paragraphs.

Table 3. Comparison of findings from literature analysis and expert interviews

	Expert interviews	Academic literature	Practitioner literature
(1) Scope of backsourcing	▪ **Differentiation** between services suited for o **Outsourcing**: e.g., maintenance, datacenter, etc. o **In-house/backsourcing**: e.g., architecture, service integration, etc. ▪ **Conscious sourcing decisions**	▪ **Mostly "in or out"-view** ▪ **Limited consideration** of scope/differentiation between services	▪ **Limited discussion** in purely **backsourcing focused literature**, but addressed in general IS outsourcing articles
(2) Reasons for backsourcing	▪ **Cost savings** ▪ **Better quality** ▪ **Improved collaboration** ▪ **Personal preferences** ▪ Compliance with **regulatory requirements**	▪ **High concordance** with the category expectation gaps ▪ **No/less mentioning** of personal preferences and regulatory requirements	▪ **High concordance** of key reasons; mainly cost, quality and control ▪ **Personal preferences** less cited in literature
(3) Reasons against backsourcing	▪ **Missing staff** (internal/external) ▪ **Lack of relevant IS knowledge** ▪ **High switching costs** ▪ **Missing support from provider**	▪ **Good match** with identified back-sourcing barriers, e.g., lock-in and know-ledge/resource gaps	▪ **No/very limited discussion** within the practitioner literature

(1) Scope of (back-)sourcing: Within the expert interviews, we observed that most experts stressed a required differentiation regarding the scope of the sourced IS services. Instead of arguing for a general out- or insourcing of IS services, the experts emphasized the importance of distinguishing between services suited for outsourcing, for example, maintenance or operation of datacenters, and services which should be performed in-house, for example architecture or service integration. Consequently, these services are suited for backsourcing if currently outsourced to an external IS vendor. Further, we can conclude that the experts are reflecting many aspects connected to the sourcing decision and call for more conscious sourcing decisions for each separate function.

In contrast, when analyzing the academic literature on IS backsourcing, we mostly found publications discussing an in-or-out view, and therefore no differentiation between the suitability of individual services for backsourcing. Therefore, we conclude that the backsourcing-focused academic literature has shortcomings in considering the functional scope of backsourced services, since most authors do not address the differentiation between services as emphasized by the interviewed experts.

Similarly, in the reviewed practitioner literature on IS backsourcing, there are only limited discussions regarding the scope of (back-)sourcing. However, when looking beyond on practitioner literature considering IS sourcing in general, we do observe similar arguments as collected in the expert interviews.

(2) Reasons for backsourcing: Comparing the reasons for backsourcing, we generally notice a high concordance between all three sources of data. Especially the most important and most discussed reasons around costs, quality, and control/collaboration could be observed in each source. While practitioner literature mostly discusses those key reasons, academic literature aims to identify a broader range of all potential reasons, for example, changes within the internal organization or consequences from mergers and acquisitions [27]. This matches the academic aspiration towards exhaustiveness and accuracy [18] while practitioners rather put focus on the topics of largest relevance to them.

Within the expert interviews, we also observe a concentration of fewer, and more essential reasons, matching those from the practitioner literature. However, we observed two reasons less cited in the academic and practitioner literature,

namely decision makers' personal preferences and the compliance with regulatory requirements as driving force for backsourcing. Especially the great importance of personal preferences of the decision makers, e.g., based on previous experience, personal attitudes, or the perceived need to demonstrate change within the organization was a new result from the expert interviews. Even though personal preferences are currently not frequently mentioned in the academic literature on IS backsourcing, some researchers have previously discussed this topic. For example, McLaughlin and Peppard [33] argue that personal experience could bias decision makers in future sourcing decisions. Those preferences could be, for example, based on past experience with backsourcing, insourcing, or outsourcing [43]. The increasing importance of regulatory requirements as a driver of backsourcing decisions can be explained by stricter standards introduced by regulatory bodies, e.g., the Basel regulations for the banking sector in Europe [44, 45].

(3) Reasons against backsourcing: The high concordance between the three sources changes when looking at the reasons against backsourcing. Especially within the practitioner literature, we could find only very few discussions regarding potential reasons against backsourcing. This could be attributed to the fact that most of the practitioner publications can be characterized by their descriptive type. Therefore, they report on cases were companies decided in favor of backsourcing and thus do not discuss reasons against backsourcing [27]. Comparing academic literature and expert interviews, we generally observe a good match between reasons stated by the experts and the identified backsourcing barriers within academic publications, for example lock-in effects and knowledge and resource gaps.

6. Discussion

Reflecting on RQ1, which discussed the concordance between the perceptions of sourcing experts on IS backsourcing and the available literature, we can conclude that in general, there is a good match between all sources of data. This supports previous academic contributions in the field of IS backsourcing. At the same time, there are some noteworthy differences, for example, the importance to differentiate between services suited for out- or insourcing, which was emphasized by the interviewed experts. In addition, we observed certain differences among the reasons for and against backsourcing, for example, the significance of personal preferences of the decision makers.

Generally, we conclude that the topic of IS backsourcing is relevant to companies. However, a certain degree of outsourcing will most likely always remain. In addition, companies as well as individuals have gained substantial sourcing experience over the last decades. Thus, they are continuously improving their sourcing setup and strategy, for example by strengthening their vendor management organization or by increasing internal know-how which might lead to less backsourcing based on dissatisfaction or wrong expectations. An additional option could be to set up shared service centers in on- or offshore locations with internal resources, but with the possibility to achieve benefits like efficiency, cost savings, or better access to labor [46]. Also, the discussed trend towards more conscious, and – with respect to scope and volume – smaller outsourcing decisions could reduce large backsourcing transitions in the future. However, due to the increasing strategic importance of IS [8], we are still expecting that companies will backsource certain functions to increase control and flexibility.

After the detailed discussion and comparison of the utilized sources of data, we can draw conclusions regarding the overall IS backsourcing process. Consistent with RQ2, we have created a comprehensive framework to display all elements of a backsourcing transition, shown in Fig. 4. Our objective was to connect all elements which are part of a backsourcing process and which we have identified by reviewing the existing literature on IS backsourcing and by additionally consolidating opinions from sourcing experts. By doing so, we extend previous academic contributions, for example by McLaughlin and Peppard [33], Veltri et al. [4], and Wong [34], who already presented different backsourcing frameworks in their works. Based on our research findings, we can enhance those contributions with additional aspects connected to backsourcing transitions.

At this point, we will briefly introduce the main elements of the framework, and then discuss three topics more detailed as potential future research opportunities. In the middle of the illustration, we displayed the temporal sequence of different sourcing decisions. Initiating from the first sourcing decision on the left, typically characterized by outsourcing large volumes to one or few vendors, follows the second sourcing decision. At this point, a company takes the decision

to backsource or not, which is influenced by organizational factors and individual factors. Here, especially individual factors like sourcing experience and external influence extend previous academic publications, whereas organizational factors are mostly a result from analyzing the existing literature. Further, the framework in Fig. 4 considers the importance of differentiating between backsourcing entirely, backsourcing parts of the outsourced IS services, and continuing to outsource. This aspect also enhances the existing research cited above. The second sourcing decision can then be followed by n further, maybe less significant sourcing decisions, often characterized by sourcing of selective IS services triggered by business departments.

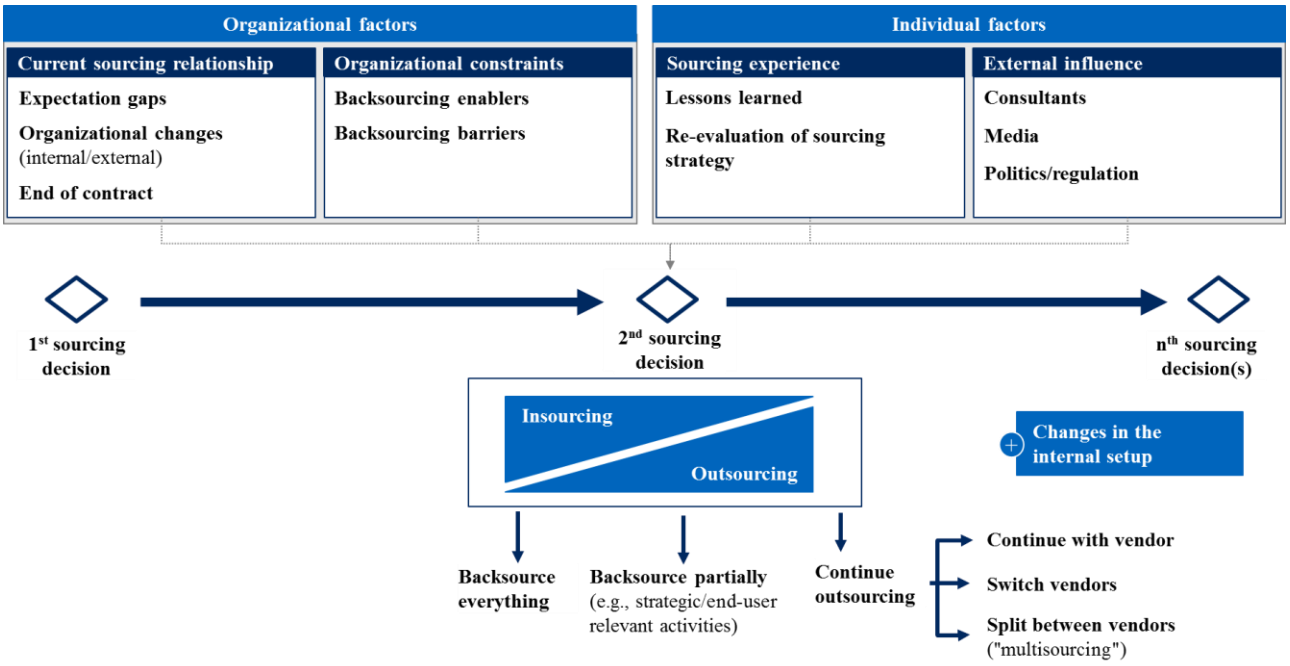

Fig. 4: Comprehensive overview of elements connected to a backsourcing transition

Based on the introduced overview of elements connected to an IS backsourcing transition, we suggest three potential research opportunities to further contribute to the existing research. Drawing upon our review of the existing body of academic literature in this field combined with the connection to IS sourcing practitioners, we introduce those research topics to provide an impulse for future researchers. This approach follows the recommendations by Benbasat and Zmud who suggest to also look at practice to discover topics for future research [19].

(1) Re-evaluation of sourcing decision: A first research topic could be the examination of the decision to backsource with the objective to determine why a company would re-evaluate and change its previous decision to outsource. We argue that this re-evaluation is driven by the sourcing history of the company and the experiences and lessons learned during the outsourcing relationship. Different influencing factors, for example, organizational factors and individual factors, could thus lead to a change in the sourcing strategy. This research topic could possibly extend existing work on IS outsourcing decisions, for example the frequently cited descriptive model by Lacity et al. [47], with backsourcing-specific factors. Also, further research could extend the research from Whitten and Leidner [48], who tested the influence of service quality, product quality, relationship quality, and switching costs on the decision to switch vendors or to backsource amongst top executives in the US. Lastly, we see the opportunity to follow Foerstl et al. [49], who

discussed reshoring in the field of manufacturing, and proposed to further investigate specific drivers of backsourcing decisions based on Transaction Cost Economics and Organizational Buying Behavior Theory.

(2) Backsourcing scope: Second, future research could focus on developing decision criteria to decide which services to repatriate as part of a backsourcing decision, and which services to leave in an outsourcing setting, either at the same vendor or by switching them to a new vendor. Potential influencing factors within the backsourcing context could be, for example, a different strategic positioning of the IS function or desired changes in the collaboration model. While working on this topic, researchers could build upon existing theoretical foundations on (selective) outsourcing, for example by Grover et al. [50] or Lacity et al. [51].

(3) Backsourcing transition success factors: A third research topic we are proposing is the derivation of the required steps of a backsourcing transition after the decision was made, coupled with the identification of success factors companies should consider. This research could extend existing research on outsourcing transitions, for example by Beulen et al. [52] or on the successful switching between vendors, for example, by Chua et al. [53]. Additionally, it could enhance first academic contributions within the IS backsourcing literature, for example by Butler et al. [54] or Bhagwatwar et al. [55]. Findings could be tested within qualitative case studies with employees from companies that have backsourced IS services.

7. Conclusions and limitations

Our objective for this paper was to determine how the perceptions from IS sourcing experts on IS backsourcing matches the available literature on the same topic. Additionally, we aimed to determine all aspects connected to an IS backsourcing transition to identify further opportunities for research. At first, we presented the underlying methodology and findings from two previously conducted literature analyses examining both the academic and the practitioner literature on IS backsourcing. Within the academic literature, three major research themes could be identified, namely motivators for backsourcing triggering a re-evaluation of the sourcing setup, decision factors which positively or negatively influence the backsourcing decision, and implementation success factors. For each theme, we presented the constituting aspects found in the academic literature. Similarly, we discussed results from reviewing practitioner literature on IS backsourcing. Here, the identification of reasons for backsourcing is the main theme discussed in the retrieved publications. A remarkable fact we observed is the different terminology applied in both literature types: while academic literature mostly uses the term backsourcing, practitioner literature mostly applies the terms back in-house or insourcing.

In a second step, we presented findings from a series of qualitative interviews with IS sourcing experts. During the interviews, we could observe clear differences between the experts, from backsourcing sceptics to strong backsourcing supporters. Based on their perceptions, the first companies which performed backsourcing were correcting shortcomings often based on missing experience when entering first generation outsourcing contracts. At the same time, companies still rely on outsourcing for many IS functions, and have created more robust, better functioning outsourcing relationships. The experts confirmed that backsourcing is happening and relevant in practice, and discussed several reasons for and against backsourcing. Arguments for backsourcing are, for example, cost savings and improvements of quality or collaboration. Further, personal preferences or regulatory requirements can lead towards a backsourcing decision. In contrast, stated reasons against backsourcing were missing staff and IS knowledge, high switching costs, and missing support from the provider. Additionally, we were also able to identify adjacent trends within IS sourcing in general, for example the growth in selective sourcing and thus the increased challenge of service integration, or a more conscious choice of location to balance cultural fit and benefits from lower labor costs.

In a last step, we compared the findings between the three introduced sources of data. We concluded that the experts had a stronger emphasis on the importance to differentiate between services suited for out- or insourcing, whereas the literature mainly took an in-or-out view, without considering the scope of backsourcing or differentiating between services. When comparing the reasons for backsourcing, we observed a high concordance between all three sources regarding the main reasons to backsource. The practitioner literature focuses on stating the key reasons, while academic

publications aim for exhaustiveness by identifying all possible reasons. Two new reasons emerged during the expert interviews, which were less found in the literature, namely the importance of managers' personal preferences in the sourcing decision, and the need to comply with regulatory requirements. Comparing the reasons against backsourcing between the different sources of data, the concordance is reduced. Practitioner literature contains very limited discussions on reasons against backsourcing. When only looking at the expert interviews and academic literature, we generally see a good match between the stated reasons.

Overall, our contribution is twofold. For the academic community, the main implications stem from the three outlined avenues for further research. By combining academic literature with both practitioner literature and expert interviews, we were able to draw an IS backsourcing framework, spanning from the original (out-)sourcing decision to the successful repatriation of the services. This approach allowed us to identify opportunities to extend the existing body of research on IS backsourcing. Second, the implications for practitioners originate from the aggregation and comparison of practitioner-focused literature and practical experiences from sourcing experts, for example, on key reasons to backsource or about connected trends and developments. Additionally, in the future practitioners could benefit from an even more practitioner-oriented academic research based on the recommendations within this contribution.

Our research has several potential limitations, which should be considered. Despite a systematic approach to identify the set of relevant experts for the qualitative interviews, which included a thorough search within the leading career networks and a screening of the candidates' profiles, we might have missed relevant experts in the field. Further, since not all the contacted experts were willing to participate in the interviews, we omitted additional opinions leading to a potential non-response bias. A further bias could stem from the professional experience of the experts, who often advise companies in outsourcing assignments, and thus are potentially inclined to favor outsourcing over insourcing. However, in total we consider the approach of selecting and interviewing experts in our research as appropriate and robust to identify the perceptions of sourcing experts on the topic of IS backsourcing.

A further limitation could be found in the temporal difference between the literature publication dates and the dates of conducting the interviews. The search period for the analyzed literature were the last 20 years, from 1997 to 2017, whereas the interviews were conducted between February and April 2018. This might lead to new perspectives, for example, regarding the reasons for or against backsourcing, or the topicality of certain trends. For example, the compliance with regulatory requirements as reasons for backsourcing identified in the expert interviews might be based on recent regulatory changes, and was thus not reflected in earlier publications. While this fact might be a limitation from one standpoint, we argue that it is justifiable since it also enables us to contribute new arguments relevant to practitioners to IS research. Therefore, it contributes to increase the relevance of academic research for practitioners, which is a frequently named shortcoming of IS research.

Additional limitations could stem from the two previously published literature reviews, which are expanded in this contribution. For example, those literature reviews might not have retrieved all relevant material on the topic of IS backsourcing within academic and practitioner literature. Further relevant practitioner literature might have only been published as internet articles or as reports from consulting companies, and may have been ignored by the utilized databases. Additionally, we focused on selected databases during the literature retrieval, leaving the possibility to miss further publications only listed in other databases.

Overall, we are convinced that our contribution follows an appropriate and robust research approach and methodology despite the mentioned limitations, and thus provides a benefit to both the academic and the practitioner community.

References

[1] I. Karabasz and M. Wocher. (2018, February 01). *Großauftrag verloren: Rückschlag für T-Systems* [Online]. Available: http://www.handelsblatt.com/20916242-all.html.

[2] J. Berke. (2018, February 01). *Telekom: thyssenkrupp storniert Auftrag über 700 Millionen Euro* [Online]. Available: https://www.wiwo.de/unternehmen/it/20914986.html.

[3] F. d. Sá-Soares, D. Soares, and J. Arnaud, "A catalog of information systems outsourcing risks," *International Journal of Information Systems and Project Management*, vol. 2, no. 3, pp. 23–43, 2014.

[4] N. F. Veltri, C. S. Saunders, and C. B. Kavan, "Information systems backsourcing: Correcting problems and responding to opportunities," *California Management Review*, vol. 51, no. 1, pp. 50–76, 2008.

[5] P. Heltzel. (2017, July 11). *9 forces shaping the future of IT* [Online]. Available: http://www.cio.com/article/3206770.

[6] K. Bredmar, "Digitalisation of enterprises brings new opportunities to traditional management control," *Business Systems Research Journal*, vol. 8, no. 2, pp. 115–125, 2017.

[7] M. Benaroch, Q. Dai, and R. J. Kauffman, "Should we go our own way?: Backsourcing flexibility in IT services contracts," *Journal of Management Information Systems*, vol. 26, no. 4, pp. 317–358, 2010.

[8] B. v. Bary and M. Westner, "Information systems backsourcing: A literature review," *Journal of Information Technology Management*, vol. XXIX, no. 1, 62-78, 2018.

[9] M. Marrone and M. Hammerle, "Relevant research areas in IT service management: An examination of academic and practitioner literatures," *Communications of the Association for Information Systems*, vol. 41, no. 1, pp. 517–543, 2017.

[10] M. Marrone and M. Hammerle, "An integrated literature review: Establishing relevance for practitioners," in *ICIS 2016*, Dublin, Ireland, 2016, pp. 1–21.

[11] R. Hirschheim and M. Lacity. (1998, September 01). *Backsourcing: An emerging trend?* [Online]. Available: http://www.outsourcing-center.com/1998-09-backsourcing-an-emerging-trend-article-38943.html.

[12] M. C. Lacity and L. P. Willcocks, "Relationships in IT outsourcing: A stakeholder perspective," in *Framing the Domains of IT Management: Projecting the Future Through the Past*, R. W. Zmud, Ed., Cincinnati, OH, 2000: Pinnaflex Educational Resources, Inc, 2000, pp. 355–384.

[13] B. Nujen, L. Halse, and H. Solli-Saether, "Backsourcing and knowledge re-integration: A case study," in *IFIP*, Sophia Antipolis, France, 2015, pp. 191–198.

[14] B. v. Bary, "How to bring IT home: Developing a common terminology to compare cases of IS backsourcing," in *AMCIS 2018*, New Orleans, USA, 2018.

[15] J. Dibbern, T. Goles, R. Hirschheim, and B. Jayatilaka, "Information systems outsourcing: A survey and analysis of the literature," *SIGMIS Database*, vol. 35, no. 4, pp. 6–102, 2004.

[16] R. Hirschheim and M. Lacity, "Information systems outsourcing and insourcing: Lessons and experiences," in *PACIS 1997*, Brisbane, Australia, 1997, pp. 19–28.

[17] J. Hartley. *Academic Writing and Publishing: A Practical Guide*. London: Routledge, 2008.

[18] G. Gill and A. Bhattacherjee, "Whom are we informing?: Issues and recommendations for MIS research from an informing sciences perspective," *MIS Quarterly*, vol. 33, no. 2, pp. 217–235, 2009.

[19] I. Benbasat and R. W. Zmud, "Empirical research in information systems: The practice of relevance," *MIS Quarterly*, vol. 23, no. 1, pp. 3–16, 1999.

[20] W. C. Booth, G. G. Colomb, J. M. Williams, J. Bizup, and W. T. Fitzgerald. *The Craft of Research*. Chicago: The University of Chicago Press, 2016.

[21] S. Raub and C.-C. Rüling, "The knowledge management tussle – speech communities and rhetorical strategies in the development of knowledge management," *Journal of Information Technology*, vol. 16, no. 2, pp. 113–130, 2001.

[22] M. Grafström and K. Windell, "The role of infomediaries: CSR in the business press during 2000–2009," *Journal of Business Ethics*, vol. 103, no. 2, pp. 221–237, 2011.

[23] D. L. Deephouse and P. P. M. A. R. Heugens, "Linking social issues to organizational impact: The role of infomediaries and the infomediary process," *Journal of Business Ethics*, vol. 86, no. 4, pp. 541–553, 2009.

[24] E. Vaara and J. Tienar, "A discursive perspective on legitimation strategies in multinational corporations," *Academy of Management Review*, vol. 33, no. 4, pp. 985–993, 2008.

[25] M. D. Myers and M. Newman, "The qualitative interview in IS research: Examining the craft," *Information and Organization*, vol. 17, no. 1, pp. 2–26, 2007.

[26] A. Fontana and J. H. Frey, "The interview: From structured questions to negotiated text," in *Handbook of Qualitative Research*, N. K. Denzin and Y. S. Lincoln, Eds., 2nd ed., Thousand Oaks, CA, USA: Sage Publications, 2000, pp. 645–672.

[27] B. v. Bary, M. Westner, and S. Strahringer, "Do researchers investigate what practitioners deem relevant?: Gaps between research and practice in the field of information systems backsourcing," in *CBI 2018*, Vienna, Austria, 2018.

[28] A. Fink. *Conducting Research Literature Reviews: From the Internet to Paper*. Thousand Oaks, CA, USA: Sage, 2014.

[29] Y. Levy and T. J. Ellis, "A systems approach to conduct an effective literature review in support of information systems Research," *Information Science Journal*, vol. 9, pp. 181–212, 2006.

[30] J. Webster and R. Watson, "Analyzing the past to prepare for the future: writing a literature review," *Management Information Systems Quarterly*, vol. 26, no. 2, xiii-xxiii, 2002.

[31] G. Schryen, "Writing qualitative IS literature reviews - guidelines for synthesis, interpretation, and guidance of research," *Communications of the Association for Information Systems*, vol. 37, no. 1, pp. 286–325, 2015.

[32] I. Vessey, V. Ramesh, and R. L. Glass, "Research in information systems: An empirical study of diversity in the discipline and its journals," *Journal of Management Information Systems*, vol. 19, no. 2, pp. 129–174, 2002.

[33] D. McLaughlin and J. Peppard, "IT backsourcing: from 'make or buy' to 'bringing it back in-house'," in *ECIS 2006*, Gothenburg, Sweden, 2006, pp. 1–12.

[34] S. F. Wong, "Drivers of IT backsourcing decision," *Communications of the IBIMA*, vol. 2, pp. 102–108, 2008.

[35] W. Bandara, E. Furtmueller, E. Gorbacheva, S. Miskon, and J. Beekhuyzen, "Achieving rigor in literature reviews: Insights from qualitative data analysis and tool-support," *Communications of the Association for Information Systems*, vol. 37, no. 1, pp. 154–204, 2015.

[36] A. Stettner. (2017, June 13). *Xing vs. LinkedIn: Welches Karriere-Netzwerk brauche ich?* [Online]. Available: https://www.merkur.de/leben/karriere/zr-8399154.html.

[37] R. K. Yin. *Case Study Research: Design and Methods*, 4th ed. London, UK: Sage Publications, 2009.

[38] S. Overby, "Backsourcing pain," *CIO Magazine*, 2005, pp. 64–72, 2005.

[39] W. Hadfield. (2006, May 03). *J Sainsbury completes UK's largest ever IT insourcing from Accenture* [Online]. Available: http://www.computerweekly.com/news/2240077243/J-Sainsbury-completes-UKs-largest-ever-IT-insourcing-from-Accenture.

[40] M. Könning, M. Westner, and S. Strahringer, "Multisourcing on the rise: Results from an analysis of more than 1,000 IT outsourcing deals in the ASG region," in *MKWI 2018*, Lüneburg, Germany, 2018, pp. 1813–1824.

[41] A. Strasser and M. Westner, "Information systems offshoring: Results of a systematic literature review," *Journal of Information Technology Management*, vol. 26, no. 2, pp. 70–142, 2015.

[42] C. Salge, "Pulling the outside in: a transactional cost perspective on IT insourcing," in *AMCIS 2015*, Puerto Rico, 2015.

[43] H. T. Barney, G. C. Low, and A. Aurum, "The morning after: What happens when outsourcing relationships end?," in *Information Systems Development: Towards a Service Provision Society*, G. A. Papadopoulos, W. Wojtkowski, G. Wojtkowski, S. Wrycza, and J. Zupancic, Eds., Boston: Springer US, 2010, pp. 637–644.

[44] Accenture. (2016, November 24). *Regulierung von Fintechs: Eine Chance Für Banken* [Online]. Available: https://www.accenture.com/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Local/de-de/PDF_4/Accenture-FS-ASG-FinTech-Regulatorik-Final-Web.pdf.

[45] Oliver Wyman. (2017, October 23). *The future of risk management* [Online]. Available: http://www.oliverwyman.de/content/dam/oliver-wyman/v2-de/publications/2017/sep/Zukunft_Risk_Management_20170922.pdf.

[46] S. Miskon, W. Bandara, E. Fielt, and G. Gable, "Understanding shared services: An exploration of the IS literature," *International Journal of E-Services and Mobile Applications*, vol. 2, no. 4, pp. 60–75, 2010.

[47] M. C. Lacity, Khan Shaji, A. Yan, and L. P. Willcocks, "A review of the IT outsourcing empirical literature and future research directions," *Journal of Information Technology*, no. 25, pp. 395–433, 2010.

[48] D. Whitten and D. Leidner, "Bringing IT back: An analysis of the decision to backsource or switch vendors," *Decision Sciences*, vol. 37, no. 4, pp. 605–621, 2006.

[49] K. Foerstl, J. F. Kirchoff, and L. Bals, "Reshoring and insourcing: Drivers and future research directions," *Int'l Journal of Physical Distribution & Logistics Management*, vol. 46, no. 5, pp. 492–515, 2016.

[50] V. Grover, M. Cheon, and J. T. C. Teng, "An evaluation of the impact of corporate strategy and the role of information technology on IS Functional Outsourcing," *European Journal of Information Systems*, vol. 3, no. 3, pp. 179–190, 1994.

[51] M. C. Lacity, L. P. Willcocks, and D. F. Feeny, "The value of selective IT sourcing," *Sloan Management Review*, vol. 37, no. 3, pp. 13–25, 1996.

[52] E. Beulen, V. Tiwari, and E. van Heck, "Understanding transition performance during offshore IT outsourcing," *Strategic Outsourcing: An International Journal*, vol. 4, no. 3, pp. 204–227, 2011.

[53] C. E. H. Chua, W.-K. Lim, C. Soh, and S. K. Sia, "Client strategies in vendor transition: A threat balancing perspective," *The Journal of Strategic Information Systems*, vol. 21, no. 1, pp. 72–83, 2012.

[54] N. Butler, F. Slack, and J. Walton, "IS/IT backsourcing - A case of outsourcing in reverse?," in *HICSS 2011*, Kauai, HI, USA, 2011, pp. 1–10.

[55] A. Bhagwatwar, R. Hackney, and K. C. Desouza, "Considerations for information systems "backsourcing": A framework for knowledge re-integration," *Information Systems Management*, vol. 28, no. 2, pp. 165–173, 2011.

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Project portfolio risk categorisation – factor analysis results

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Abstract:
The subject of this article is project portfolio risk categorisation. Research conducted indicated categories containing the most probable and significant risks. The research described in this paper was carried out in two stages. In the first stage, the relevant literature was reviewed and the Delphi method was used to identify 36 risks specific to a project portfolio. In the second stage, the respondents (project portfolio managers) assessed the probability of each risk occurring and the impact of that risk on the objectives of the project portfolio. The empirical data obtained in this way made it possible to conduct an exploratory factor analysis and to identify the risk categories of the project portfolio. The presented results may also contribute to a broader discussion concerning the validity of identifying project portfolio risks and how to categorise them. The results may be useful for further discussion on the empirical confirmation of three categories of portfolio risks proposed by the Project Management Institute.

Keywords:
project portfolio risk; portfolio risk categorization; factor analysis results.

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1. Introduction

Aspects concerning the management of project risks, focusing predominantly on tooling [1, 2] and interpersonal [3] issues, have been described in detail in the literature. Managing project portfolio risks, however, is a relatively new area of interest. Based on Markowitz's studies [4], a portfolio can be defined as a collection of projects, the value of which can be maximised at acceptable risk levels when they are managed together [5] (p. 97). An analysis of the literature shows that managing project portfolio risks is much more complex than managing project risks [6]. Studies emphasise the importance of limiting the implementation of traditional risk management, which is oriented towards single projects in a multi-project environment [7]. A traditional approach does not take into account the risk that arises from the collection structure or the risk resulting from potential relationships between the projects found within the collection [8, 9] (p. 85). Identifying risks for projects implemented as part of a portfolio can be done at once. This improves the efficiency with which project portfolio risks can be managed [10]. In discussing this issue, it is important to point out the significant outlays, which are made with respect to managing risks, and correlate them with expected results [11]. Therefore, one can state that the proper management of project portfolio risks leads to a potentially lower likelihood of errors and failures, which in turn leads to a higher likelihood of project portfolio success [12, 13]. From a managerial point of view, it needs to be said that managing risks requires a comprehensive overview of the whole portfolio. Should the manager lack such an approach, they may have a problem with monitoring risks on the portfolio level [7]. Managing risks thus demands unique competences from the part of the manager, which will shape the desired behaviours of the organisation members [14–16]. An analysis of the literature produced four interesting research questions:

- RQ_1 – what are the risk categories obtained from exploratory factor analysis based on the following variables: the likelihood of risk occurrence and the risk's impact on portfolio objectives?
- RQ_2 – which of the categories identified will include the risk with the highest likelihood of occurrence?
- RQ_3 – which of the categories identified will include the risk with the greatest impact on portfolio objectives?
- RQ_4 – is the empirically obtained categorisation of project portfolio risks coincident with the categorisation most frequently appearing in the literature, i.e. structure, component and overall risks?

Answering the above questions would allow for the identification and naming of project portfolio risks. It would also facilitate the identification of the category of risk within a project portfolio that has the highest likelihood of occurrence, as well as of the risk that has the greatest negative impact on the project portfolio's objectives.

The article is structured as follows. The first part presents the theoretical aspects of project portfolio risk management. The second presents the method to identify project portfolio risks and its results. The third part contains the findings of research on project portfolio risk categorisation (i.e. the characteristics of the research sample and research results). The article closes with a presentation of the conclusions from the conducted research and a discussion on their importance for the management of a project portfolio.

2. Portfolio risk management – theoretical background

The management of project portfolio risks has gained increasingly more attention from researchers [10, 13, 18, 19, 20]. As already mentioned, the origins of portfolio management can be traced to the works of Markowitz, which were rooted in the context of equity investments. Portfolio management later found its way into the development of new products [21] and into the field of project management [6, 22]. Applied to project portfolio management, portfolio theory concerns the constant allocation of resource choices, taking into account the interdependencies between projects. Guidelines for managing project portfolios have been included in special studies [9, 23]. Companies adapt those guidelines, written into standards, to the organisational solutions implemented in their structure. A project portfolio is a collection of single projects and programmes that are carried out under a single sponsorship and typically compete for scarce resources [24]. Focus is on the alignment of the projects and programmes with the organisation's strategy and the balancing of the project portfolio regarding risks and benefits [9, 17]. The task of project portfolio management

involves the management of resources and other constraints, the coordination of the group of projects, and the management of the interfaces between projects [8, 25].

Risk is defined as an uncertain event or condition that, if it occurs, has a significant positive or negative effect on at least one strategic portfolio objective [9] (p. 85). In discussing risk management, it is necessary to consider two important aspects. The first is understanding and defining the notions of uncertainty and risk. Knight and Frank make a distinction between measurable uncertainty (which can be considered risk) and immeasurable uncertainty [26]. One can assume that risks relate to events which are either perceived or perceptible, and the likelihood of which can be estimated. The ongoing discussion in this field of study is crucial for the perception of risk either as a consequence of uncertainty or as a separate notion in its entirety, which defines a wholly independent phenomenon [27]. It seems appropriate to consider risk as a situation in which the result of the actions undertaken is not known. This way of defining risk allows us to distinguish between two basic notions of risk: negative (unilateral) risk and neutral (bilateral) risk. A negative perception of risk involves associating this notion with a negative event: danger, damage or loss. A neutral approach to risk means that it is perceived as neither negative nor positive [28]. The Project Management Institute describes three categories of portfolio risk (i.e., structure, component and overall risks). Structural risks are those associated with the composition of the group of projects and the potential interdependencies among components. Component risks are risks that the project manager needs to escalate to the portfolio level for information or action. Overall risks consider the interdependencies between projects and are, therefore, more than just the sum of individual project risks [9] (pp. 85–86). This approach to categorising project portfolio risks has been preliminarily adopted in this research.

The issue of project risk management has been covered both in terms of methodology and tooling [1, 2, 29]. Apart from that, there are studies which bring a methodological approach to project risk management in SMEs [30]. The management of risks at the portfolio level may enhance the effectiveness of risk management compared to the independent consideration of risks at project level [5, 8]. Considering the relationships between individual projects in managing risks at the portfolio level makes it possible to find solutions which will significantly contribute to lowering the likelihood of negative impact on the entire portfolio. At the same time, such solutions would not be viable when applied to single projects. Furthermore, it can transpire that while the manager of a single project assesses a given situation to be wholly negative considering its negative impact on the scope, time and cost of the project, its effects on the portfolio as a whole may be positive, and the losses made in one project compensated by gains in another. A comprehensive overview of project portfolio risks produces new opportunities for preventive actions, which would minimise the likelihood of the risk materialising, as well as actions which would diminish the effects of a negative event on the project portfolio. An analysis of the available studies on portfolio risk management shows that this issue is discussed both from a theoretical and an empirical perspective. Pellegrinelli was the first to address this issue. He differentiated between risk management on project level and risk management on programme level, pointing out that programme risk management is a much broader problem and requires a different approach [6]. Olson mentioned differences between risk management on project level and risk management on portfolio level [8]. Sanchez, in turn, made a theoretical model for risk management on the level of project portfolios [5]. As mentioned before, certain studies address the management of project portfolio risks from an empirical point of view. In his studies, Teller presents a broad empirical account of the impact of formalisation and risk management quality on the success of a portfolio [10, 18]. More recent studies take a theoretical and empirical approach to selecting portfolios and establishing their structure in the context of portfolio success [31, 32]. Further, a separate strand of research on portfolio risk management studies the specific nature of managing project portfolios in engineering [33, 34] and IT projects [35, 36]. Finally, Guan and his team suggested an interesting way to reduce risk in project portfolios based on the Bayesian network structure learning algorithm and the set theory [37].

3. Project portfolio risk identification

Recent studies have facilitated the selection and identification of risks specific to a project portfolio [5, 7, 8, 12, 13, 14, 15, 16, 17, 19, 25, 31, 32, 33, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50]. All identified risks were classified into three categories, as suggested in the literature (component, structural and general risk) [9]. They were, then, evaluated by experts in accordance with the Delphi method [51, 52]. Four experts in the field of project management were invited to participate. The expert evaluation of the list of risks developed by the study was conducted in the first half of 2014 and involved six evaluation rounds. Each assessment round lasted for two weeks and was moderated by a designated member of the research team [53]. The criteria for selecting the experts ensured competent assessment, as well as a critical view of the conceptual value of the list of risks (i.e. correctness of the proposed names and descriptions, proper classification of risks and the level of completeness of the list).

Table 1. List of project portfolio risks [53]

Component risks	Structural risks	Overall risks
1.1 Significant changes in the project or programme environment	2.1 Too large a portfolio from the point of view of the portfolio executors' capacity	3.1 Lack of transfer of information and knowledge among the portfolio elements
1.2 Change in an approach of key project or programme stakeholders	2.2 Significant portfolio fragmentation	3.2 Improper control over life cycles of projects and programmes
1.3 Significant change in the basic parameters of particular portfolio elements	2.3 Overly complicated hierarchical structure of portfolio management	3.3 Unavailability of resources necessary to execute works within the portfolio
1.4 Improperly defined priorities for particular portfolio elements	2.4 Significant portfolio homogeneity	3.4 Lack of coordination of the involvement of key resources in the execution of the portfolio
1.5 Disturbances in information flow and communication within the portfolio elements	2.5 Portfolio diversity range too wide from the point of view of portfolio executors' applied capacity	3.5 Relationships among products created by the portfolio elements
1.6 Ignoring risks by portfolio element managers	2.6 Mismatch between the portfolio structure and the parent organisation's strategy	3.6 Problems with access to the portfolio financing capital
1.7 Lack of developed methodical standards within the scope of portfolio element management	2.7 Improper portfolio balance	3.7 Possibility of the lack of financial liquidity within the portfolio
1.8 Improperly operating steering committees of projects, project groups and programmes		3.8 Portfolio financing collapse
1.9 Conflicts between project and programme managers within the portfolio		3.9 Non-compliance of a key element strategy with the portfolio's strategy
1.10 Conflicts between portfolio element managers and the parent organisation's decision-makers		3.10 Conflicts among objectives of projects and programmes executed within the portfolio
1.11 Improper competencies of project and programme managers		3.11 Conflicts between portfolio managers and portfolio element managers
1.12 Risks arising from the application of innovative technical and material solutions in the portfolio elements		3.12 Lack of involvement of top-level and middle-level managers in portfolio execution
		3.13 Lack of appropriate competencies of the portfolio manager and of the portfolio support structures
		3.14 Risks arising from the unknowns at the cost estimation of the execution of selected portfolio elements

Component risks	Structural risks	Overall risks
		3.15 Risks related to the personnel stability of the portfolio managing team and the possibility of losing key portfolio element managers
		3.16 Lack of developed methodical standards within the scope of portfolio management
		3.17 Formulation of fixed-price contracts for the portfolio elements

The research methodology adopted by the team assumed a compromise between providing the experts with adequate freedom to modify (or submit new proposals for) the names and descriptions of risks, add risks and move risks within categories as required, and acquiring information on how to adjust the available statistical tools to suit expert consensus. Upon reaching consensus, the experts recommended 36 risks specific to the project portfolio: 12 in the component risk category, 7 in the structural risk category, and 17 in the general risk category (see Table 1).

4. Project portfolio risk categorisation

4.1 Sample description and research method

Under the next research phase, the likelihood and impact of each identified risk on the project portfolio was assessed. This assessment was made by respondents with professional experience in programme and portfolio management. The request to complete the questionnaire was sent to managers with an international certificate confirming their competence in project management. Contact details were obtained from local branches of international organisations associating professionals with project management. A request for participation in the assessment of the above variables for each identified risk of the project portfolio was addressed to a group of 400 managers. The scope of the research covered the territory of Poland. 73 respondents (that is to say, 18% of all respondents) assessed portfolio risk. Within the group of respondents who made the assessment, women constituted 16% of the professionals examined. 8% of respondents had 16–25 years of professional experience in the management of multiple projects, 15% had 11–15 years of experience, 47% had 5–10 years of experience, while 30% had less than four years of experience. Within the assessing group, 64% of the experts worked for service companies, 21% worked for manufacturing companies, while 11% worked for mixed-profile companies. 62% of all respondents were employed in large enterprises (over 250 people), 18% in medium enterprises (employing 50–249 people), and 21% in small enterprises (employing less than 50 people). In the group of respondents, 21% managed IT project portfolios. The research was carried out in 2015.

Based on the characteristics of the survey participants, it may be argued that the sample included individuals with experience in the management of various project portfolios, both in terms of type, size and industry. It may also be argued that the results obtained may describe both the materiality level and also illustrate the relationships between risks for the full scope of the project portfolios. As mentioned above, experts in managing multiple projects assessed 36 risks, which were identified in the previous step by the Delphi method (see Table 1). According to the approach suggested in the literature, the operationalisation of each assessed risk included two variables: (1) risk likelihood, and (2) impact of the risk on portfolio goals [1 (pp. 143–145), 29 (pp. 91–93), 54 (pp. 242–252), 55 (p. 47)]. The variables studied were defined on an ordinal scale, with 1 denoting very low risk likelihood, 2 – low, 3 – average, 4 – high and 5 – very high risk likelihood. A variable – risk impact – was assessed on a scale, where 1 denoted very low impact of the risk on portfolio goals, 2 – low impact, 3 – average impact, 4 – high impact and 5 – very high impact. The Computer Aided Self-Evaluation Interviews (CASI) method was applied. The respondents assessed individual risks in a special questionnaire, which was posted on the website. It contained all the risks from the list, along with their names and description. Risks from the list were distributed in the questionnaire at random, in order to avoid suggesting the relevant

categorisation referred to in the literature (structure, component and overall risks) to respondents [9]. In order to answer the research questions posed at the beginning, an exploratory factor analysis was applied. The calculations performed took into account the likelihood of occurrence of a given risk in executing the project portfolio as a variable. The statistical procedure adopted for the research involved scree plots and varimax rotation [56].

4.2 Research results

The implementation of the statistical procedure resulted in determining main factors. Implementing the Kaiser criterion [57] meant that the analysis was to be conducted for 11 factors (see Fig. 1).

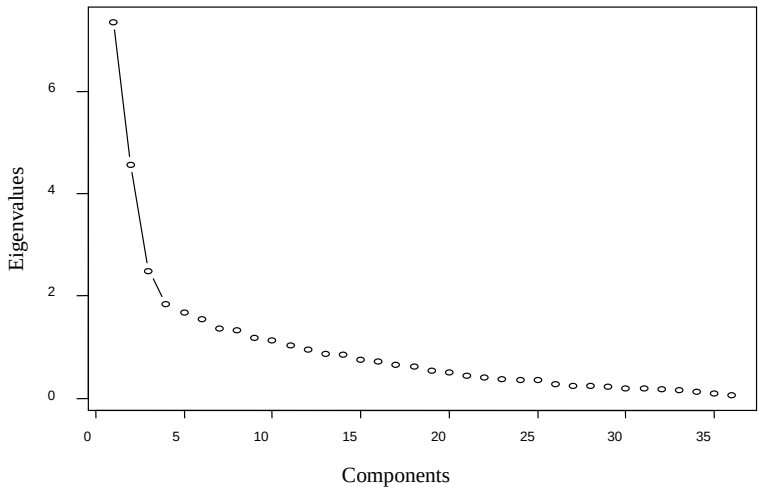

Fig. 1. Scree structure for the variable - likelihood of project portfolio risk occurrence

Appendix A contains the eigenvalues and rotated component matrix for all distinguished main factors. The statistical analysis allowed for classifying the 36 assessed risks to 11 factors (see Table 2). Total explained variance for the 11 factors was 59%. The analysis was conducted using the method of maximum reliability with varimax rotation. The reliability of respondents' evaluations was reviewed with Cronbach's α. In accordance with the interpretation provided in the literature, the value of this coefficient ranges from 0 to 1. The studies available state that Cronbach's α values above 0.6 mean satisfactory reliability, above 0.7 – good reliability and above 0.9 – perfect reliability [58].

Table 2. Likelihood of risk occurrence – main factors

Factor	Portfolio risks	Cronbach's α
Factor 1 – Risks which may cause problems with controlling the project portfolio environment	1.2 Changes in an approach of key project or programme stakeholders 1.3 Changes in the basic parameters of particular portfolio elements 1.5 Disturbances of information flow and communication within the portfolio elements 1. 6 Ignoring risks by portfolio element managers 1.11 Improper competencies of project and programme managers 1.12 Risks arising from the application of innovative technical and material solutions in the portfolio elements 3.1 Lack of transfer of information and knowledge among portfolio elements 3.12 Lack of involvement of top-level and middle-level managers in portfolio execution	0.825

Project portfolio risk categorisation – factor analysis results

Factor	Portfolio risks	Cronbach's α
Factor 2 – Risks which cause problems with the proper structure of the portfolio	2.3 Overly complicated hierarchical structure of portfolio management 2.4 Significant portfolio homogeneity 2.5 Portfolio diversity range too wide from the point of view of portfolio executors' applied capacity 2.6 Mismatch between the portfolio structure and the parent organisation's strategy 3.2 Improper control over life cycles of projects and programmes 3.13 Lack of appropriate competencies of the portfolio manager and of the portfolio support structures 3.15 Risks related to the personnel stability of the portfolio managing team and the possibility of losing key portfolio element managers	0.761
Factor 3 – Risks which cause anomalies among the project portfolio components	1.1 Significant changes in the project or programme environment 1.4 Improperly defined priorities for particular portfolio elements 1.7 Lack of developed methodical standards within the scope of portfolio element management 1.10 Conflicts between portfolio element managers and the parent organisation's decision-makers 2.7 Improper portfolio balance 3.14 Risks arising from the unknowns at the cost estimation of the execution of selected portfolio elements	0.719
Factor 4 – Risks which cause anomalies in the strategic management of portfolio financing	3.8 Portfolio financing collapse 3.9 Non-compliance of a key element strategy with the portfolio's strategy	0.743
Factor 5 – Risks which cause anomalies in the management of material and financial resources	3.4 Lack of coordination in the involvement of key resources for the execution of the portfolio 3.5 Relationships among products created by the portfolio elements 3.6 Problems with access to the portfolio financing capital	0.574
Factor 6 – Risks which result in interpersonal conflicts within the portfolio	1.9 Conflicts between project and programme managers within the portfolio 3.11 Conflicts between portfolio managers and portfolio element managers	0.789
Factor 7 – Risks which result in the limited accessibility of material and financial resources within the portfolio	3.3 Unavailability of resources necessary to execute works within the portfolio 3.7 Possibility of the lack of financial liquidity within the portfolio	0.665
Factor 8 – Risks which cause problems with the consistency of objectives within the project portfolio	2.1 Too large portfolio from the point of view of the portfolio executors' capacity 3.10 Conflicts among objectives of projects and programmes executed within the portfolio	0.334
Factor 9 – Risks which cause portfolio fragmentation	2.2 Significant portfolio fragmentation	–
Factor 10 – Risks associated with fixed-price contracts for the portfolio elements	3.17 Formulation of fixed-price contracts for portfolio elements	–
Factor 11 – Risks which cause methodological irregularities within the portfolio	3.16 Lack of developed methodical standards within the scope of portfolio management 1.8 Improperly operating steering committees of projects, project groups and programmes	0.428

In regard to the variable of the likelihood of risk occurrence, Cronbach's α for factors 8 and 11 was below the satisfactory level. Analysis of the eigenvalues for these factors and the total explained variance showed that these factors should be excluded from further analysis. As such, factors 8 and 11 were excluded from further stages of the analysis (see Table 3).

Table 3. Explained variance and Cronbach's α value for the likelihood of risk occurrence – main factors

Factor	Eigenvalues	Explained variance	Cronbach's α
Factor 1	7.344941	11.8%	0.825
Factor 6	1.551096	4.1%	0.789
Factor 2	4.564699	8.5%	0.761
Factor 4	1.845396	5.2%	0.743
Factor 3	2.490466	7.8%	0.719
Factor 7	1.371455	4.1%	0.665
Factor 5	1.677928	4.6%	0.574
Factor 11	1.038219	2.7%	0.428
Factor 8	1.332244	3.5%	0.334
Factor 9	1.177720	3.5%	–
Factor 10	1.136058	3.2%	–

In regard to the variable of the impact of risk on portfolio objectives, the implementation of the Kaiser criterion [57] meant that the analysis had to be conducted for ten factors (see Fig. 2). Appendix A contains the eigenvalues and rotated component matrix for all distinguished main factors.

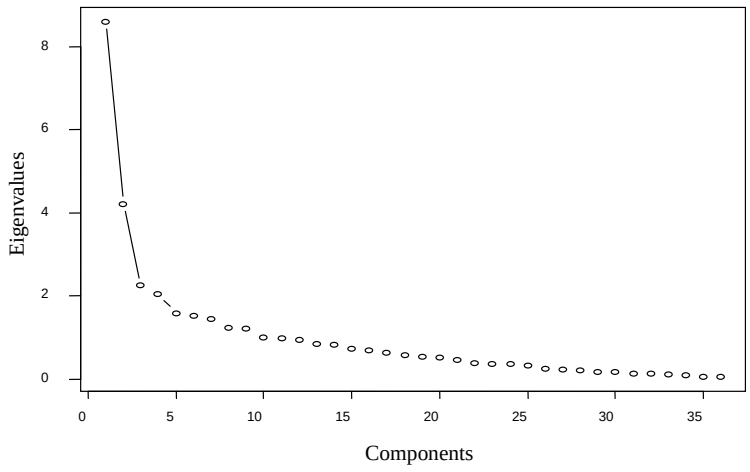

Fig. 2. Scree structure for the variable - impact of risk on portfolio objectives

Using the impact of risk on portfolio objectives as a variable, the statistical analysis allowed for the classification of the 36 assessed risks to 10 factors (see Table 4). The total explained variance for the impact of risk on portfolio objectives is 58.8%. As in the previous case, the analysis was conducted using the method of maximum reliability with varimax rotation.

Table 4. Impact of risk on portfolio objectives – main factors

Factor	Portfolio risks	Cronbach's α
Factor 1 – Risks related to anomalies in project portfolio planning	1.4 Improperly defined priorities for particular portfolio elements 1.6 Ignoring risks by portfolio element managers 1.7 Lack of developed methodical standards within the scope of portfolio element management 1.8 Improperly operating steering committees of projects, project groups and programmes 1.10 Conflicts between portfolio element managers and the parent organisation's decision-makers 2.7 Improper portfolio balance 3.3 Unavailability of resources necessary to execute works within the portfolio 3.9 Non-compliance of a key element strategy with the portfolio's strategy 3.14 Risks arising from the unknowns at the cost estimation of the execution of selected portfolio elements	0.701
Factor 2 – Risks resulting from improper project portfolio structure	2.2 Significant portfolio fragmentation 2.4 Significant portfolio homogeneity 3.4 Lack of coordination of the involvement of key resources in the execution of the portfolio 3.5 Relationships among products created by the portfolio elements 3.6 Problems with access to the portfolio financing capital	0.643
Factor 3 – Risks resulting from anomalies in project portfolio management	1.12 Risks arising from the application of innovative technical and material solutions in the portfolio elements 3.2 Improper control over life cycles of projects and programmes 3.10 Conflicts among objectives of projects and programmes executed within the portfolio	0.327
Factor 4 – Risks resulting from anomalies in the transfer of information and knowledge within the project portfolio	1.5 Disturbances of information flow and communication within the portfolio elements 1.11 Improper competencies of project and programme managers 3.1 Lack of transfer of information and knowledge among portfolio elements 3.17 Formulation of fixed-price contracts for the portfolio elements	0.639
Factor 5 – Risks resulting from changes in the project portfolio structure	1.3 Significant changes in the basic parameters of particular portfolio elements 2.1 Too large a portfolio from the point of view of the portfolio executors' capacity 2.5 Portfolio diversity range too wide from the point of view of portfolio executors' applied capacity 2.6 Mismatch between the portfolio structure and the parent organisation's strategy 3.12 Lack of involvement of top-level and middle-level managers in portfolio execution	0.581
Factor 6 – Risks resulting from anomalies in managing project portfolio financing	3.7 Lack of financial liquidity within the portfolio 3.8 Portfolio financing collapse	0.749
Factor 7 – Risks resulting from changes in the approach of project portfolio stakeholders	1.2 Changes in an approach of key project or program stakeholders 3.15 Risks related to the personnel stability of the portfolio managing team and the possibility of losing key portfolio element managers	0.550

Factor	Portfolio risks	Cronbach's α
Factor 8 – Risks which result in interpersonal conflicts within the project portfolio	1.9 Conflicts between project and programme managers within the portfolio 3.11 Conflicts between portfolio managers and portfolio element managers	0.789
Factor 9 – Risks resulting from methodological irregularities of portfolio management	1.1 Significant changes which can occur in the project or programme environment 2.3 Overly complicated hierarchical structure of portfolio management 3.16 Lack of developed methodical standards within the scope of portfolio management	0.393
Factor 10 – Risks resulting from the lack of appropriate competencies of the portfolio managers	3.13 Lack of appropriate competencies of the portfolio manager and portfolio support structures	–

In regard to the variable of the impact on portfolio objectives, Cronbach's α for factors 3 and 9 was below the satisfactory level (see Table 5). These factors are, therefore, excluded from further analysis. Factors 5 and 7, however, which were just below the satisfactory level will still be accounted for.

Table 5. Explained variance and Cronbach's α value for the impact of risk on portfolio objectives – main factors

Factor	Eigenvalues	Explained variance	Cronbach's α
Factor 8	1.240838	4.4%	0.789
Factor 6	1.522739	5.1%	0.749
Factor 1	8.593424	10.3%	0.701
Factor 2	4.209597	7.7%	0.643
Factor 4	2.049452	6.0%	0.639
Factor 5	1.588498	5.9%	0.581
Factor 7	1.440268	4.9%	0.550
Factor 9	1.217886	5.1%	0.393
Factor 3	2.254325	6.7%	0.327
Factor 10	1.005667	3.7%	–

4.3 Findings

The factor analysis answered the first research question (RQ1), which assumed the possibility of differentiating several categories (factors) that covered risks with respect to two variables: (1) the likelihood of risk occurrence, and (2) the impact of risk on portfolio objectives. The investigation distinguished categories grouping 36 specific project portfolio risks in terms of those two variables (analyses were conducted separately for each variable). In order to answer the second research question (RQ2), it was necessary to use descriptive statistics for each factor. An analysis of those values made it possible to indicate the category (factor), which covered the project portfolio risk that was deemed most likely to occur by the respondents (see Table 6).

Table 6. Descriptive statistics for the main factors distinguished, with the variable likelihood of risk occurrence (scale 1–5)

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 8**	**Factor 9**	**Factor 10**	**Factor 11**
Average	3.15	2.56	3.19	3.73	2.68	2.73	3.71	2.69	2.64	3.32	2.92
SD	0.75	0.80	0.79	0.93	0.85	0.84	0.89	0.76	0.81	1.03	0.90
Min	2	1	1	1	1	1	1.5	1	1	1	1
Q25	2.5	2	3	3	2	2	3	2	2	3	2.5
Median	3	2	3	4	3	3	3.5	2.5	3	3	3
Q75	4	3	3.5	4.5	3	3.5	4.5	3	3	4	3.5
Max	5	5	5	5	5	4.5	5	4.5	5	5	5

The data in the table above show that respondents think the risks assigned to the fourth category are the most likely to occur, with the average evaluation level at 3.73 and the median at 4 (on a scale 1–5). This factor covers the risk which results in anomalies in the strategic management of portfolio financing. It included the following risks: 3.8 and 3.9. The respondents deemed the risk included in the seventh factor (covering risks resulting in limited access to material and financial resources within the portfolio – risks 3.3 and 3.7) as slightly less likely to occur (average 3.71, median 3.5). This finding answered the second research question (RQ2), which postulated the possibility of indicating the categories of group project portfolio risks that were most likely to occur.

As was the case with the second question, for RQ3 it was necessary to use descriptive statistics for each factor. An analysis of those statistical values allowed for the determination of which category (factor) covered the risks that would have the greatest impact on project portfolio objectives according to the respondents (see Table 7).

Table 7. Descriptive statistics for the main factors distinguished, with the variable impact of risk on portfolio objectives

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 8**	**Factor 9**	**Factor 10**
Average	2.95	3.21	3.19	3.51	3.52	2.45	3.49	3.05	2.86	3.37
SD	0.83	0.87	0.95	0.77	0.82	0.95	0.91	0.87	0.82	0.95
Min	2	1	1	1.5	2	1	1.5	1	1	1
Q25	2	3	3	3	3	2	3	2.5	2	3
Median	3	3	3	3.5	4	2.5	3.5	3	3	3
Q75	4	4	4	4	4	3	4	3.5	3	4
Max	5	5	5	5	5	5	5	5	5	5

The data included in Table 7 show that respondents think that the risks assigned to the fifth factor have the greatest impact on portfolio objectives, with an average evaluation level of 3.52 and a median of 4. This factor covers the risks resulting from changes in project portfolio structure. It includes the following risks: 1.3, 2.1, 2.5, 2.6 and 3.12. This finding answered the third research question (RQ3), which postulated the possibility of indicating the categories of risks that would have the greatest impact on portfolio objectives. The fourth research question (RQ4) regarding the correspondence between the empirically obtained categorisation of project portfolio risks and the categorisation most frequently appearing in the literature (i.e. structure, component and overall risks) received a negative response. This research has shown from the outset (Table 1) that the risks had a characteristic designation for each group prefix, i.e. component risks were assigned the prefix "1.", structural risks "2.", and overall risks "3.". Analysing the composition of individual factors in Tables 2–4, it may be seen that for almost all there are risks in at least two groups from component

risks, structural risks and overall risks. Therefore, grouping factors into larger collections does not lead to a reproduction of the division from the literature, because the mixing of risks occurs at the level of individual factors. Therefore, even a factor analysis with a predetermined number of factors equal to three did not produce results as derived from the literature. Also, the k-means algorithm with any given three clusters did not reproduce the theoretical categorisation.

5. Conclusion

The research conducted with the use of exploratory factor analysis produced answers to the research questions posed at the beginning of this study. The answer to the first question (RQ_1) allowed for the identification of 11 categories (factors) grouping project portfolio risks according to the variable of likelihood of risk occurrence, and 10 categories (factors) covering the risks according to the variable of the impact on portfolio objectives. The answers obtained allow us to look at the classification proposed by PMI, assuming the division of risk in three categories, i.e. component, structure and overall risks, in a different light [9]. The research carried out indicates that respondents perceive portfolio risks in a more analytical way, by distinguishing a greater number of categories, including the risk of those who endanger it. The answer to the second question (RQ_2) highlighted the category which covered the risks deemed by the respondents to be the most likely to occur (i.e. risks within categories 4 and 7). These categories capture the risks resulting from irregularities in the strategic financial management of the project portfolio (Factor 4) and the risk resulting from problems with the availability of material and financial resources within the portfolio (Factor 7). The answer to the third research question (RQ_3) indicated the category which grouped the risks with the greatest impact on portfolio objectives (i.e. the risks within category 5). In this case, the category captures the risk resulting from changes in the structure of the project portfolio. The negative answer to the fourth research question (RQ_4) reveals the need for a more detailed study on the appropriateness of the division into component, structure, and overall risks adopted in the literature, or the verification of the categorisation made by experts using the Delphi method. The reason for the negative answer to the last research question may also lie in cultural and macroeconomic differences. Repeating the research in other countries may provide an explanation for many of these issues.

The results obtained allowed us to categorise the risks of project portfolios and, what is more, to indicate the categories that capture the risk with the highest probability of occurrence and the one which has the greatest impact on the goals of the portfolio. The presented results may also make a contribution towards a broader discussion concerning the validity of identifying project portfolio risks and how to categorise them. The results may be useful for further discussion on whether the empirical confirmation of the three categories of portfolio risks (i.e. structure, component and overall risks) proposed by the Project Management Institute [9] (pp. 85–86) is possible.

Conversely, the knowledge gained concerning the categories that capture the most probable risk and the categories that capture the risk that has the greatest potential impact on the portfolio's goals may be helpful in developing rules for managing such risks [59]. Such knowledge could be useful for design managers and the subsequent implementation of preventive actions by project portfolio managers, which would minimise the likelihood of risk occurrence, as well as the negative effects that such risks would have on project portfolios.

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References

[1] D. Baccarini and R. Archerv, "The risk ranking of projects: a methodology," International Journal of Project Management, vol. 19, no. 3, pp. 139–145, 2001.

[2] T. Raz and E. Michael, "Use and benefits of tools for project risk management," International Journal of Project Management, vol. 19, no. 1, pp. 9–17, 2001.

[3] K. De Bakker, A. Boonstra and H. Wortmann, "Risk management affecting IS/IT project success through communicative action," Project Management Journal, vol. 42, no. 3, pp. 75–90, 2011.

[4] H. Markowitz, Portfolio selection: efficient diversification of investments, John Wiley & Sons, Inc., New York, 1959.

[5] H. Sanchez, B. Robert and R. Pellerin, "A project portfolio risk-opportunity identification framework," Project Management Journal, vol. 39, no. 3, pp. 97–109, 2008.

[6] S. Pellegrinelli, "Programme management: Organising project-based change," International Journal of Project Management, vol. 15, no. 3, pp.141–149, 1997.

[7] R. Olsson, "In search of opportunity management. Is the risk management process enough?," International Journal of Project Management, vol. 25, no. 8, pp. 745–752, 2007.

[8] R. Olsson, "Risk management in a multi-project environment. An approach to manage portfolio risks," International Journal of Quality &Reliability Management, vol. 25, no. 1, pp. 60–71, 2008.

[9] PMI Project Management Institute (PMI), The Standard for Portfolio Management, Second Edition, Newton Square, Pennsylvania, 2008.

[10] J. Teller, A. Kock and H. Gemünden, "Risk Management in Project Portfolios Is More Than Managing Project Risks: A Contingency Perspective on Risk Management," Project Management Journal, vol. 45, no. 4, pp. 67–80, 2013.

[11] E. Kutsch and M. Hall, "The rational choice of not applying project risk management in information technology projects," Project Management Journal, vol. 40, no. 3, pp. 72–81, 2009.

[12] B. De Reyck, Y. Grushka-Cockayne, M. Lockett, S. Calderini, M. Moura and A. Sloper, "The impact of project portfolio management on information technology projects," International Journal of Project Management, vol. 23, no. 7, pp. 524–537, 2005.

[13] J. Teller, "Portfolio Risk Management and Its Contribution to Project Portfolio Success: An Investigation of Organization, Process and Culture," Project Management Journal, vol. 44, no. 2, pp. 36–51, 2013.

[14] T. Blomquist and R. Müller, "Practices, roles and responsibilities of middle managers in program and portfolio management," Project Management Journal, vol. 37, no. 1, pp. 52–66, 2006.

[15] D. Jonas, "Empowering project portfolio managers. How management involvement impacts project portfolio management performance," International Journal of Project Management, vol. 28, no. 1, pp. 818–831, 2010.

[16] C. Beringer, D. Jonas and A. Kock, "Behavior of internal stakeholders in project portfolio management and its impact on success," International Journal of Project Management, vol. 31, no. 6, pp. 830–846, 2013.

[17] S. Meskendahl, "The influence of business strategy on project portfolio management and its success — A conceptual framework," International Journal of Project Management, vol. 28, no. 8, pp. 807–817, 2010.

[18] J. Teller and A. Kock, "An empirical investigation on how portfolio risk management influences project portfolio success," International Journal of Project Management, vol. 31, no. 6, pp. 817–829, 2013.

[19] A. Taroun, "Towards a better modeling and assessment of construction risk: Insights from a literature review," International Journal of Project Management, vol. 32, no. 1, pp. 101–115, 2014.

[20] M. Hofman, A. Spalek and G. Grela, "Shedding New Light on Project Portfolio Risk Management," Sustainability, vol. 9, no. 10, 1798, 2017.

[21] S. Wheelwright and K. Clark, "Creating project plans to focus product development," Harvard Business Review, vol. 70, no. 2, pp. 67–83, 1992.

[22] P. Patanakul and D. Milosevic, "The effectiveness in managing a group of multiple projects: Factors of influence and measurement criteria," International Journal of Project Management, vol. 27, no. 3, pp. 216–233, 2009.

[23] Office of Government Commerce (OGC), Portfolio Management Guide, The Stationery Office, Norwich, 2008.

[24] N. Archer and F. Ghasemzadeh, "An integrated framework for project portfolio selection," International Journal of Project Management, vol. 17, no. 4, pp. 207–216, 1999.

[25] S. Elonen and K. Artto, "Problems in managing internal development projects in multi-project environments," International Journal of Project Management, vol. 21, no. 6, pp. 395–402, 2003.

[26] E. Knight and H. Frank, Risk, uncertainty and profit, Courier Corporation, 2012.

[27] O. Perminova, M. Gustafsson and K. Wikström, "Defining uncertainty in projects: A new perspective," International Journal of Project Management, vol. 26, no. 1, pp. 73–79, 2008.

[28] D. Wilson, Risk. Wiley Encyclopedia of Management, vol. 12, Strategic Management, Blackwell Publishing, Oxford 2005.

[29] A. Jaafari, "Management of risks, uncertainties and opportunities on projects: time for a fundamental shift," International Journal of Project Management, vol. 19, no. 2, pp. 90–91, 2001.

[30] S. Marcelino-Sádaba, A. Pérez-Ezcurdia, A. Echeverría Lazcano and P. Villanueva, "Project risk management methodology for small firms," International Journal of Project Management, vol. 32, no. 2, pp. 327–340, 2014.

[31] M. Kaisera, F-E. Arbib and F. Ahlemannc, "Successful project portfolio management beyond project selection techniques: Understanding the role of structural alignment," International Journal of Project Management, vol. 33, no. 1, pp. 126–139, 2015.

[32] F. Costantino, F. G. Di Gravio and F. Nonino, "Project selection in project portfolio management: an artificial neural network model based on critical success factors," International Journal of Project Management, vol. 33, no. 8, pp. 1744–1754, 2015.

[33] F. Caron, M. Fumagalli and A. Rigamonti, "Engineering and contracting projects: A value at risk based approach to portfolio balancing," International Journal of Project Management, vol. 25, no. 6, pp. 569–578, 2007.

[34] N. Ghim Hwee and R. Tiong, "Model on cash flow forecasting and risk analysis for contracting firms," International Journal of Project Management, vol. 20, no. 5, pp. 351–363, 2002.

[35] L. Jun, W. Qiuzhen and M. Qingguo, "The effects of project uncertainty and risk management on IS development project performance. A vendor perspective," International Journal of Project Management, vol. 29, no. 7, pp. 923–933, 2011.

[36] R. Teubner, "IT program management challenges: insights from programs that ran into difficulties," International Journal of Information Systems and Project Management, vol. 6, no. 2, pp. 71–92, 2018.

[37] D. Guan, P. Guo, K. Hipel and L. Fang, "Risk reduction in a project portfolio," Journal of Systems Science and Systems Engineering, vol. 26, no. 1, pp. 3–22, 2017.

[38] S. Fricke and A. Shenhar, "Managing multiple engineering projects in a manufacturing support environment," IEEE Transactions on Engineering Management, vol. 47, no. 2, pp. 258–268, 2000.

[39] S. Pender, "Managing incomplete knowledge. Why risk management is not sufficient," International Journal of Project Management, vol. 19, no. 2, pp. 79–87, 2001.

[40] R. Cooper, S. Edgett and E. Kleinschmid, "Portfolio management for new product development: results of an industry practices study," R&D Management, vol. 31, no. 4, pp. 361–380, 2001.

[41] J. Pennypacker and L. Dye, "Portfolio management and managing multiple projects. Planning, Scheduling and Allocating Resources for Competitive Advantage," in Managing multiple projects; Pennypacker, J., Dye L., Eds.; Marcel Dekker Inc, New York - Basel, 2002.

[42] R. Cooper, S. Edgett and E. Kleinschidit, "New problems, New solutions. Making portfolio management more effective," in Managing multiple projects, Pennypacker, J.; Dye, L., Eds.; Marcel Dekker Inc, New York – Basel, 2002.

[43] G. Kendall and S. Rollins, Advanced project portfolio management and the PMO, J. Ross Publishing, Florida, 2003.

[44] N. Archer and F. Ghasemzadeh, "An integrated framework for project portfolio selection," International Journal of Project Management, vol. 17, no. 4, pp. 207–216, 1999.

[45] M. Martinsuo and P. Lehtonen, "Role of single-project management in achieving portfolio management efficiency," International Journal of Project Management, vol. 25, no. 1, pp. 56–65, 2007.

[46] S. Rajegopal, P. McGuin and J. Waller, Project Portfolio Management, Palgrave Macmillan, London, 2007, pp. 134–136.

[47] B. Blichfeldt and P. Eskerod, "Project portfolio management – There's more to it than what management enacts," International Journal of Project Management, vol. 26, no. 4, pp. 359–363, 2008.

[48] R. Müller, M. Martinsuo and T. Blomquist, "Project portfolio control and portfolio management performance in different contexts," Project Management Journal, vol. 39, no. 3, pp. 28–42, 2008.

[49] H. Payne, "Management of multiple simultaneous projects. A state-of-the-art review," International Journal of Project Management, vol. 27, no. 1, pp. 72–79, 2009.

[50] J-P. Paquin, C. Gauthier and P-P. Morin, "The downside risk of project portfolios: The impact of capital investment projects and the value of project efficiency and project risk management programmes," International Journal of Project Management, vol. 34, no. 8, pp.1460–1470, 2016.

[51] H. Linstone and M. Turoff, "Delphi: A brief look backward and forward," Technological Forecasting & Social Change, vol. 78, pp. 1712–1719, 2011.

[52] H. Von der Gracht, "Consensus measurement in Delphi studies. Review and implications for future quality assurance," Technological Forecasting & Social Change, vol. 78, no. 8, pp. 1525–1536, 2012.

[53] M. Hofman and G. Grela, "Project portfolio risk identification - application of the Delphi method," Journal of Business and Economics, vol. 6, no. 11, pp. 1857–1867, 2015.

[54] Project Management Institute (PMI), A Guide to the Project Management Body of Knowledge, (PMBOK© Guide), Third Edition, Newton Square, Pennsylvania, 2004.

[55] International Project Management Association (IPMA), International Competence Baseline Version 3.0, Van Haren Publishing NL, 2006.

[56] B. Cattell, "The scree test for the number of factors," Multivariate Behavioral Research, vol. 1, no. 2, pp. 245–276, 1966.

[57] F. Kaiser, "Varimax Criterion for Analytic Rotation in Factor Analysis," Psychometrika, vol. 23, no. 3, pp. 187–200, 1958.

[58] J. Cronbach, "Coefficient alpha and the internal structure of tests," Psychometrika, vol. 16, no. 3, pp. 297–334, 1951.

[59] S. Spalek, "Does investment in project management pay off?," Industrial Management & Data Systems, vol. 114, no. 5, pp. 832–856, 20.

Appendix A

Table. 1 Rotated component matrix for the likelihood of risk occurrence (Factor 1)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
1.2	0.39367	0.283301	-0.05942	0.103809	0.143165	0.15229	-0.05622	0.324695	0.093393	0.066118	0.099662
1.3	0.702794	0.17951	-0.0946	0.083693	-0.09692	-0.01845	-0.023044	-0.02287	-0.017672	-0.138364	-0.158089
1.5	0.657743	0.027049	-0.02866	-0.1338	0.120447	0.110338	0.026974	-0.00087	0.135453	0.034516	-0.0304
1.6	0.702418	0.006002	-0.01295	0.023254	-0.09525	0.041877	-0.146	0.238879	-0.09835	0.01964	0.14496
1.11	0.558796	0.2106	-0.21424	-0.11217	-0.14316	0.077496	-0.02662	0.069437	-0.23815	0.094819	-0.1916
1.12	0.416929	0.007031	0.287289	-0.0619	0.107168	0.179725	-0.00365	-0.04901	0.177891	0.047376	0.11335
3.1	0.767683	0.108555	0.27384	-0.01949	0.13352	-0.00226	-0.22686	-0.01103	0.099394	-0.06583	-0.075306
3.12	0.601676	-0.06975	-0.12003	-0.03695	0.092839	0.177333	0.118708	0.249324	-0.09563	0.042064	-0.21048

Table. 2 Rotated component matrix for the likelihood of risk occurrence (Factor 2)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
2.3	0.12738	0.700134	0.183936	-0.06263	0.061626	0.08837	0.044068	0.15803	-0.03171	0.033286	0.073909
2.4	-0.00968	0.520325	0.128014	-0.07576	0.072839	0.047351	0.018662	-0.06066	0.106054	-0.00425	0.109762
2.5	0.122795	0.52434	0.080293	0.148226	0.273573	-0.06697	0.192543	0.085933	0.048627	-0.15974	-0.15386
2.6	0.314956	0.528261	-0.05946	0.305407	-0.13071	0.086182	-0.13025	0.002238	0.158966	0.07101	-0.10117
3.2	0.359665	0.3617	-0.11065	-0.05487	0.270898	0.025496	-0.03247	-0.045	-0.10186	0.226079	0.049013
3.13	0.435101	0.52139	0.229909	-0.20637	-0.12232	0.195621	0.007235	0.198898	-0.02681	0.108537	0.184919
3.15	-0.0797	0.481828	0.090009	0.006832	0.285148	0.189545	-0.01157	0.116894	0.264126	0.15951	0,113875

Table. 3 Rotated component matrix for the likelihood of risk occurrence (Factor 3)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
1.1	-0.12302	-0.00043	0.472111	0.144504	-0.05286	0.015583	0.060479	0.104657	0.061938	0.087956	-0.12159
1.4	0.089249	-0.09778	0.483099	0.456178	0.092763	-0.05392	0.182774	0.237488	0.269433	-0.13381	0.13007
1.7	0.026201	0.227241	0.74728	0.057103	0.084453	0.071983	0.128365	-0.26283	-0.07214	0.060226	0.092666
1.10	-0.0896	0.245458	0.551719	0.177685	0.073108	0.05537	0.19539	-0.02394	0.110001	0.005603	-0.03214
2.7	0.227317	-0.04817	0.378525	0.055512	-0.12061	0.087114	0.107952	0.168371	0.086994	-0.0265	0.028449
3.14	-0.07742	0.112066	0.471749	-0.00335	0.081584	0.138562	-0.02537	0.095229	0.038641	0.111694	0.071101

Table. 4 Rotated component matrix for the likelihood of risk occurrence (Factor 4)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
3.8	-0.11129	-0.18497	0.193493	0.602249	0.01278	0.017089	0.378323	-0.00704	0.04882	0.041002	0.027769
3.9	-0.09999	0.099722	0.186884	0.896934	0.045919	0.042716	0.04576	0.040095	-0.0029	0.022895	0.021318

Table. 5 Rotated component matrix for the likelihood of risk occurrence (Factor 5)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
3.4	0.23409	0.335306	0.085064	0.035199	0.432908	0.289447	-0.21145	0.116544	0.006453	-0.20255	-0.06519
3.5	-0.0254	0.124871	0.103557	0.092452	0.863767	0.139378	0.044806	0.015069	0.120679	0.103552	0.052985
3.6	0.204103	0.182522	-0.05859	-0.1283	0.321761	0.042823	0.190599	0.173142	0.154301	0.254904	-0.01077

Table. 6 Rotated component matrix for the likelihood of risk occurrence (Factor 6)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
1.9	0.424225	0.210658	0.063105	0.000597	0.249344	0.588946	-0.01318	0.030894	0.074181	-0.06133	0.049855
3.11	0.168672	0.180353	0.348245	0.059105	0.102027	0.793619	-0.05347	0.184083	0.183322	-0.03085	0.045329

Table. 7 Rotated component matrix for the likelihood of risk occurrence (Factor 7)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
3.3	-0.11553	0.31682	0.271998	0.095712	0.044424	-0.14826	0.511568	0.262516	-0.00544	0.00905	-0.19236
3.7	-0.12274	-0.00314	0.363848	0.33504	0.00548	0.00032	0.826374	-0.19629	-0.04614	-0.0605	0.089735

Table. 8 Rotated component matrix for the likelihood of risk occurrence (Factor 8)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
2.1	0.340887	0.093297	-0.0799	-0.03239	0.218877	-0.08696	-0.08146	0.368775	-0.12433	0.055332	0.078864
3.10	0.185891	0.139054	0.209629	0.072002	0.004545	0.183713	0.007915	0.616852	0.04572	0.003663	0.057602

Table. 9 Rotated component matrix for the likelihood of risk occurrence (Factor 9 & 10)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
2.2	0.044872	0.312535	0.198712	0.083277	0.157095	0.196361	-0.03052	0.006376	0.885364	-0.02503	-0.01354
3.17	0.31428	0.067543	0.345774	0.06628	0.127046	-0.09748	-0.05078	0.035308	-0.04105	0.857121	0.043662

Table. 10 Rotated component matrix for the likelihood of risk occurrence (Factor 11)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Factor11
1.8	0.194807	0.085422	0.343148	0.23106	0.058521	-0.09569	0.065067	0.051012	-0.09439	-0.16354	0.343504
3.16	0.189631	0.532568	-0.00409	0.041778	0.062269	0.252866	-0.06365	0.260475	0.083857	0.223526	0.69061

Table. 11 Rotated component matrix for the impact of risk on portfolio objectives (Factor 1)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
1.4	0.643952	0.182861	-0.03045	-0.07813	0.155842	0.018008	-0.15913	-0.07383	-0.00331	-0.1043
1.6	0.343291	-0.00998	0.198983	0.33562	0.146156	0.073138	0.012245	0.102637	0.298432	0.237303
1.7	0.635833	-0.11435	0.250083	0.118953	-0.08225	0.130683	0.069572	0.109114	0.012782	0.125342
1.8	0.824196	-0.08897	-0.00753	-0.05373	0.03017	-0.01774	-0.06547	-0.16218	0.172146	0.152014
1.10	0.69448	-0.14774	0.14372	0.006982	-0.0575	0.349339	0.170634	0.131567	-0.01999	0.035191
2.7	0.48497	0.241393	-0.12938	0.024819	0.124786	-0.07939	-0.39278	-0.14953	-0.10355	0.073736
3.3	0.444726	0.049384	0.095084	-0.18561	0.099332	0.195839	-0.24675	-0.03472	-0.08461	-0.13299
3.9	0.552911	-0.10407	0.103009	0.149953	0.002486	0.290639	0.033808	0.142324	0.098864	0.092015
3.14	0.569661	0.077848	0.008045	0.157823	-0.04892	0.069455	0.141375	0.12092	0.06343	-0.18976

Table. 12 Rotated component matrix for the impact of risk on portfolio objectives (Factor 2)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
2.2	0.105799	0.54457	0.149154	0.068258	0.176667	0.068656	-0.13068	0.244125	0.112852	0.104525
2.4	-0.12578	0.554736	0.22012	0.087923	-0.07127	0.053421	0.084429	-0.03719	0.19744	0.077377
3.4	0.195905	0.430636	0.114849	-0.21565	0.152207	-0.03407	0.112914	0.362214	0.244819	-0.02198
3.5	-0.04938	0.66158	0.14909	0.033858	0.068419	-0.01604	0.203717	0.107417	0.135418	-0.06685
3.6	-0.01766	0.50657	0.185114	0.119989	0.125087	0.0024	0.081607	0.11155	-0.15583	0.194205

Table. 13 Rotated component matrix for the impact of risk on portfolio objectives (Factor 3)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
1.12	-0.01858	0.217735	0.597024	0.073002	0.137629	0.067242	0.022667	-0.02583	0.022175	0.186209
3.2	0.2347	0.136307	0.717565	0.1343	0.113832	0.111074	0.181501	0.080676	0.159876	0.096218
3.10	0.105291	0.229468	0.549901	0.179403	0.077183	-0.0897	0.004001	0.145769	0.116526	-0.03819

Table. 14 Rotated component matrix for the impact of risk on portfolio objectives (Factor 4)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
1.5	0.188998	0.142846	0.088302	0.44751	0.111867	0.246892	0.24738	0.14599	0.193287	0.139127
1.11	-0.13561	-0.00755	0.238571	0.454455	0.220718	0.138931	0.37611	0.072482	0.170122	0.22396
3.1	0.001999	-0.07323	0.079504	0.482407	0.342585	0.035916	-0.01212	0.112633	0.047104	0.128445
3.17	0.081376	0.276467	0.193154	0.927494	0.049032	0.005954	0.099085	-0.01433	-0.02581	-0.03553

Table. 15 Rotated component matrix for the impact of risk on portfolio objectives (Factor 5)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
1.3	0.049305	-0.03916	0.152526	0.170586	0.658465	-0.32648	-0.02608	0.196211	-0.10857	-0.04447
2.1	0.111845	0.189644	0.390672	-0.03171	0.464179	0.019714	0.190441	0.261472	0.026849	-0.14089

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
2.5	0.054374	0.336648	0.43577	0.112919	0.597545	0.198252	0.103448	0.079682	0.024831	0.136101
2.6	0.254994	0.207879	0.012243	0.088545	0.400992	-0.20735	-0.02626	0.124618	0.093807	0.156595
3.12	-0.10621	0.043928	0.031689	0.098033	0.506188	0.167112	0.159991	-0.15342	0.083956	0.047157

Table. 16 Rotated component matrix for the impact of risk on portfolio objectives (Factor 6)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
3.7	0.27764	0.011797	-0.07261	0.053156	-0.07971	0.662359	0.00997	0.080934	0.045587	0.136838
3.8	0.258635	0.090354	0.146739	0.104539	0.091494	0.796995	0.016294	-0.06449	0.109693	-0.12081

Table. 17 Rotated component matrix for the impact of risk on portfolio objectives (Factor 7)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
1.2	0.12528	0.150948	0.388017	0.0891	0.125534	-0.12415	0.518658	0.005324	0.14022	0.112653
3.15	-0.07519	0.419198	0.040475	0.188407	0.22416	0.129901	0.824222	0.162344	0.014852	0.058759

Table. 18 Rotated component matrix for the impact of risk on portfolio objectives (Factor 8)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
1.9	-0.01698	0.237516	0.267165	0.254769	0.264276	0.005308	0.206601	0.43052	0.102311	0.020936
3.11	-0.00388	0.392585	0.103634	0.174771	0.070634	0.036501	0.104601	0.827792	0.221753	0.218895

Table. 19 Rotated component matrix for the impact of risk on portfolio objectives (Factor 9)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
1.1	0.239701	0.242561	-0.00334	0.042952	-0.02042	0.177999	0.109561	0.212696	0.317555	-0.01886
2.3	0.045715	0.277462	0.360191	0.115173	0.045028	0.092638	0.156446	0.223293	0.819093	0.130652
3.16	0.15951	0.282245	0.110136	0.212583	0.362675	0.251229	0.002411	0.046889	0.397279	0.272185

Table. 20 Rotated component matrix for the impact of risk on portfolio objectives (Factor 10)

Risk	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10
3.13	0.018934	0.27114	0.27354	0.202709	0.111531	0.028657	0.159276	0.157236	0.159186	0.846475

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The roles of top management and users in strategic IS planning: a perspective of SMEs

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Abstract:
Research on the strategic Information Systems (IS) planning is typically concentrated on large firms. However, the outcomes of this research may not be sufficient to adequately apply to Small and Medium Enterprises (SMEs). Responding to the limited body of work in SMEs with respect to strategic IS planning, this research aims to fill the gap in the body of literature. Having limited resources available, financially and technically, strategic IS planning is getting more crucial for SMEs. Prior work suggests that a high level of internal competencies such as IT leadership by the owner or the top management of the firm are important for progressive IT development to take place in SMEs. Having said that IS is getting paramount for firm's survival to optimize IS effectively, it is incumbent to investigate the factors influencing strategic IS planning amongst the SMEs. This study contributes to research and practice by providing in-depth insights into the IS planning processes in SMEs with a particular focus on the roles of top management and users. Researchers can use these results, which are somewhat different from larger organizations, to revise IS planning phases.

Keywords:
strategic IS planning; top management commitment; user participation; SMEs.

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1. Introduction

Over the last decades we have seen a growing deployment of information systems (IS) to support the operations of organizations. The deployment of IS enables provision of both financial and non-financial information for decision support. The deployment of appropriate IS facilitates firms in extending their information-processing capabilities that provide firms with the right information at the right time. The availability of relevant and accurate information in a timely manner could enable firms to reduce operating costs, to effectively utilize available resources, to execute strategic plans and ultimately to improve their overall productivity. However, the deployment of IS in an organization will be successful only if the IS investment is aligned with the organization's strategic objective. In other words, firms gain value out of the IT/IS-related investment such as greater competitive advantage [1]. This can be achieved by establishing strategic information systems planning (IS planning). The failure of strategic IS planning can result both in loss of opportunities and waste of expensive IS resources.

The assessment of IS planning success has a long research tradition (e.g., [2]). Research on the IS planning success is typically concentrated on factors influencing IS planning practices and IS planning success. These factors include firm size [3], management style [3],[4], changes in the external environment [5], and inputs contributed by employees and top management in the IS planning process [3],[6],[7]. The participation of employees and commitment of management are widely studied variables as they are deemed very crucial and a lack of these can lead to an unimplemented strategic IS plan [6].

Despite the substantial body of research on strategic IS planning success, prior research focuses mainly on large firms. There is a lack of study on small and medium-sized enterprises (SMEs) [8]. One reason for the lack of SMEs-focused study is said to be that SMEs put less emphasize on IS-related investment [9]. Another reason might be that the IS in SMEs is considered to only support the administrative functions of these firms instead of supporting their strategic objectives [10],[11]. Hence, optimizing IS values is not seen as important or significant. However, in response to a more pressing business environment, firms are putting more reliance on the support of various IS as potential mechanisms to extend their business efficiency [11]. Due to the importance of IS in SMEs nowadays, calls have been made to understand how SMEs could successfully plan their IS to facilitate better firm performance [12]. Responding to the limited body of work in SMEs with respect to strategic IS planning, this research attempts to fill the gap in the body of literature and heeding the calls for undertaking research in the area of IS planning in SMEs.

This effort is crucial because a research framework applied in large firms may not be perfectly applicable in the context of SMEs [10]. Although SMEs and larger firms are facing similar issues while incorporating IS into their operations, they often have unique approaches in dealing with such issues [13]. On top of that, the unique nature of the organization structure and operations of SMEs further attests to the distinct practices of IS/IT amongst SMEs [14]. In contrast to their larger counterparts, SMEs are inherently known to suffer from having limited resources regardless of whether they are financial resources or IS technical expertise [15]. A lack of available resources obviously influences how firms perceive and response to IS potentials. For example, inherent financial resources are a major barrier for the strategic use of IS in most SMEs [16]. As such, firm primarily consider IS/IT for extending operational efficiencies rather than for having a clear strategic focus [11]. Specifically, IS deployment being more widespread for finance, accounting, and inventory management [17]. Meanwhile, due to the scarce of employees who are IT competent, some firms opt to outsource the IS-related projects [18]. Ashurst et al. [19] also suggest that an elevated level of internal competencies such as IT leadership by an owner or the top management of the firm are particularly important for progressive IT development to take place in SMEs.

In response to the increased importance of IS in business and hurdles facing SMEs to effectively utilize IS, a crucial need exists to explore strategic IS planning as practiced by SMEs. Considering the dominant roles of top management in most SMEs decision making, their active involvement in IS-related projects promotes a better planning process, which ultimately ensures the successful use of IS. The characteristics and values of the dominant actors or decision makers of a firm will determine the firm's commitment toward IT/IS deployment [20]. In a similar vein, the need to ensure IS corresponds well to user's requirements, their involvement in any IS planning activities have considerable

impact on successful IS-planning processes [21]. In line with the above concern, this study aims at understanding how top management and user participation facilitate IS planning processes amongst SMEs.

For that purpose, an empirical qualitative study among experienced SMEs located in the northern region of Malaysia has been conducted. Through a series of open-ended interviews, the top management or owners and the IS users of the SMEs were asked about their roles in the IS-planning processes and factors influencing their commitment and involvement. To strengthen the credibility of the collected data, a triangulation strategy was applied [22]. Such a strategy requires that at least two independent researchers carry out the analysis and that their results are later compared. This process helps to counter any possible discrepancy in the interpretation of the collected data.

This study contributes to the domain of IS planning by reporting details and descriptions of the roles of top management support and user involvement in the IS planning practiced within the SMEs. Owing to the growing importance of IT to today's business and therefore increases in its complexity, IS planning is getting more paramount [23]. Unfortunately, IS planning has been reported as considerably limited amongst the SMEs [24]. If there are, the focus is somewhat restricted to the short-term or operational focus instead of more strategically oriented [25]. Firms that are successfully managing the IT in a more strategic manner are capable to ensure successful IT deployment [26] and ultimately lead to better firm performance. Having said that, it is essential for the SMEs to establish proper IS planning that view IT potentials in more strategic manner. More importantly, it is a good move to understand how IS planning has taken place in SMEs and later to propose the best approach of IS planning that fit well with this business sector [25]. Therefore, this study attempts to provide insight on the IS planning practice amongst the SMEs. Having varying characteristics in various aspects, particularly on the uncertainty of the IT potentials and firm's competitiveness, the limited resources availability as well as operational-oriented focus on IT deployment [27] SMEs become a unique context of research to explore. Moreover, due to its resources constraints, the role of top management and users are expected to be somewhat different from their larger counterparts. This study, therefore, helps researchers to ascertain applicability of the IS planning framework as initially developed for larger organizations, into the SMEs context. Researchers may benefit from the results of this study, that are somewhat different in relative to larger organizations, to revise IS planning phases as Newkirk et al. [28] initially proposed by incorporating the different roles of top management and users. Practitioners in SMEs could gain insights for understanding the role of top management and user involvement in strategic IS-planning activities. They might rethink their way of empowering their employees (i.e., the IS users) in the decision-making process related to investment in IS.

This paper is divided into five major sections. The next section provides the theoretical background of strategic IS planning and IS practices in SMEs. The third section describes the research methodology employed by explaining the design of the research processes (i.e., data gathering and data analysis). Section four presents and discusses the research findings, authenticated with quotes from the interviews. The final section then concludes this paper with implications, limitations and future research.

2. Theoretical Background

2.1 Information systems (IS) planning

The concept of strategic IS planning involves the process of identifying a collection of computer-based applications that correspond to an organization's business plan for ensuring that the organizations achieve their intended business objectives [11]. Strategic IS plan theory that was initially developed by Lederer and Salmela [29] posits that a strategic IS plan may be illustrated as input-process-output model. The model comprises seven interrelated constructs, namely, (i) internal environment, (ii) external environment, (iii) planning resources, (iv) planning process, (v) information plan, (vi) plan implementation, and (vii) alignment between the internal environment and the organizations' strategic goals. The complete model is illustrated in Figure 1.

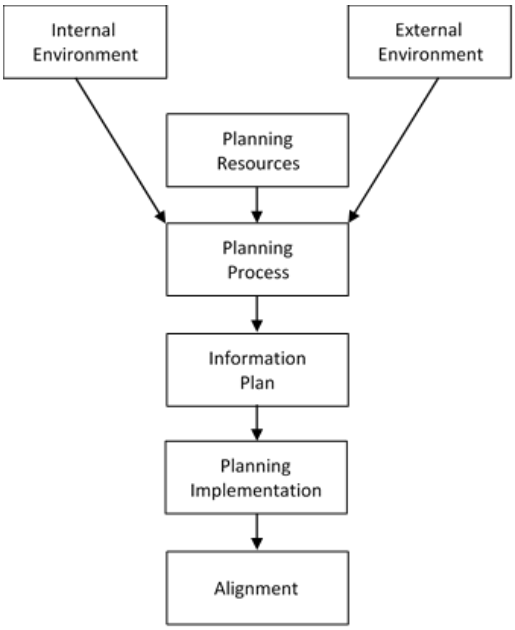

Figure 1: Theory of strategic IS plan (adapted from Lederer & Salmela [29])

Several researchers have suggested that the internal environment influences the planning process. For example, the size of an organization influences the strategic IS-planning process because, in large organizations a formal approach to strategic IS planning may be more appropriate when compared to small organizations [3]. The planning resources comprise the effort and inputs from all levels of employees, including top management in the planning process that enables the execution of the planning process. A lack of resources can reduce the scope of planning [6]. The role of participation and commitment by employees at different levels is very critical and has been highlighted in several studies, including those by Earl [3] and Smits et al. [7]. A more recent mixed method study was conducted by Raja Mohd Ali [30] to investigate the effect of culture on the strategic IS planning success particularly with respect to top management commitment and user participation. Initially, data were collected from 108 medium and large IT organizations in Malaysia and New Zealand. The results suggested that both top management commitment and user participation affected the strategic IS-planning success dimensions relating to communication and technology. Then, interview sessions were conducted to gain further understanding on the relationships between the two factors studied (top management commitment and user participation) and the strategic IS planning. This study focused on the effect of top management commitment and user participation on strategic IS planning success in medium and large organization but does not account for small-sized organizations that are known to be endowed with unique characteristics. This is the gap that this current study explores further.

Various sets of phases for developing strategic IS planning have been suggested from previous studies. Mentzas [31] suggested five phases, namely, strategic awareness, situation analysis, strategy conception, strategy formulation and strategy implementation planning. Cassidy [32] suggested another set of phases, which included the visioning phase, the analysis phase, the direction phase and the recommendation phase. Newkirk et al. [28], in their quantitative study, however, identified five main phases which are (i) the planning process, (ii) analyzing the current environment, (iii) conceiving strategy alternatives, (iv) a selecting strategy, and (v) a planning strategy implementation. The planning process stage focuses on determining the key planning issues such as the steering committee, defining the objectives and obtaining top management commitment. The analyzing current environment stage emphasizes analyzing the current business systems and technology, both internally and externally. The conceiving strategy alternative examines the main

technology objectives and finding opportunities to improve should improvement is needed. Strategy selection involves processes to identify new business processes or technology and how to prioritize among the listed projects. More recently, Parviainen et al. [33] suggested four steps, which include gap identification between current situation and organization's objectives, actions need to be taken to reduce or close the gap, conducting feasibility study and prioritization, and developing the roadmap. Implementation of such planning focusing on the evaluation of executing the projects agreed in the plan. The implementation might either reducing IT costs or improving organization's use of information in terms of information sharing and information integration [34].

2.2 IS practices amongst small and medium-sized enterprises (SMEs)

SMEs contribute substantially to the economic and social growth of most countries. This sector plays substantial roles in promoting higher Gross Domestic Product (GDP), greater export activities, and employment opportunities [35]. As they are generally domestic-oriented business, their trading activities would have direct impacts on a nation's economy [36]. Considering the vital roles of SMEs in both developed and developing economies, many international agencies such as the United Nation (UN), the World Intellectual Property Organisation (WIPO), and the Organisation for Economic Co-operation and development (OECD) have sought to facilitate such firms in playing a meaningful role in the economic system worldwide.

SMEs also play greater roles in ensuring competitiveness of most developing and transitional economies. In the Asia Pacific region, more than 95% of businesses are SMEs with more than 70% in micro-firm category [37]. Of the 49 million SMEs in this region, about half of them are currently operating in China and Indonesia. Thus, their activities could be an important indicator of the entrepreneurial health and competitiveness of a particular country. Owing to the salient role of SMEs for the economies of most nations, governments have initiated various strategies and incentives to extend their efficiency and productivity. The deployment of appropriate IT/IS is one possible strategy for such a purpose [38]. Nowadays, IT/IS has made its presence felt in all kinds of businesses of all sizes and has a significant role in extending business productivity. Ideally, a firm would receive considerable benefits from deploying IT/IS. This deployment could facilitate firms in managing administrative tasks, enhancing production activities, expanding their product/service market [39] and supplying information needed in a timely manner [14]. It further enables rapid innovation activities and levels the playing field with their larger counterparts [15]. In other respects, IT/IS deployment can facilitate cost cutting in business operations while extending customer services and more effective product distribution [40].

Due to the overwhelming claims of IT/IS potentials, SMEs have been the subject of many studies over the years. Previous works have concentrated on several aspects of IS practices. Earlier works are primarily concerned with drivers/inhibitors of IS adoption [18], [40], [41] and intensity of IS deployment [17]. Several other works have examined IS sophistication [37] and IT/IS success factors [13]. However, a handful of these studies have investigated IS strategic-related issues. For example, Levy and Powell [25] explored the current state of IS alignment in the SME sector and reported that a lack of alignment leads to the failure of firms to benefit from IS investment. Similarly, Cragg et al. [43] suggested that appropriate IS alignment with SMEs business strategies ensures greater IS success and firm performance. Meanwhile, Ismail and King [44] reaffirmed the essence of IS alignment within a specific business function (accounting information systems) to the successful deployment of IS. Chao and Chandra [45], who adapted Resource-based view, confirmed the impact of owner IT knowledge on business and IT strategic alignment and ultimately IT use.

2.3 Strategic IS planning practices among SMEs

Extensive works have been conducted that investigate strategic IS planning in large organizations; however, studies amongst SMEs are relatively limited. Levy and Powell [47] asserted that there is a lack of strategic planning in SMEs. One of the reasons may be due to IS strategy was seen as one of the least significant concerns of SMEs [48]. Nevertheless, due to growing strategic importance of IT and considerable cost incurred on such investment, there are an

urgent need for SMEs to put serious consideration on setting up proper IS planning. This is even crucial despite the fact that most SMEs are yet to have formally documented strategic plan for their business [46].

Studies conducted in relation to strategic IS planning and SMEs suggested that in view of unique nature of the SMEs, firms may not fully consider phases (as described in section 2.1 above) and approaches of IS planning as recommended in large organizations especially in the situational analysis phase [49]. The situational analysis on current business environment includes organizational systems, information systems, and internal and external IT environment allows the organization to identify problems and solutions opportunities. However, the difficulties in various resources aspect, such as financial issues, lack of technology expertise, and limited capabilities in managerial and operational level somewhat restrain the SMEs ability to survive in the uncertain environment. Lacking of alignment between business and IS strategy and lacking of strategic decision making and sharing information are the two important aspects of the survivor issues in SMEs [50]. The inability to survive in an uncertainty environment may give a negative influence to the SMEs business [51]. Thus, this study was conducted to fill the gap by understanding the top management commitment in giving business direction and user participation in sharing information in the SMEs strategic IS planning practices.

Further, many SMEs focus more on short-term profitability rather than long-term sustainability as practiced by large organizations [51]. Due to the short-term focused, strategic decision made have emphasized more on reaction which response to issues arise rather than future anticipation [27]. In addition, as compared to large organization, SMEs owners' strategic thinking is based more on intuition, where owners intuitively understand their business domain, but not analyzing on the IS opportunities [52].

3. Methodology

One primary concern of this study is to understand the roles played by the top management of a firm as well as the degree of user involvement in the various stages of IS planning activities as Newkirk et al. [28] outlined; (i) the planning process, (ii) analyzing the current environment, (iii) conceiving strategy alternatives, (iv) selecting strategy, and (v) planning strategy implementation. This study adapts the model into the SMEs context for in-depth investigation of the role of top management and users in strategic IS planning using a qualitative perspective.

The study adopts a qualitative research strategy based on a multiple cases study. A screen assessment was carried out to ensure that the selected firms had employed certain types of IS/IT-related applications. This was the prerequisite for the firms to be considered for an interview. This study defines SMEs based on the guidelines of Malaysia's National SME Development Council. As per the guidelines, manufacturing-based SMEs refer to firms with less than a RM50 million annual turnover with the number of employees not exceeding 200. Meanwhile, for the service-based sector, the SMEs are firms with an annual turnover of less than RM20 million or firms with less than 75 employees. Due to financial resource constraints, the potential firms involved in this study were restricted to those located in northern region of Malaysia. After a series of phone calls to the selected firms in northern region which was listed in the SME info list, only three firms agreed to take part in the study, namely, Company A, Company B, and Company C. The data was collected for a period between June and August 2016.

Data for analysis were obtained via a semi-structured themed interview with the owner/manager of each firm. Where appropriate, researchers arranged for an interview session with representative system users to cross check the information reported by the owner/manager. In total, three owners or managers and four executives took part in the interview sessions. A standardized open-ended interview method was utilized because it does not predetermine the answers and allows room for the participants to respond in their own terms [53]. The interview sessions were carried out at the respective firms. Each interview session from each company took between 90 and 130 minutes. The interview questions were presented to all participants in English, but some of the interviewees requested to respond in Malay language. A description of the respondents who took part in the study and duration of the interviews are reported in Table 1.

Table 1. Details of interview session

Company	Interviewees	Duration of interview (minutes)
A	Owner / Managing director	90
	Account executive	20
	Administration executive	20
B	Information System manager	60
	Human Resource manager	15
	Quality System Engineer (QS Engineer)	15
C	Account/administrative executive	120

Table 2 below presents the profile of the participating companies. As seen from Table 2, the companies involved in distinct types of business, ranging from manufacturing to service. All companies had a similar business maturity, which was around 20 years. However, these companies were varied in terms of the number of employees. Company B was still considered to be a SME because most of the employees were operators suggesting that they were part-time employees.

Table 2. General profiles of the companies

	Company A	Company B	Company C
Nature of business	Manufacturing (paddy processing) and supplying (rice mills)	Printing and supplies services	Food (chicken rice) and beverages
Year of establishment	1995	1996	1995
No. of employee	50 full-time employees	350 full-time and part-time employees	25 full-time employees

Based on the Table 2 above, Company B was considered as a medium-sized company and the other two companies were considered as small-sized.

With regards to the technology/application adoption as presented in Table 3, only Company B had a sophisticated application with an Enterprise Resource Planning (ERP) and a web-based system, which is considered reasonable when looking at the budget allocated for systems and technology. This is due to the fact that Company B was a medium-sized company as compared to the other two companies. More budgets were allocated for more sophisticated IT/IS. For Company C, less budget were allocated for a specific IT/IS may be due to financial constraint.

With regards to IS planning, all companies do not seem to have a formal strategic IS planning. But, these companies had their own expectations and objectives about how IS could assist them in their business operations. However, Company B has a rigour objective as compared to Company A and C. As expected, the top management championed the IS planning process in all three participating companies. However, the position of the top management is different between these three companies.

The interview led researchers to the primary thematic focus of the study, namely, (i) a description of top management roles in IS planning activities, (ii) identifying the roles of IS users on IS planning, and (iii) identifying the factors affecting top management commitment and user involvement. The researchers personally conducted the interview sessions, which were digitally recorded. The researchers listened to the recordings and then transcribed them. The

analysis of qualitative data was processed based on Erlandson et al. [22]. The data were divided into units so that each unit corresponded to an individual concept. Then, the researcher assigned meaningful codes to data units one by one.

Table 3. IS adoption profile of the companies

	Company A	**Company B**	**Company C**
Technology/Information Systems adopted	Computerised accounting system	ERP, call centre system, web-based ordering and receiving order	Computerised accounting system
IS Budget	Not specified	Less than RM100,000	Less than RM10,000
Objective of IS Planning	Depend on the criticality of the business process	Compete on the online market	Need of the business to prepare a full set of accounts and to fulfil the Goods and Services Tax (GST) requirements as enforced by the Government, apart from limited functions available in earlier accounting system
IS Planning champion	Owner	IT/IS manager	Directors

4. Findings and Discussion

The interview session provided ample opportunities for the researchers to gather detailed descriptions with respect to the roles of top management and the involvement of users in IS-planning activities. In addition, further inquiries revealed factors leading to the roles of top management and users in IS-planning activities of the respective firms. This section elaborates in greater detail the roles played by top management and users as well as factors affecting their commitment or involvement as obtained from the series of interviews conducted on all the case firms identified in this study.

4.1 Roles of top management

As the interview results revealed, the role of top management was not limited only to that of a decision maker, but also as a researcher when strategic IS-planning activities are concerned. All decisions with regards to the organization were made by the top management [53]. This includes the decision for acquiring the technology, as one respondent noted:

> "The most important is (that) I'm the one who makes the decision... Of course, I get the help from the account's executives. We discussed. I need to use a system to prepare a budget. I don't know (how to do it). So, they need to assist me. I do not know how to prepare the paperwork. I only have ideas." (Owner, Male, 51 years old, Company A, Manufacturing Industry).

The respondent from Company C added that directors did not simply take the words of the employee. One director consulted with the company's auditor on which system they should invest in. Additionally, he also asked the opinions of his business friends. He wanted to make sure that the new accounting system was easy, simple, and, most importantly, received first-hand support from supplier. An account executive from Company C talked about the process. She said:

> "However, the directors will not decide immediately. He contacted his auditor first, then his business friends in the same industry. He wanted to get second and third opinions. After that, he investigated the suppliers. What important is the system is easy, simple, and has support service. Meaning that, there is direct support team from the supplier whenever we encounter problems with the system. I can see that the directors are very committed in this process. What I can conclude is that, we analyzed the current system, surveyed what was

> available in the market, identified one that is suitable with the nature of the business and can handle GST, obtained others' opinions and investigated the suppliers." (Account Executive, Female, 36 years old, Company C, Food and Beverage).

While Company A top management only sought advice from employees to prepare the working paper [53], Company C's directors sought the opinions of the expert users such as the supervisor, the account executive, the company's auditor and users from other companies when it comes to issues related to acquiring new IS. A respondent from Company C remarked that:

> "It is impossible for the director to make his own decision on acquiring new accounting system. He did not use the system, so he does not know what is needed. I am the heavy user of the system, and I know what is best for the business." (Account Executive, Female, 36 years old, Company C, Food and Beverage).

In contrast to the other two firms, CEO of Company B was not directly involved in the SISP process. Instead, he provided his opinion about whether to proceed with the development or not. Holding the role as a middle person between the top management and the development teams, The IT/IS manager sought advice from the top management. She mentioned that,

> "Normally, for our company, I will meet my CEO, basically once a month when we have a meeting for monthly task update. I will update him the status of the key projects, which are in progress. So, he won't be involved in the project. I just give him a summary to get what he says about the status. For some projects, if I can't make decision by myself, I will seek his opinion. I ask him first if we shall go for this." (IS/IT Manager, Female, 37 years old, Company B, Printing Service Company).

As the interview further revealed, top management also acts as a researcher in the IS planning process. In this context, the top management is responsible for seeking information related to the proposed system. To illustrate, the owner of Company A stated that he studied the proposed technology including a site visit to the supplier's office [53]. Taking such role puts less reliance on his employees to supply this information. As he asserted,

> "Ooo…. They do not know either [about the technology]…. Most of my employees, they only know about their daily tasks. I am the one who needs to know everything." (Owner, Male, 51 years old, Company A, Manufacturing Industry).

The IT/IS manager of Company B requested for demo from suppliers and consulted their business friends. She stated that,

> "Normally we request for demo. After the demo, we say that give us one month to test. We also seek information from the people that working in the same areas as us. In my company, we have this kind of projects, how about your company?" (IS/IT Manager, Female, 37 years old, Company B, Printing Service Company).

In addition, a respondent from Company C surveyed the system online and consulted with the company's auditor and business friends. He also investigated the supplier. The respondent stated that:

> "The director checks the supplier too…to confirm whether the supplier can provide after sales services…whether the supplier is scammer or not… He checks whether his business friends use the same supplier…, if so, maybe he will follow them. Maybe." (Account Executive, Female, 36, Company, F&B Industry).

The above findings can be summarized in Table 4.

Table 4. Roles of Top Management as Decision Maker and Researcher

	Company A	Company B	Company C
Decision maker			
Decision to acquire new technology/IS	Owner was involved directly	CEO was involved indirectly	Director was involved directly
Researcher			
Investment in new technology/IS	Study the proposed technology thoroughly	Request for demo from suppliers and consult their business friends	Survey the system online and consult the company's auditor and business friends

Based on the information in Table 4, it can be concluded that the owner or director of Company A and C were directly involved in making decision to acquire new IT/IS but the CEO of Company B was not directly involved. IT/IS manager was given the responsibility to take the necessary actions but the ultimate decision was in the hand of CEO. Furthermore, all the owner, director, and IT/IS manager of Company A, C and B acted as a researcher in justifying the investment in new IT/IS but in different ways.

In sum, the findings suggest that, apart from having a significant role as key decision maker, the top management plays the role of researcher in the strategic IS-planning process. Specifically, other than having an authority to make final decision on the proposed system project, the top management takes further initiative to obtain relevant information for the proposed systems rather than merely relying on the employees to supply the information. The top management seeks information from various parties including employees, executives, other business owners as well as the system vendors.

4.2 Roles of users

In most instances, users are actively involved by merely providing input for IS planning processes. As user from Company B highlighted:

> "The business unit manager will be involved during the planning stage. After we studied their problems, we present to them what are the pros and cons of the system. They will give their opinions in the decision-making meeting." (IS/IT Manager, Female, 37 years old, Company B, Printing Service Company).

The user from Company C further added, although the users may be able to influence the directors, they do not have solid authority to make decisions on behalf of the company. As the respondent suggests,

> "At the end, the director will make his own decision. We can provide inputs only. Whether he wants to follow us or not, it is up to him." (Account Executive, Female, 36, Company C, F&B Industry).

From the beginning of the SISP process, the users play a significant role in describing the users' requirements for a proposed new system to the top management or directors. The users surveyed the market and identified systems that are suitable for the nature of the business and have a long-life span. When asked whether the inputs from users are important, one respondent replied:

> "Of course! The input from the users is very important and should be considered. We are the ones who know about the system because we use it daily. And we are the ones who need the system. If we are not comfortable with the system, it will be difficult later on." (Account Executive, Female, 36, Company C, F&B Industry).

She further added that user's roles are very important and may influence the top management decision making. She said:

> "I told the director about the weaknesses of X accounting system, and he listened. From my information, we changed to Y accounting system." (Account Executive, Female, 36, Company C, F&B Industry).

The users also provided inputs during the planning process to make sure that the applications acquired can assist them in performing their daily tasks. One user explained,

> "At the beginning stage, I believed they involved certain groups of people who are directly involve with the system. Definitely, they will go to the users and come out with a discussion first and meet up to understand the requirements and then only develop. We will discuss before everything is started." (HR Manager, Female, Company B, Printing Service Company).

Nevertheless, the results demonstrate that, for some firms, the roles of users in the strategic IS-planning process were not only limited to providing inputs for decision making. To some extent, the users also acted as a decision maker [53]. However, the authority to make the ultimate decision was restricted to those whom the applications were highly related to their routine tasks. For example, in Company A, the Accounts Manager decided upon the application to be used in the accounting department. The owner stated that,

> "For example, the accounts department, they will make their own decision. I do not know about their applications…The HR manager refused to use any applications for her department, so I said ok… They know better about their department." (Owner, Male, 51 years old, Company A, Manufacturing Industry).

Further, when respondents were asked about who made the decision on the applications to be used in their departments, one of the users asserted, "We make our own decision" [53] (Accounts Executive, Female, 60 years old, Company A, Manufacturing Industry).

In sum, as the findings suggest, even though employees play most crucial roles as an input provider in strategic IS-planning process, certain users are being empowered to make decisions, particularly on the aspects that are related to their responsibility and daily routine activities. It can be summarized that users of both companies acted as input provider and researcher but in different ways as shown in Table 5.

Table 5. Roles of User as Input Provider and Researcher

	Company A	**Company B**	**Company C**
Input Provider			
IS planning process	Not available	Discussion about the problems with the current system and the requirements for new system with IT/IS manager and development team	Discussion related to the weaknesses of the current systems and the needs for proposed system with director
Researcher			
Investment in new IT/IS	Not available	Prepare return of investment for a proposed system	Survey the market and identify suitable systems

As a conclusion, both the top management and users act not only as a decision maker but also as a researcher in the strategic IS planning process. Unlike the top management that makes the ultimate decision on the new systems or technology, employees are seen to make decisions specific to their own tasks. Both top management and users in the SMEs also studied and surveyed the systems and technology before they actually acquired them. Such study conducted ranged from searching on the Internet to asking for advice from business industry associates and company's auditors.

5. Discussion and implication of the study

The deployment of IT/IS is getting more essential in today's business to facilitate the supply of timely and accurate information in support of business decision making. Regardless of the increased interest towards IT/IS in business, SMEs relatively lag behind with respect to their larger counterparts as firms embrace constant challenges to effectively deploy IT/IS. However, SMEs have not optimized IT/IS strategic values. Hence, more effective IS planning deserves further investigation to promote more effective IT/IS management of these firms. More importantly, the unique nature of SMEs means that top management commitment and user involvement in IS-planning activities should be expected to be somewhat different than those of larger organizations. Therefore, this study examined the top management commitment and user involvement in the IS planning practices of three selected SMEs that are operating in three different industries, namely, manufacturing, food and beverages, and printing.

Figure 2 synthesizes the results obtained from this study. Overall, the figure shows the different roles played by top management and users, factors affecting the top management commitment, and user participation.

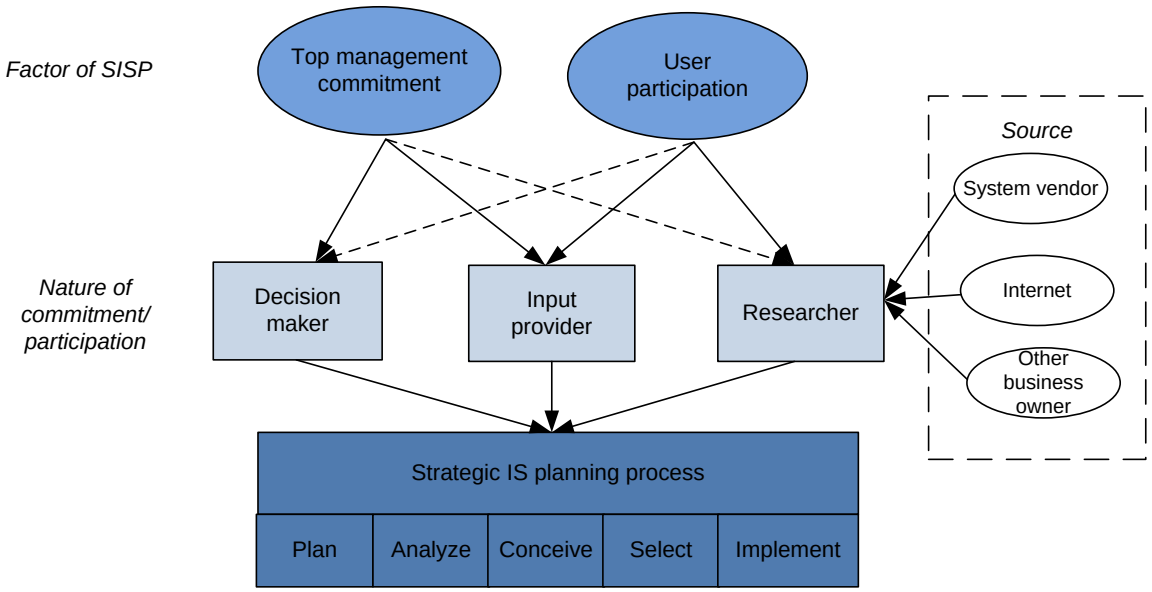

Figure 2: Roles of top management and user in SMEs strategic IS planning process

Note: Dotted line indicates indirect roles while straight line suggests direct roles played by top management and user participation

The importance of top management in strategic IS planning has been highlighted in some studies. Raja Mohd Ali [30], in a study of top management and users in an education industry, found that top management contributes to IS planning in many ways such as being a knowledge provider regarding the business environment, a resources provider, and a decision maker. In contrast, this study suggests that, in the context of SMEs, top management not only acts as a decision maker, but also as a researcher by collecting and gathering relevant information regarding the systems or technology that a business wants to acquire. In other words, rather than restricting themselves as a decision maker and resource provider, top management of the SMEs tend to actively involved in multiple roles at various stages of IS planning. This corresponds to the claim that the involvement of the owner in all aspects of the business is due to the unique nature of SMEs with respect to the size and the more active roles of the top management [25]. Comparing the results of this study

with those studies involving larger organizations, the top management not only makes decisions on what technology or IS that their organization needs to acquire, but also involves in the process before the actual decision can be made. This prior process is collecting and gathering as much information as possible about the IS and technology that could help the organization to achieve its business objectives. As SMEs have limited financial resources, especially with regards to technology, the top management must be very selective in acquiring the technology to ensure a maximum return on investment.

Similarly, as the result indicates, the roles of users in the strategic IS planning process is not limited to only providing inputs, but, to some extent, the users also act as a decision maker. The result of this study is somewhat inconsistent with those of Raja Mohd Ali [30], whose works are discussed above. Her study found that the users play some roles namely, input provider, feedback provider and system user but not as a decision maker. This present study, however, found that users are empowered to make a decision, particularly for decisions to acquire the systems or technology that are highly related to their routine tasks. In such cases, the users have a better grasp of the system functionalities that correspond best to the requirements for performing their tasks. As has been stated in an earlier section of this paper, SMEs are unique compared to larger organizations in terms of its operation, resource limitations and decision-making power. In most cases, only a few people are attached to functional departments such as sales and accounts. Therefore, these employees would have vast knowledge and experience about their work and related needs. As a result, the assumption is that they are the most suitable people to make decisions about what technology or application to acquire or whether to acquire a new technology or information system. More importantly, one metric for IS planning success is that a system or technology is useful and able to assist a firm in achieving its intended business objectives.

More interestingly, one of the case companies in this study was a medium-sized firm with relatively larger number of employees. As the firm is getting larger in size, the focus of its' IS planning shifts from operational-oriented (or quick-fix of the emerging problem) to a more long-term focused and a more strategic in nature [25]. The comparison across small and medium-sized firms involved in this case study clearly indicates that while small firms are primarily concern on using IT to enhance efficiency and effectiveness of the existing operation or meeting the urgent demand of the current business needs, medium-sized firm (in this case - Company B), spells out long-term benefits of IT investment as its primary objective i.e. sustaining firm's competitiveness and retaining market share. This result corresponds well with [23] on the practice of IS planning in a medium-sized manufacturing-based SME. Also, there is somewhat varying roles played by top management of those small firms in relative to the medium firm. The top management of small firms involves directly with the decision making and research activities prior to the system acquisition. Meanwhile, the top management of medium firm indirectly involved in the planning activities and seems to empower the responsibility to their subordinates or specific department. With regards to the user involvement, both small and medium firms do indicate direct user involvement in the IS planning process via discussion with the top management. Considering the fact that medium-sized firms are comparatively having greater manpower and resources than smaller firms, therefore, empowerment by the top management becomes possible. Hence, the roles of top management in the IS planning process reduced considerably while at the same time maintain its authority as a decision maker. In another respect, smaller firms hardly reported to have setup separate IS function to oversee IS-related activities [42]. Hence, as the findings further suggest, the medium-sized firm put greater reliance on the IS manager in managing the ERP project as compared to other smaller firms. To compensate the limitation of not having separate IT division, the smaller firms, therefore have demonstrated greater top management in most parts of the IS planning activities, particularly as the role as researcher. Nevertheless, the roles played by users in both small and medium-sized firms are relatively similar but is more specific in nature.

Figure 2 further highlights three common sources of information for both top management and users while carrying out research on a proposed system. In this study, the decision for acquiring a new technology or systems was made with the assistance from subordinates and other business owners or through their own research via the Internet source without the support of IS expertise or IT consultants. This is consistent with Mohammed and Nzelibe [54] who stated that one characteristic associated with SMEs firms is that the top management participates actively in the decision-making process and day-to-day operation of the firm with little or no adequate specialist support. The result could not agree further with Néal's [46] observation; in contrast to large organizations that usually subscribe to the specialized paid

research service in setting up their IS planning (which involve financial cost), SMEs tend to favor available resources (in this case through his/her own research and reading activities) or at least opted for a more affordable advice such as the accounting firms or IT consulting firm around them.

Table 6 highlights the factors affecting top management commitment in the strategic IS planning process. These include owner's knowledge of the new technology, a sense of ownership and information accuracy. Raja Mohd Ali's [30] study highlighted a consistent result about the owner's knowledge. However, the results of her study based on large organizations is not limited to knowledge about a new technology only, but also knowledge about the environment and the future of the studied organization. With regards to the sense of ownership factor, this might be because the SMEs are normally owned by families and co-operative partners who would have a high sense of belonging to the firms. Apart from that, top management has full responsibility to ensure the survival of the firm and thus need to provide its full commitment to a decision made on an IT-related investment.

Table 6: Factors affecting top management and users to participate in SISP process

Factors affecting	**Top management**	**Users**
Knowledge	X	X
Ownership	X	
Information accuracy	X	
Compulsion		X

Similarly, one factor affecting user involvement in the strategic IS planning process is employee's knowledge. This is consistent with Raja Mohd Ali's [30] study who found that the users participate in the strategic IS planning process due to, among other reasons, their knowledge about their tasks. One of her respondents highlighted that the users have knowledge about their work-related tasks, so they will provide sound information about future IS. In the same study, the element of compulsion also was found to be one of the factors explaining user participation. In a similar vein, Bruque and Moyano [55], in their qualitative study on identifying the factors behind the intensity and speed of adoption of information technology in SMEs, reported that the participation of the member–workers (employees) was seen as important in the decision-making process regarding innovation in technology. Some respondents in their study felt that the ownership, management and workers was important in the introduction of technological innovations.

The aim of the study was to investigate the practice of IS planning by Malaysian SMEs, with a particular focus on the role of top management and user involvement. The results lead to implications that can be viewed from theoretical and practical perspectives. The results of the study contribute further to the body of knowledge by demonstrating the roles of top management and users in the strategic IS-planning process in the SME environment. While previous studies have mainly highlighted the importance of top management commitment and user participation in the strategic IS-planning process in large organizations [56],[1], this current study is among the first attempts to study the commitment of the top management and the participation of users in the strategic IS-planning process of SMEs. Furthermore, this study has highlighted how top management and users participate in the strategic IS planning process. Specifically, the study examines the roles of top management and users as decision maker, researcher and decision maker. The study further reports factors contributing to varying roles of top management and users' involvement. Despite the fact that the study has ascertained applicability of IS planning phases in the SME environment, further refinement is needed as to reflect somewhat different roles played by the top management and users involvement amongst firms in this sector. Hence, the outcomes of the study could shed some insight for researchers to further refined IS-planning phases as Newkirk et al. [28] proposed earlier by incorporating the roles of top management and users that possibly better fit with the SME context. This study has then set a starting point for further investigation.

With respect to managerial implications, the study is of relevance for top management of the SMEs. The findings could facilitate the top management to plan for more efficient and effective strategic IS planning. Hence, to slowly moving

from IS planning that is informal, operationally-oriented and short-term focused, into a more strategic IS planning approach, as to reap optimum values from IT/IS. Having considered limited resources and capabilities, this study provides understanding to the top management and users of the SMEs on the roles and responsibilities that they would have to anticipate in IS planning activities. This study, therefore, could facilitate management decision making by informing about the importance of top management commitment and the roles that users may be empowered with to ensure effective strategic IS planning activities. Owing to its inherent constraint of resources and expertise to optimize strategic IT values, more extensive collaboration with their IT consultant or vendor is very much anticipated in a way to further support the top management decision. Such move would complement the limitations (lack of IT knowledge and skills) that are inherent amongst the SMEs. In addition, partnering with IT consultant or vendor ensures more synchronized IS planning to take place within a firm [42]. Consequently, by having more establish IS planning activities could potentially facilitate the SMEs in aligning their IT investment in support of their strategic needs.

6. Conclusion

Having considered its domination of the business presence and its substantial contribution to the economic development of most countries, the Small and Medium Enterprise (SME) sector has been given exceptional governmental attention while formulating various national strategic plans. Even though SMEs usually comprise a large percentage of total established business, its contribution to national GDP and employment opportunities are relatively moderate. Hence, more efforts are expected to promote greater roles played by SMEs by extending their productivity and pushing the firms to become high-value added exporters. With globalization challenges facing them, firms must be equipped with various capabilities to survive, which include continuous innovation and technology adoption. The deployment of appropriate IT/IS facilitates firms in extending information-processing capabilities that provide firms with right information at the right time. Therefore, proper IS planning is essential to ensure that the deployment of IS/IT aligns with the strategic business needs of the firms. Considering the dominant roles of top management in most SMEs decision making, and the importance of user participation in planning activities, this study initiated an investigation of the roles of top management and users in the strategic IS planning process.

Deploying a case study approach, a series of interview sessions were conducted involving three top management and four users working at three SMEs operating in different industries (manufacturing, printing service, and food and beverage). The investigation revealed that the top management plays two important roles in the strategic IS-planning process, namely, decision maker and researcher, whilst the user plays mainly the role of an input provider. The results of the study are somewhat consistent with findings related to large organizations except for the role of top management role in SMEs as a researcher. This might because the strategic IS planning process in larger organizations is typically conducted by a special steering committee or by consultants. This team develops the strategic IS planning and presents a report to the top management whereas, for smaller organizations, such a team will be too costly. In this study, finding information regarding new technology or information systems was the responsibility of the owner with the assistance of employees or business partners.

Despite meaningful insights, some precautions on interpreting the results of this study must be observed considering its limitations. First, this study was conducted on firms located in the northern region of Malaysia. The SME environment in the other parts of Malaysia might give a different view regarding the roles of top management and user participation and the strategic IS planning process itself. Second, the research quality depends heavily on the individual skills of the interviewer and could have been influenced by the interviewers' personal biases. Nevertheless, effort was made to minimize the possible bias by triangulating the data obtained with the interviewees. Lastly, the study involved three companies in three different industries, which limits an explanation on the results as each industry has unique dependence on the information systems and technology. Future research should include more companies in the same industries to increase the generalizability for specific industry.

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References

[1] V. Basu, E. Hartono, A. L. Lederer and V. Sethi, "The impact of organisational commitment, senior management involvement, and team involvement on strategic information systems planning," *Information & Management*, vol. *39*, pp. *513–524*, 2002.

[2] T. Bechor, S. Neumann, M. Zviran and C. Glezer, "A contingency model for estimating success of strategic information systems planning," *Information & Management*, vol. *47*, no. *1*, pp. *17–29*, 2010.

[3] M. J. Earl, "Experiences in strategic information systems planning," *MIS Quarterly*, pp. *1–24*, 1993.

[4] G. S. Kearns, "How the internal environment impacts information systems project success: an investigation of exploitative and explorative Firms," *Journal of Computer Information Systems*, pp. *63–75*, 2007.

[5] L. Chi, K. G. Jones, A. L. Lederer, P. Li, P., H. E. Newkirk and V. Sethi, "Environmental assessment in strategic information systems planning," *International Journal of Information Management*, vol. *25*, no. *3*, pp. 253*–269*, 2005.

[6] G. Premkumar and W. R. King, "Organisational characteristics and information systems planning: an empirical study," *Information Systems Research*, vol. *5*, no. *2*, pp. *75–109*, 1994.

[7] M. T. Smits, K. G. v. d. Poel and P. M. A. Ribbers, "Assessment of information strategies in insurance companies in the Netherlands," *Journal of Strategic Information Systems*, vol. *6*, pp. *129–148*, 1997.

[8] A. Garg and D. P. Goyal, "Striving towards strategic alignment in SMEs: an empirical analysis," *Journal of Advances in Management Research*, vol. *9*, no. *1*, pp. *77–95*, 2012.

[9] T. Fuller, "Fulfilling IT needs in small businesses: a recursive learning model," *Small Business Journal*, vol. *14*, no. *4*, pp. *25–45*, 1996.

[10] Z. T. Temtime, S. V. Chinyoka and J. P. W. Shunda, "Toward strategic use of IT in SMEs: a developing country perspective," *Information Management and Computer Security*, vol. *11*, no. *5*, pp. *230–237*, 2003.

[11] P. Schubert and U. Leimstoll, "Importance and use of information technology in small and medium-sized companies," *Electronic Markets*, vol. *17*, no. *1*, pp. *38–55*, 2007.

[12] J. Xiong and S. Qureshi, "Information technology for development in small and medium-sized enterprises," *Information Systems and Quantitative Analysis Faculty Proceedings & Presentations*, [Online] Available: http://digitalcommons.unomaha.edu/isqafacproc/20, 2015.

[13] W. H. DeLone, "Determinants of success for computer usage in small business," *MIS Quarterly*, vol. *12*, no. *1*, pp. *51–61*, 1988.

[14] M. Ghobakhloo, M. Sabouri and T. Hong, "Information technology adoption in small and medium-sized enterprises; an appraisal of two decades literature," *Interdisciplinary Journal of Research in Business*, vol. *1*, no. *7*, pp. *53–80*, 2011.

[15] N. Nduati, K. Ombui and A. Kagiri, "Factors affecting ICT adoption in small and medium enterprises in Thika Town, Kenya," *European Journal of Business Management*, vol. *2*, no. *3*, pp. *395–413*, 2015.

[16] H. Teittinen, J. Pellinen and M. Järvenpää, "ERP in action—challenges and benefits for management control in SME context," *Journal of Accounting Information System*, vol. *14*, no. *4*, pp. *278–296*, 2013.

[17] R. Ashrafi and M. Murtaza, "Usages and effects of information and communication technologies on small and medium sized enterprises in Oman," *International Conference on Information Resources Management (CONF-IRM) 2008 Proceedings*, [Online]. Available: http://aisel.aisnet.org/confirm2008/60, 2008.

[18] G. Premkumar, "A meta-analysis of research on information technology implementation in small business," *Journal of Organizational Computing and Electronic Commerce*, vol. *13*, no. *2*, pp. *91–121*, 2003.

[19] C. Ashurst, P. Cragg and P. Herring, "The role of IT competencies in gaining value from e-business: an SME case study," *International Small Business Journal*, vol. *30*, no. *6*, pp. *640–658*, 2011.

[20] H. O. Awa, S. C. Eze, J. E. Urieto and B. J. Inyang, "Upper Echelon Theory (UET): A major determinant of information technology (IT) adoption by SMEs in Nigeria," *Journal of Systems and Information Technology*, vol. *13*, no. *2*, pp. *144–162*, 2011.

[21] L. Raymond, A. M. Croteau and F. Bergeron, "The strategic role of IT: an empirical study of its impact on IT performance in manufacturing SMEs," *International Journal on Advances in Systems and Measurements*, vol. *4*, no. *3–4*, pp. *203–211*, 2011.

[22] D. A. Erlandson, E. L. Harris, B. L. Skipper and S. D. Allen, "Doing naturalistic inquiry: a guide to methods," California, Sage publications, 1993.

[23] H. Haron, Z. N. Zolkarnain and S. Md. Sabri, "A situational analysis of strategic information system planning in the context of a Malaysian SME," In *3rd International Conference on Research and Innovation in Information Systems – 2013 (ICRIIS'13*), Kajang, Selangor, Malaysia, 2013.

[24] C. Hagmann and C. McCahon, "Strategic information systems and competitiveness," *Information and Management*, vol. *25*, pp. *183–192*, 1996.

[25] M. Levy and P. Powell, "Information systems strategy for small and medium sized enterprise: an organisational perspective," *Journal of Strategic Information Systems*, vol. *6*, pp. *63–84*, 2000.

[26] P. Cragg, A. Mills and T. Suraweera, "Understanding IT management in SMEs," *The Electronic Journal Information Systems Evaluation*, vol. *13*, pp. *27–34*, 2010.

[27] S. Blili and L. Raymond, "Information technology: Threats and opportunities for small and medium-sized enterprises," *International Journal of Information Management*, vol. *13*, pp. *439–448*, 1993.

[28] H. E. Newkirk, A. L. Lederer and A. M. Johnson, "Rapid business and IT change: drivers for strategic information systems planning," *European Journal of Information Systems*, vol. *17*, pp. *198–218*, 2008.

[29] A. L. Lederer and H. Salmela, "Toward a theory of strategic information systems planning," *Journal of Strategic Information Systems*, vol. *5*, pp. *237–253*, 1996.

[30] R. H. Raja Mohd Ali, "The impact of culture on strategic information systems planning," PhD. dissertation, Department of Management, Massey University, Palmerston North, New Zealand, 2016.

[31] G. Mentzas, "Implementing an IS strategy- a team approach," *Long Range Planning*, vol. *30*, no. *1*, pp. *84–95*, 1997.

[32] A. Cassidy, "*A Practical Guide to Information Systems Strategic Planning*," Auerbach Publications. NW: Taylor & Francis Group, 2006.

[33] P. Parviainen, M. Tihinen, J. Kaariainen and S. Teppola, "Tackling the digitalization challenge: how to benefit from digitalization in practice," *International Journal of Information Systems and Project Management*, vol. *5*, no. *1*, pp. *63–77*, 2017.

[34] S. P. Williams, V. Hausmann, C. A. Hardy and P Schubert, "Managing enterprise information: meeting performance and conformance objectives in a changing information environment," *International Journal of Information Systems and Project Management*, vol. *2*, no. *4*, pp. *5–36, 2014.*

[35] World Trade Organization, "World Trade Report 2016: Levelling the trading field for SMEs," WTO Publications: Switzerland, 2016.

[36] M. Azam and M. Quaddus, "Examining the influence of national culture on adoption and use of information and communication technology: A study from Bangladesh's SME perspective," *The International Technology Management Review*, vol. *3*, no. *2*, pp. *116–126*, 2013.

[37] Asia Pacific Economic Cooperation [APEC], "Study on SMEs internationalisation best practices across selected APEC economies," Spring Singapore: Singapore. [Online]. Available: http://www.apec.org, 2011.

[38] V. Kotelnikov, "Small and medium enterprises and ICT," Bangkok, Thailand: UNDP Asia-Pacific Development Information Programme. [Online] Available: http://www.apdip.net/news/sme, 2007.

[39] World Association for SMEs [WASME], "Annual report for 2004 – 2006," WASME: Uttar Pradesh, India. [Online]. Available: http://www.wasmeinfo.org**,** 2006.

[40] I. Irefin and I. Abdul-Azeez, "An investigative study of the factors affecting the adoption of information and communication technology in small and medium scale enterprises in Nigeria," *Australian Journal of Business and Management Research*, vol. *2*, no. *2*, pp. *1–9***,** 2012.

[41] J. Hashim, "Information communication technology (ICT) adoption among SME owners in Malaysia," *International Journal of Business and Information*, vol. *2*, no. *2*, pp. *221–240*, 2015.

[42] A. Gutierrez, J. Orozco and A. Serrano, "Factors affecting IT and business alignment: A comparative study in SMEs and large organisations," *Journal of Enterprise Information Management*, vol. *22*, pp. *197–211*, 2009.

[43] P. B. Cragg, M. King and H. Hussin, "IT alignment and firm performance in small manufacturing firms," *Journal of Strategic Information Systems*, vol. *11*, pp. *109–132*, 2002.

[44] N. A. Ismail and M. King, M., "Factors influencing the alignment of accounting information systems in small and medium sized Malaysian manufacturing firms," *Journal of Information Systems and Small Business*, vol. *1*, no. *1–2*, pp. *1–20*, 2007.

[45] C. A. Chao and A. Chandra, "Impact of owner's knowledge of information technology (IT) on strategic alignment and IT adoption in US small firms," *Journal of Small Business and Enterprise Development*, vol. *19*, no. *1*, pp. *114–131*, 2012.

[46] C. L. Néal, "IT strategic planning for SMEs – white paper," Chartered Professional Accountants Canada, 2010.

[47] M. Levy and P. Powell, "SME flexibility and the role of information systems," *Small Business Economics*, vol. *11*, no. *2*, pp. *183–196*, 1998.

[48] B. J. Hicks, S. J. Culley and C. A. McMahon, "A study of issues relating to information management across engineering SMEs," *International Journal of Information Management*, vol. *26*, pp. *267–289*, 2006.

[49] D. A. Mirchandani and A. L. Lederer, "Less in More: Information systems planning in an uncertain environment," *Journal of Information Systems Management*, vol. *29*, no. *1*, pp. *13–25*, 2012.

[50] M. Kamariotou and F. Kitsios, "An empirical evaluation of strategic information systems planning phases in SMEs: determinants of effectiveness," Paper presented at 6th International Symposium and 28th National Conference on Operation Research, pp. *67–72*, 2017.

[51] K. Siakas, M. Naaranoja. S. Vlachakis and E. Siakas, "Family businesses in the new economy: how to survive and develop in times of financial crisis," *Procedia Economics and Finance*, vol. *9*, pp. *331–341*, 2014.

[52] A. Garg, D. P. Goyal and A. S. Lather, "Information systems success factors in software SMEs: a research agenda," *International Journal of Business Information Systems*, vol. *3*, no. *4*, pp. *410–430*, 2008.

[53] R. H. Raja Mohd Ali, R. Mohamad, Y. Y. Abdul Talib, and A. Abdullah, "Strategic IS planning practices: a case of medium manufacturing company in Malaysia," in *The 17th Annual Conference of the Asian Academic Accounting Association*, Kuching, Sarawak, Malaysia, 2016.

[54] U. D. Mohammed and C. G. Obeleagu-Nzelibe, "Entrepreneurial skills and profitability of small and medium enterprises (SMEs): resource acquisition strategies for new ventures in Nigeria," *Proceedings of 25th International Business Research Conference, South Africa*, [Online]. Available: https://wbiworldconpro.com/uploads/south-africa-2014/management/1389072800_417-Mohammed.pdf, 2014.

[55] S. Bruque and J. Moyano, "Organisational determinants of information technology adoption and implementation in SMEs: the case of family and cooperative firms," *Technovation*, vol. *2*, no. *5*, pp. *241–253*, 2007.

[56] R. H. Raja Mohd Ali and R. Mohamad, "Strategic information system (IS) planning practices among small and medium enterprises in Malaysia," Research Report submitted to Research Innovation and Management Centre, Universiti Utara Malaysia, Malaysia, 2014.

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What causes positive customer satisfaction in an ineffectual software development project? A mechanism from a process tracing case study

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Abstract:
The customer role is crucial in agile information systems development (ISD). There is, however, a scarceness in research on how this role is enacted, and how its practice influences project outcome. In this longitudinal case study, an agile ISD project is followed with a particular focus on the customer organization's participation, aiming to contribute to the understanding of how customers influence agile ISD projects. The data analysis follows a process tracing approach, a case study method where one aims to identify the causes and outcomes of any kind of process through the rigorous analysis of qualitative data. The analysis of the case shows that the low completion of the initial project requirements was caused by over-scoping and by an immature customer. Further, the customer's acceptance of the outcome was caused by the agile practices introduced in the project. These helped to create a high customer's sense of responsibility for the outcome, which worked as a mediator towards a positive acceptance of the delivery. The study contributes a mechanism for why agile projects may still be successful in light of low delivery. It is also a first case study in the information systems field explicitly using a process tracing approach.

Keywords:
information systems development; agile methods; customer role; process tracing; causal model.

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1. Introduction

Agile software development approaches are common, if not dominating, in information systems project management practice these days. Among the stakeholders in agile projects, the customer has a prominent role as the provider of requirements and domain knowledge to the development team. In the original agile approaches, for instance Extreme Programming [1] or Scrum [2]. The customer is often envisioned as a single person representing the client's interests, being available for the developers to specify and prioritize requirements as well as being an on-site domain expert. In recent practice, particularly as we aim to scale agile methods to many geographically distributed and specialized teams within one project, the customer is often not a single person, but a team or organization of people with the responsibility of providing requirements and quality control [3][4].

The formulation of the Agile Manifesto [5] is mostly a developer-oriented perspective on how to do software development projects, so the developers' practices are in focus, and the customer role is under-specified in the concrete methods. Also in research, the role has not been focused much, but we do know that it is a difficult role to fill, with practitioners enjoying it and exploring a variety of approaches [3]. At the same time it has been observed that customers struggle with the role, leading to project risks [6][7].

Agile software development has become mainstream, and given that customer collaboration is crucial and understudied, it is necessary to establish more knowledge about what effects customer collaboration performance have on the outcome. What are the mechanisms involving customers that enable or inhibit progress and success in agile software development projects? It is the purpose of this article to search for some answers to this question, and to study this, we have analysed qualitative data from a two-year development project, where the customer's performance has had significant effect on the outcome. To get valid conclusions about causes and effects, we have chosen to follow a process tracing case study methodology [8], i.e., a research method where one in a rigorous manner analyses qualitative data to identify mechanisms at work, observed through chains of events, and through this explain the outcome of a case from its particular contingencies.

The outcome of the analysis shows why the outcome of the software development project, in the context of over-scoping and immature customer, still has acceptance from the customer. The answer is that the agile software development methodology, with its communication practices, gradual requirements specification, and continuous delivery, combined with important events in the project increases the customer's sense of responsibility for the outcome, and further causes an acceptance of a low completion of initial requirements. An additional main contribution of the article is that it constitute a first example of how to use process tracing as a research method in information systems and project management research.

The paper is organized as follows: We start with a section on the customer role in agile methods (section 2), motivating the research question, and then continue with a presentation of the particular case study method called process tracing (section 3). After a short presentation of the data collected in this longitudinal study (section 4), we go on with the analysis (section 5), providing examples of how we have used process tracing to explain the mechanisms at work. In a discussion (section 6), we summarize the findings and implications for theory on customer collaboration before we conclude (section 7).

2. The customer role in agile software development projects

An early summary of customer collaboration practice in general is found in a grounded theory study by Martin et al. [3]. They present a number of de-facto roles occurring in customer teams, and in addition, a collection of established customer practices providing value to the development project. In another grounded theory study, Hoda et al. [6] document how projects struggle with lack of customer involvement, identifying causes for this as well as consequences. They also identify a number of "undercover strategies" practiced for increasing customers' involvement, contingent on the project factors.

Some authors have a focus on other aspects of agile methods than the customer role per se, but has findings related to the customer, for instance Ramesh et al. [7] who show that lack of customer competence and lack of customer concurrence imply risks in agile requirements engineering. This is an observation also made in a study by Conboy et al. [9]. A couple of studies emphasize how missing domain knowledge on the developer side causes misunderstanding of requirements provided by the customer [10][11]. Lately there has been attempts to facilitate customer participation in requirements work and decision making suggesting new approaches, techniques, and tools [12]-[15].

There is, so far, not any conclusive studies that the resource demanding customer practices suggested in the Agile Manifesto actually deserve the merit they are given. However, one source of evidence for the necessity of well-functioning customer collaboration is all the research conducted on user participation in software engineering. The user role is not the same as the customer role, but users have the domain understanding and can also assess usability and quality of the resulting products of a development project. Two meta-studies conclude on solid grounds that user/customer participation and/or involvement have positive impact on system success [16][17]. Notice that both these studies include work on customer collaboration in software engineering in their collection of studies. One of the studies includes a collection of user or customer participation practices found in software engineering projects, documenting a large variation on how user participation is managed [16]. Abelein and Paech's [16] meta-study identifies main factors that influence the value of user participation, and human aspects related to user involvement (psychological ownership) and trust are considered important. Siddique and Hussein [18] looks at success criteria for agile projects as seen from the supplier' side, and brings forth the continuous and collaborative supplier-customer assessment of project status as instrumental to success. Worthwhile mentioning is also Nuotilla et al. identification of stakeholder participation and involvement as a main challenge in public domain projects [19]. Another trend supporting the importance of customer collaboration in software development, is in the general project management literature where we now find research that identifies relational contracts combined with good owner-contractor collaboration as factors that contribute to project success [20]-[22].

In a longitudinal case study Bano et al. [23], continuing the previously mentioned meta-study [17], they aim to understand more deeply how user satisfaction, indicating system success, evolves as the contingencies of the project are changing [23]. This kind of deeper analysis of how the theoretical mechanisms contributing to project outcome play out in a particular project, and further how the mechanisms interact, is not found in the research on customer collaboration. Such studies will potentially help to strengthen and adjust existing theories as well as bringing in new perspectives on what makes customer collaboration successful. In the case study presented here, these mechanisms are the main study object, as we identify mechanisms in place in a particular project organization, and analyse how these actually contribute to the outcome of the project.

3. Process tracing case studies

The use of case study research is well accepted in both information systems and software engineering research [24]-[26]. It is a research approach that allows us to get a deeper understanding of theoretical concepts, and in a domain where it is difficult to do valid quantitative studies, the case study is helpful also for theory development. In the domain of customer collaboration in agile software development several of the mentioned studies in the previous section are case studies ([3][6][10][11]).

McLeod et al. [27] focus on longitudinal case studies in software development. They discuss relevant issues for longitudinal research in the domain, for example, access to the case organization during the whole data collection period and collection of data from many sources, representing multiple perspectives. Dubé and Paré [28] have assessed the level of rigor in a large collection of information systems case studies, and found varying rigorous strength. As a consequence, they give recommendations as to how higher rigor could be ensured. In particular, they mention better documentation of data collection and analysis processes.

In political science, there has lately been attempts to formalize case study approaches that aim to understand causes of events and processes. Beach and Pedersen [29] provide an overview of such methods dividing them into three categories, comparative methods, congruence methods, and *process tracing*. The last one, process tracing, is

particularly relevant in cases where you have longitudinal data, and aim to understand what mechanisms work throughout the lifespan of the case, and how they influence the outcome of the process going on inside the case. As such, it matches well with longitudinal studies of software development projects, where one aims to find out what happened, why it happened, and what the consequences were.

Beach and Pedersen [8] describe in detail their perspective on process tracing, and their approach has also been followed in this case study. They see process tracing as a method where a researcher can make strong within-case inferences about why an outcome came about. What were the initial states of a process, what were the events during a process, and how did causal mechanisms at work in the particular domain, contribute to create the outcome? As every case will have its own features and mechanisms in place, the method is a single-case study method. It is essential to note that we are talking about causality in the form on "X caused Y"-propositions, not correlations between variables as often seen in quantitative studies.

Process tracing opens for both deductive and inductive studies. The case may contribute to science by using existing theoretically knowledge, and try to give deeper explanations on how this theory works. But there is also an option to establish new theoretical concepts and statements, verified by good data and analysis, presenting novel causal mechanisms. Often, a process tracing study will have elements of both [30].

Central in process tracing is the concept of a mechanism, which is understood as "an agent or entity that has the capacity to alter its environment because it possesses an invariant property that, in specific contexts, transmits either a physical force or information that influences the behaviour of other agents or entities" ([31]; in [8]). Beach and Pedersen [8] maintain that in the single-case context a mechanism is deterministic, i.e., the effects it produces occur out of necessity in the specific context of the case. Finally, it must be noted that a mechanism is to be seen as something that works on the whole case, and may have some non-trivial complexity relating to variables and causes. It may, however, consist of parts or sub-mechanisms that by metaphor can be seen as "toothed wheels" and "bolts" help to bring about the total effect of the overall "machine" or mechanism.

The analysis in process tracing is based on qualitative data. This can be whole documents, interviews, or even only single statements in an interview or from a meeting's minutes. These chunks of data will through the analysis gain status as evidence. For this to happen, the data must be related to the context and the hypothesized mechanisms, and seen to be relevant for the argumentation. Collier et al. [32] have named evidence in this understanding by the term causal process observations (CPOs).

Identifying the right hypotheses about mechanisms is a challenge, and is depending on theoretical and practical knowledge of the domain under investigation. For example, there could be traces of evidence that relate to a particular explanation from theory, and this would be a starting point for making hypotheses or identify parts that may be included in a hypothesized mechanism. (Sub-)mechanisms explicitly stated or strongly suggested in the data are also candidates.

Arguments in process tracing is rooted in Bayesian logic, where one assign a priori probabilities to statements given no evidence, and then estimate posteriori probabilities based on updating from the use of conditional probabilities relating hypothesis and evidence [8]. This is done in a qualitative manner in process tracing, where conclusions are based on qualitative assessments of the strength of evidence and its power to confirm or disconfirm hypotheses. Van Evera [33] suggests that one categorizes the Bayesian arguments for or against a particular hypothesis into four types, straw-of-the-wind test, smoking-gun test, hoop tests, and double-decisive tests. A straw-of-the-wind test is an application of evidence to strengthen or weaken a hypothesis, but neither at the level of confirmation nor disconfirmation. Smoking-gun tests allow us to strongly confirm a hypothesis, whereas the opposite evidence would not disconfirm the hypothesis. Hoop tests allow us to disconfirm a hypothesis if needed evidence is missing, but not strongly confirm it if the evidence is there. Finally, double-decisive tests are when evidence allows us to confirm one particular hypothesis and disconfirm the rest. Although these categories can be helpful one should be aware that they really can be seen as a division of a continuum with two dimensions, one dimension being the confirmatory power of evidence (because evidence is unique to a hypothesis), and the other dimension being the disconfirmatory power of evidence (because certain evidence is needed to confirm a hypothesis).

Beach et al. [8] emphasize rigor in process tracing, and by that meaning, among others, sources of hypotheses, documentation of evidence sources, prior assessments hypothesis strength, specifications of what kind of evidence one needs for a test to be passed, and documentation and argumentation for the strength of applied evidence. It is challenging to describe all of this at a sufficient level within the space limits of a journal article. Qualitative case studies are by nature demanding to present. However, we will here try to give a convincing exposition of the studied case and the conclusions drawn.

4. The case story and the data

The customer organization of this study has existed for more than 100 years. The last 20 years the company has changed from being mainly involved with services within one particular business domain to be engaged in two related business domains. The old domain (domain O) is rather static, and there are few changes in the domain, whereas the new domain (domain N) is still growing and new approaches and solutions to the business are still developing. The company has a central office in a main, Norwegian city C1, as well as regional offices all around the country. To avoid identification of the organization, respondents and other stakeholders, the description is here kept at an abstract level, but maintaining essential features of the project itself.

The service provided is complex and needs planning before delivery. The company some years ago identified a need for better computer support for their field personnel. The field workers wanted faster access to information, a standardized way of behaving towards customers, and automated documentation of the services provided. Other aims were to present themselves to their clients with a uniform behaviour and being able to collect better statistics about the clients and the market. They conducted an internal process for specifying needs, and an external consultant (A1) was engaged in process modelling for activities to be supported by the final tool. The resulting document was an informal requirements analysis.

During spring 2015, tenders were invited for a 20 months long, 3.0 million Euro software development project. The company has a significant, internal Information and Communication Technology (ICT) department, but they do not have the capacity to run such ISD projects. A small/medium-sized software development company won the bidding process. The contract was formulated as a hybrid contract with three production deliveries, but applying a Scrum process with monthly, intermediate test releases throughout the project. The contractor has its main site in another Norwegian city C2, and a second site in a third city (C3). Both sites were involved in the project. Consequently, we got a distributed project with development teams at two sites, and the company at a third geographical site.

The project started in September 2015, focusing on functionality for domain N. In the first sprints, focus was on going from the specified needs in the informal requirements document with its process models to describe epics and user stories for the domain N in parallel with initial software development. A1 had a significant role in this work together with functional designers at site C3. The customer role was realised by a product owner group that consisted of representatives for both domains, as well as a constituted product owner who lead the group.

During the first six months it became clear that the management for domain N was not satisfied with the solutions for service delivery planning, and the manager took over for the deputy that had participated in the product owner group. The project's contract, due to lacking progress and continuous discussion about changed requirements, was changed into an agile contract in the start of 2016. Simultaneously, A1 was released from the project, and consultant A2 was hired by the company. A2 had experience with agile project practices, and took an internal project manager role. The project also started the development of epics and user stories for domain O during spring 2016. A2 initiated changes to the delivery practice into a continuous, Kanban-like delivery process. Production releases should be delivered every month, as well as bi-weekly releases for testing.

Ten months into the project, they had spent most of the funding for the domain N, but solutions for service delivery planning (main functionality of the system) were not accepted. The intention was now to focus on domain O, but resources were also in the continuation spent on completing domain N. The project was extended with a few months.

During fall 2016, a client for the field workers in domain N was tested in production with positive responses on the users' behalf, even though domain N's main office was dissatisfied because it did not match their ideas of how the business processes should be. Initial functionality was delivered for domain O, as well as documentation of epics and user stories for prioritized functions in that domain. Expectations on the company's side were reduced, but they still trusted that there would be a significant amount of useful functionality at the project's end date. In November 2016, a report stating that with current development speed less than half of the first priority features of the system could be delivered within the project time. The company representatives in general did not seem to a serious extent to be critical to the project process and the contractor, and still had fairly high expectations.

The project was prolong until the end of 2017, when the project went into maintenance status. During that period, not many significant changes happened to the organization of the project. One person in domain N was from late 2016 partially assigned responsibilities to participate in developing services related to the customer's own clients' planning and accounting of production. Functionality for this was delivered in 2017. Functionality regarding plans for customer interaction in domain O was also delivered during 2017. The customer's way of relating to the contractor did not change much, even though variants of how to handle requirements were tried and shifted out. They maintained a good cooperation towards the end of the project.

The data from this project are from the whole project period, and are mainly of four types, interviews, meeting minutes, status reports, and meeting observations. The bulk of the data are from the two first categories, and in particular the interviews have more explanatory power.

The 27 semi-structured interviews were done starting in March 2016 and continuing with some longer breaks up until October 2017. The interviews lasted from 40 minutes up to an hour. Ten of the interviews were done with three members of the developer teams, two of them in city C2, a software architect and a test manager, and one in city C3, a functional architect (designer). The rest of the interviews (17) were with the company's project representatives, located in city C1. The roles of the these interviewees were a product owner, the internal project manager, two business domain middle managers, the project owner (the Chief Information Officer (CIO), the leader of the local ICT department), two ICT department developers, and two domain specialists. The topic of the interviews was all the time on project progress and the reasons for events and outcomes of the project. In the last eight interviews we also talked about the effect of agile methods and customer-contractor communication in the project. All the interviews were conducted by this article's author. We also have data in the form of documents with minutes from project manager meetings (a total of 80 meeting minutes), steering groups (22), work group meetings (15), and retrospectives (25). In addition we have had access to project status reports produced from June 2015 up to and including September 2017 (21 reports). Finally, we have six observation protocols from a graduate student, who was taking notes at retrospective meetings in the start of the project up until March 2016. The student then moved on to collect data from a different case, irrelevant for this study.

5. Analysis

What makes this project particularly interesting was the fact that the customer more than a year into the project was informed that they would get less than 50% of their initial first priority features, and at the same time was not very critical to the contractor's work. Instead of a situation where the parties would play a blame game, the customer and the contractor seem to have been in agreement to make the best out of the situation. So we have a conjunctive outcome o that we want to explain here, formulated as $o = o_1 \wedge o_2$ where o_1 = "< 50% delivery" and o_2 = "accepting customer". What is it with this particular project that has caused this seemingly contradictory situation? Can we find the mechanism behind o by identifying events and their consequences related to the customer's participation in the project?

5.1 Generating mechanism hypotheses

Establishing which hypotheses one wants to test in process tracing is one of the challenges of the method. Guidelines say that we could look for potential hypotheses in theory, and try to match these with observations found in the data. For example, there may be statements in interviews that actually try to explain causalities. Other empirical reports on

similar topics, and the researcher's own experience and knowledge of the domain may also provide starting points for hypothesis generation. Thus, we can identify potential candidates for mechanism parts, which may in the end be combined to provide a complete explanation. In this work, candidate hypotheses originate from statements in the interviews as well as other empirical studies and theoretical knowledge about relations between variables and system success.

A rigorous start would be to first use data to verify the outcomes o_1 and o_2. There is a strong smoking-gun evidence that o_1 is true based on the report that actually states this. Later support of this is that at towards the project's end we find that only requirements regarding information presentation and data consistency control has been delivered to domain N, missing support for field work. In domain O information presentation and only parts of the complex field work support are delivered. This is far below the initial specification. As for o_2 = "accepting customer", this would have a comparably small prior probability ($P(o_2|o_1)$) in this case. But there is smoking-gun evidence found as the customer in the contractual change actually took most of economic responsibility for the slow project progress. Other supporting evidence is this sentence about the CIO found in a project status report about midways in the project: *"It was especially nice that the CIO [the customer's CIO] dropped in to say hello to the [the contractor's] team, and said that they [the customer] were satisfied with the work done."* A successful hoop test to support an alternative to o_2 would need evidence that showed that the customer at some time has tried to place economic and legal responsibility on the contractor. This is not found, so o_2 is considered to be verified. After this verification of the main outcomes, it would be interesting to establish the mechanism that results in $o = o_1 \wedge o_2$ even in a situation where the probability of o_2 given o_1 ($P(o_2|o_1)$) is small.

An standard process tracing approach for developing the mechanism that explains the case is to try to verify parts that would have to go into that mechanism, and then try to construct a complex mechanism where these parts work together. The parts we can hypothesize being at work in this case are related to those variables shown to contribute to success in systems development projects [34]. A requirement is also that we in fact have qualitative data enabling us to analyse these variables. The focus of this research was on the customer role, so we have chosen the customer's capabilities and behaviour, the contractor's capabilities and behaviour, the technological complexity of the system, the project management practices including user participation and communication practices, and finally project scoping as important variables to study. We will in the analysis describe the sub-mechanisms that has been in play in this case, and finally construct a complete mechanism from those partial mechanisms.

5.2 Sub-mechanism 1: Over-scoping and customer capabilities cause low delivery

In this section, there is an analysis of what actually lead to low delivery, i.e., o_1. First, there is an analysis of possible causes, and then an analysis on how they interact to create a low degree of project completion.

The most visible evidence that scope size has had an impact on outcome comes from the re-estimation report produced towards the end of 2016. This report itself is a CPO on outcome o_1, indicating that the hypothesis h_1="Initial project over-scoping caused o_1" needs to be tested. An argument for over-scoping is that the project consisted of two equally sized parts. At the time of the re-estimation report there had been progress for domain O, and almost half of the project period still was left. Then, if adequately scoped initially, at least 50% of the total scope, i.e., all of domain O, and in addition the accepted functionality for domain N, would be expected to be delivered. This is considered a double decisive evidence that supports h_1 as part of the explanation for over-scoping. We have no clear cut explanations as to why the project was initially over-scoped, but lack of understanding of technological and organizational complexity could be one, in combination with inadequate funding to the project. In an interview, a respondent mentioned high expectations on the possibility to integrate off-the-shelf software in the solution as a possible cause.

The customer or user's ability to provide sufficient support to the development team in a system development project has been critical in many instances, and lack of participation and engagement in the project reduces system success [35]. In this case, there is lots of evidence pointing towards insufficient customer participation. There are two main reasons for this: immaturity or lack of experience in the organization when relating to system development projects, but also low capacity for contributing to the project. This leads to the proposal of hypothesis h_2 = "Low customer capability

caused o_1". A statement from a contractor interviewee early in the project is clearly indicating this: "*…one thing to talk about is process competence - process and maturity with regard to develop IT systems. I would say that they are rather immature with regard to developing IT systems. They don't seem to have good heuristics about how behave as customer in relation to a contractor, for instance on being able to deliver the domain knowledge, to ensure that one has resources available for long enough time, and that your willing to organize a set up for participation that facilitates the process to run together with us."*

To prove this relation it is important to search in data for CPOs and events that gives a causal chain from low customer maturity to o_1. CPO-s that could support this chain, would report on low management support, conflicting priorities, unengaged users, missing understanding of the project goals, etc.

There is additional evidence, besides the statement above, which strongly supports the fact that the customer had low capability to handle this kind of projects, but only for domain N and the customer's ICT department. Domain O defined their goals clearly, for instance, by having described established business processes that they will support. They also have given very high priority to the project, by assigning qualified personnel to work 100% as customer representatives.

When it comes to evidence regarding domain N, they have since the start of the project to the last few months got clear messages about their participation. This is visible in the project management meeting minutes from the beginning of the project and even 5 months before the end we find in a document: *"The project is still not sufficiently prioritised in the domain N department"*. The middle manager of domain N who was responsible for the domain's participation was more critical to the way the project was run overall, but also he admitted that resources was not sufficient: *"So we may also be criticized for not having invested enough in the project, that we did not have enough personnel to ensure quality."* Priorities were not the only problem for domain N, as unsettled business processes lead to a situation where consultant A1 and the contractor's requirements team focused on the field workers' current practices. The initial focus on user needs obviously have support in the literature on information systems development. However, the users' immediate need was obviously in conflict with the intention of the main office's wish to establish new business processes and to support those instead. This lead to continuous disagreements about requirements, and finally domain N did not accept the solution for field support.

The customer's ICT department also had a significance role in this project, as they were responsible for the databases and API-s for accessing the data. They seem to have delivered the needed solutions only partially or after repeatedly being pushed for response. There is a constant focus in meeting minutes on the need for the ICT department to prioritize the provision of APIs to the project. Particularly towards the end of the project, this becomes visible in the data, both in interviews and minutes. This is mainly a priority issue, as the consultant A2 expressed: *"Even though they do understand agile, it has not really been understood that they actually must assign resources to this. They blame it on priorities; that business management requires things that they have to give priority."*

The contrast to department O is pronounced. In interviews, their participation is praised both in terms of resources assigned and their ability to respond constructively. One interviewee said, *"The work that has been done by domain O and those who have participated there has been fantastic, and there we have indeed come a long way".*

The maturity of the contractor is known to be a main factor in system success. This is for instance the perspective taken in the Capability Maturity Model (CMM) [36], and in models that suggest approaches to leverage an agile team's maturity [37]. There were some traces of dissatisfaction with the contractor in the later interviews. For example, the consultant A2 expressed that they are not working in an agile manner. They also continued work with user stories and epics of parts of the system that were supposed to be postponed. The contractor did probably not have the most mature agile team, but there no evidence that lack of contractor maturity caused o_1. On the other hand, the contractor seemed to have processes that to some extent match recommended processes for developing own maturity [37], suggesting awareness of the organization's need to improve.

The last factor looked at is technological complexity. There is not much evidence in the data that the technology was too difficult to handle for the contractor or the ICT department. There was some discussions regarding the data

organization that were solved after some negotiations. In addition a third party service provider was slow at responding to requests for APIs to their services, but these issues also seem to have been solved.

When it comes to the causality, of course over-scoping in itself is an important cause for low delivery. In addition, there are three main observations regarding domain N and the ICT department. First, they have had a lack of resources to participate well in the process. Second, there has been conflicting priorities, and finally, the business processes were not settled for domain N.

Thus, the customer's immaturity contributed to reducing the amount of finished functionality in addition to the effect of over-scoping. Large parts of the solutions that was made in the start of the project was in the end not accepted by domain N due to disagreement on requirements within domain N. This obviously contributed to low delivery. Lack of internal resources in the domain lead to inability to define new business processes in time, and because of conflicting priorities, representatives for domain N did not participate in or was not prepared in planning meetings. Dissatisfaction with lacking prioritisation was repeatedly expressed in minutes from retrospective meetings. As the main office did not contribute enough, the contractor relied on information from domain N's field workers. Requirements thus were often in conflict with the main office's wishes, and postponement of prioritization lead to little work to do for the system developers, making them unproductive in addition to having made the wrong solution. A quote showing the project's lack of agreements and communication within domain N, was when one representative from the contractor said about a manager in domain N: *"He was included because he had strong opinions about things, in requirements work or in development, and then he suddenly said «This is not how it should be». And this happened after some of his subordinates in fact had given their support for this solution."* Another event that shows lacking priorities in action was a superior manager's prioritization of a business report, causing the domain N representative to be unprepared for planning meetings (if at all participating).

The data also verifies that the ICT department's ability to provide the APIs to the databases in time has caused delays in the project. An issue that also was mentioned frequently, was delays in deployment of tested solutions into production. This was evidently caused by low capacity in the ICT department. A quote from several meeting minutes summarize the ICT department's lack of capacity: *«Lacking capacity to handle changes and new challenges in the ICT department is a high risk».*

5.3 Sub-mechanism 2: over-scoping and a customer with lacking capabilities, combined with agile project management practice causes customer sense of responsibility

In a case study focusing on reasons for too large scope, Bjarnason et al. [38] identify several sources of over-scoping in the project, the most prominent cause being the continuously changing requirements. In their case, approaches like agile cross-functional teams, continuous prioritization, and gradual detailing of requirements were applied, and were shown to be helpful strategies for managing over-scoping in the project. The case in this article also has an agile approach to project management, and also what may seem like a positive outcome of the project, making it similar to Bjarnason et al.'s case. Bjarnason et al. refers to the concept of "communication gap" between developers, requirements workers, and the customer, and suggest that the agile practices reduce the communication gap and thus creates acceptance for less than expected delivery.

This may suggest the sub-hypothesis "The agile project management approach facilitates outcome o_2 in the context of over-scoping and customer with lacking capabilities" for further analysis. Still, even though acceptance may be an outcome, there is a lack of understanding of how agile project management may contribute to acceptance. What are the mediating mechanisms? Closing of communication gaps is one of the goals and effects of agile methods, and it was obtained in the case in this article as well. However, it is not sufficient as mediating variable to explain acceptance. Why do closed communication gaps cause satisfied customers? As a sparking clue to how this analysis should proceed one of the interviews said *"if you have a* ***common responsibility*** *to deliver as much as possible, then you will become more interested in the process, and you see what is the best way to go"*. This suggests that the agile practices in our case in fact may have caused higher trust between customer and contractor, leading to a higher acceptance of own responsibility for the outcome of the development process. In light of this, it is suggested that o_3 = "customer sense of

responsibility" could be a mediating variable towards acceptance of the outcome. In the remaining of this subsection, we will try to verify the sub-hypothesis h_3 = "The agile project management approach facilitates outcome o_3 in the context of over-scoping and customer with lacking capabilities".

There are several clues showing that the customer has had a large sense of responsibility. For instance, after domain N's insufficient participation in the initial stages of the project, combined with a growing understanding of the complexities of their original requirements, a change of contract was initiated by the CIO of the customer. This changed the project from a fixed price hybrid project to an agile project with continuous delivery and with less focus on initial requirements. The customer in this manner took most of the cost relating to unsuccessful progress. At the same time, an internal project manager (A2) with long-time agile experience was hired to support the initial product owner who had little experience with IT projects. The agile project manager championed continuous delivery even more, and iterations were cut down to two weeks. In addition, requests for dedicated support in the project owner group were sent both to domain O and domain N. Domain O delivered one person 100%, which was a success. Domain N dedicated less in terms of work hours, but appointed a person who supported with domain knowledge related to a specific functionality (control of complex production data). This data control functionality was delivered to domain N towards the project termination, and this was considered a minor success in the project. The customer gradually assigned more and more resources to the project, responding to the contractor's requests for domain knowledge and consistent requirements prioritization.

The causes for the sense of responsibility we have observed in this project could be other than the agile project management practice. For example, it could be that the customer organisation could have a high sense of responsibility for the outcome from the start, causing them to invest more in the project than initially planned when problems occurred. To validate the hypothesis here, that the project management practice actually was causal here, we need data that shows how agile practices have changed the overall sense of responsibility of the customer organisation.

A first observation is that the communication practices of agile methods have been instrumental in this, even though a fixed price contract was initially in the foundation of the project management practice. From the start, frequent meetings were held, always in a cordial atmosphere; most meeting minutes throughout the project report that project communication is good. In the minutes it is also evident that the contractor from very early pointed at the insufficient and inconsistent participation of domain N. Internal representatives in the project confirms this in the early interviews.

As normal in agile development projects, domain knowledge and precise specifications of the requirements were also issues in communication. Early on it became clear that the requirements were not well specified, which again lead to many change requests in the project. Negotiations on change took much time, which had consequences for progress: *"Last year there was a lot of standoffs about change. We had to decide how to handle the changes, which not necessarily need to be handled in an agile manner. But then you must negotiate on each change, so I suggested we left the perspective that change was unwanted, and instead consider it wanted. How can we make this, and not spend a lot of time on deciding if this is a change."*

One communication practice that build trust in the contractor was the monthly demo meetings that showed the progress of the project, allowing the whole organisation to reflect and propose improvements. Many showed up at these meetings, contributing to a well-rooted project in the customer organization. Other straw-in-the-wind evidence suggest that the contractor got a high trust with the customer, leading to respect for their opinions, and further to an understanding of own responsibilities in the project. Communication in the O domain seemed to have been particularly successful. The domain O single contact point said: *"I have very good collaboration with them, and I must say I'm surprised about how fast they grasp my domain and understand how it works, so I'm very impressed. So I think this collaboration works fantastic."* A representative from the contractor in C3 expressed: *"The other thing we did to make things work, is that he [the domain O expert] has been here weekly on fixed days, and we have been in C1 and worked together. We have a very close collaboration, because we have been a lot together. We have done social things together, so it has been very good."*

Agile communication practices did cause the change to an agile contract, and with that, also established more focus on continuous work with requirements and delivery. The agile practice of gradual requirements work seem to have contributed to a better understanding of the customer's own role. One domain O specialist said: *"They continuously*

force us to be precise in our requirements. And we were not really aware of our needs beforehand, so that is positive." Finally, the practice of continuous delivery has helped the customer representatives to understand the value of own participation. In domain N, the successful delivery of production data control was a result of continuous improvements based on user experiences: *"We have adjusted that model quite a lot, because one has got a lot of feedback from those who have tested it."* The gradual inclusion of new functionality, also lead to an understanding of poor data quality in the customer's own databases, initiating processes to improve their data as a means to better the value of the delivered software.

5.4 Sub-mechanism 3: low delivery and customer sense of responsibility causes customer acceptance

To finalize our analysis we need to continue the development of the sense of responsibility variable and see how it causes the customer's acceptance of the outcome, and verify the sub-hypothesis h_4 = "low delivery and customer sense of responsibility causes customer acceptance" or shortly stated "$o_1 \wedge o_3$ causes o_2". Several statements from interviews contribute to the verification of the sub-hypothesis: For example,e project manager/product owner A2 said *"I believe that without the dedicated specialists in domain O, then they would not have been close to the solution they now have on the field client. It is absolutely necessary. I think that has more of an influence than the contract."* A developer said: *"We have instead worked with real priorities and what is important. The trust has been deciding for the outcome."* The middle manager of domain N said: *"We have been realistic, so to the extent that they do this to ensure quality in what we get, then that is the most important thing."* The statements are isolated, perhaps by themselves not enough to prove that the customer's sense of responsibility that mainly creates the acceptance of the outcome. But then again, following a Bayesian logic, would it be probable that other hypotheses could lead to the statements above and many other similar statements? For example, would we have observed these statements regardless of the project management approach and/or with a sense of responsibility not influenced by agile practices? A yes to that question is hardly defendable. The conclusion is that the sub-hypothesis is verified.

The complete mechanism showing the causal links between variables is given in Figure 1. The arcs connecting the causal links represent Boolean and-operators, also indicating how the three sub-mechanisms verified in the analysis work.

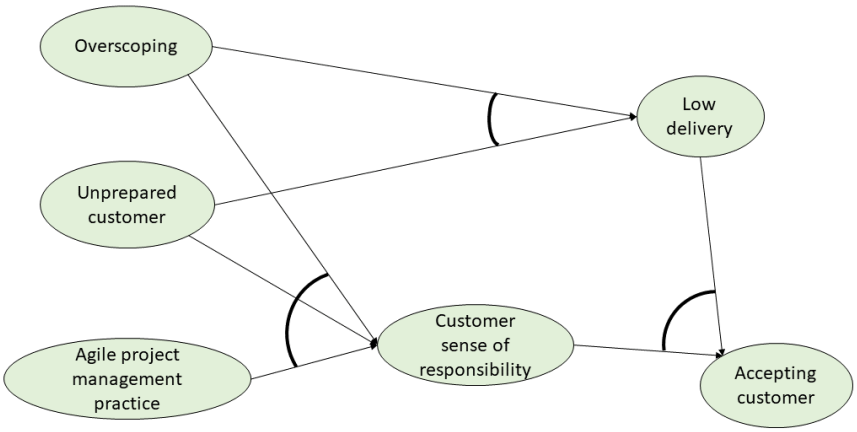

Figure 1 The complete mechanism leading to a software development project with low delivery, but an accepting customer

6. Discussion

The case presented in this study has two interesting outcomes: o_1 = "< 50% delivery" and o_2 = "Accepting customer". Often o_1 would lead to the negation of o_2, with consequential discussion of blame, negotiations of economic responsibility, etc. But here o_1 and o_2 co-occur. As we have documented in the analysis, the causes for o_2 in the light of o_1 is an agile project management approach, leading to a sense of responsibility on the customer side which again leads to acceptance of the final outcome. Figure 1 summarizes the mechanism at work in the project, focusing on important contingencies in the project. Events occurring as an outcome of the described mechanism, and that have been particularly significant to obtain o_3 = "customer sense of responsibility" and further o_2 = "Accepting customer" are:

1. Change of contract from fixed-price to agile (spring 2016);
2. Hiring consultant A2 to work as a product owner (spring 2016);
3. Change of project management approach towards more continuous delivery (spring 2016);
4. Repeated requests from the contractor about more contributions from customer (whole project period);
5. Customer assigning local domain experts with clear responsibilities to the project (early fall 2016).

The case study here verifies observations on the value of developer-customer communication in ISD [39], but also indicate a more precise cause for why communication can be important, namely making the customer aware of the competencies expected from themselves to make the project successful. It is also an example that partially matches Bjarnason et al.'s finding that agile methods contribute to a shared acceptance of the lack of delivery due to over-scoping [38].

The concept "customer sense of responsibility" thus represent a theoretical contribution in the understanding of how the customer may respond to agile information system practices. The sense of responsibility is a mediating variable that brings about a higher chance for acceptance of the final result and also seems to result in more engagement and contribution in the project during the development project.

The process tracing methodology applied here is an attempt to use qualitative data to establish truths about single cases. Like quantitative methods, it is not infallible, but in light of existing theories and previous empirical findings, other researchers' interpretation of the qualitative data most likely would support an explanation model similar to the one presented in Figure 1. Some links are not as strong as other, parallel to significance levels in numerical studies. But in this case the causal links must be considered to be strongly verified. Process tracing has not been tried out in information systems research before, and in this article we have documented how it can be used and further how it can contribute to an increased understanding of the information systems development field. It is particularly interesting that it, as in this case, has the potential to both verify existing theory as well as contributing with new theoretical concepts and relations.

In a case study on a medium sized ISD project, where you analyse system success, data is personal and sensitive for the respondents. Project failure and success may be attributed to persons who have no wish to be public persons. The researcher may need to anonymize not only persons, but also the project, and even the domain of the project. This is a challenge also observed by Milne and Maiden in analysis of power relations in requirements engineering [40]. In this article, even the business domain is anonymised, perhaps reducing the validity and usefulness of the study. Privacy has been prioritized, and the analysis has been presented at this abstraction level to ensure that the anonymity of respondents.

For the practitioner side, the presented story further adds to the evidence that all stakeholders, and in particular the customer itself, need to be aware the customer's particular responsibility for a project to be successful. Problems encountered in the cooperation need to be handled with flexibility and competence. The case illustrates that if there are obvious and early problems with the requirements in a fixed price ISD project, quickly changing to an agile approach may be an approach to reduce conflict levels and support a delivery that still can be considered successful.

7. Conclusion

In this case study we have seen how particular features of an ISD project have contributed to the outcome of the project. The process tracing method as applied gives us an insight into how one could use established theoretical knowledge and established empirical findings together with own empirical data to understand how the events and mechanisms in an ISD project actually influence the outcome. The concrete result is a mechanism for variables and outcomes valid in the particular case. Within this model, a significant contribution is the importance of the concept "Customer Sense of responsibility" as a mediator of the effects of agile project management practices. For project management practice, this study suggests an approach to explaining project outcomes in light of initial contingencies, project events, and their interactions. In particular, we have observed that participation in an ISD is demanding for a customer, and the customer's maturity level and other competencies should be in focus to ensure project success. This case study confirms that weak customer competence can be alleviated by abiding to agile practices, as these practices may bring about a mutual understanding of the project among the stakeholders.

Qualitative case studies are based on the researchers' interpretation of data as well as being problematic to generalize. So any theoretical ideas would be preliminary. In this case, it is the idea that "customer sense of responsibility" is a human aspect, alike to user involvement and trust, that contributes positively to system acceptance. To further validate the findings of the case, one needs additional case studies with agile customers. Such studies could aim to investigate the generalizability of the causal relations and the total mechanism found in this case, including the usefulness of the "customer sense of responsibility" as a theoretical concept. In the long term, quantitative studies aiming to verify this and other general theoretical mediators of customer effects in agile ISD should be conducted.

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References

[1] K. Beck, *Extreme Programming Explained: Embrace Change,* 1st ed. Reading, MA: Addison-Wesley, 2000.

[2] K. Schwaber and M. Beedle, *Agile Software Development with Scrum*, 1st ed. Upper Saddle River, NJ: Prentice Hall PTR, 2001.

[3] A. Martin, R. Biddle and J. Noble, "An ideal customer. A grounded theory of requirements elicitation, communication and acceptance on agile projects," In *Agile Software Development: Current Research and Future Directions*, T. Dingsøyr, T. Dybå, and N.B. Moe, Eds. Berlin: Springer-Verlag, 2010, ch. 6, pp. 111–141.

[4] J. M. Bass, "How product owner teams scale agile methods to large distributed enterprises," *Empirical Softw. Eng.* vol. 20, no. 6, pp. 1525–1557, December, 2015.

[5] *Manifesto for Agile Software Development* [Online (2018, July 3)]. Available: http://agilemanifesto.org

[6] R. Hoda, J. Noble and S. Marshall, "The impact of inadequate customer collaboration on self-organizing agile teams," *Information and Software Technology*, vol. 53, pp. 521–534, 2011.

[7] B. Ramesh B, L. Cao L and R. Baskerville, "Agile requirements engineering practices and challenges: an empirical study," *Info Systems J*, vol. 20, pp. 449–480, 2010.

[8] D. Beach and R.B. Pedersen, *Process-tracing methods: Foundations and guidelines.* Ann Arbor, MI: University of Michigan Press, 2013.

[9] K. Conboy, "Agility from first principles: reconstructing the concept of agility in information systems development," *Info. Sys. Res.*, vol. 20, pp. 329–354, 2009.

[10] M. Pikkarainen, J. Haikara, O. Salo, P. Abrahamsson and J. Still, "The impact of agile practices on communication in software development," *Empirical Softw. Eng.*, vol. 13, pp. 303–337, 2008.

[11] M. Korkala, P. Abrahamsson and P. Kyllonen, "A case study on the impact of customer communication on defects in agile software development," In *AGILE '06: Proceedings of the Conference on AGILE 2006*, Washington DC: IEEE Computer Society, 2006, pp. 76–88.

[12] I. Otaduy and O. Diaz, "User acceptance testing for Agile-developed web-based applications: Empowering customers through wikis and mind maps," *Journal of Systems and Software*, vol. 133, pp. 212–229, 2017.

[13] E. Bjarnason, M. Unterkalmsteiner, M. Borg and E. Engström, "A multi-case study of agile requirements engineering and the use of test cases as requirements," *Information & Software Technology*, vol. 77, pp. 61–79, 2016.

[14] E. Bjarnason and H. Sharp, "The role of distances in requirements communication: a case study," *Requir. Eng.*, vol. 22, no. 1, pp. 1–26, 2017.

[15] S. Dimitrijevic, J. Jovanovic and V. Devedzic, "A comparative study of software tools for user story management," *Information & Software Technology*, vol. 57, pp. 352–368, 2015.

[16] U. Abelein and B. Paech, "Understanding the influence of user participation and involvement on system success – a systematic mapping study," *Empir Software Eng*, vol. 20, pp. 28–81, 2015.

[17] M. Bano and D. Zowghi, "A systematic review on the relationship between user involvement and system success," *Information and Software Technology*, vol. 58, pp. 148–169, 2015.

[18] L. Siddique and B.A. Hussein, "A qualitative study of success criteria in Norwegian agile software projects from suppliers' perspective," *Intl. Journal of Information Systems and Project Management*, vol. 4, no. 2, pp. 63–79, 2016.

[19] J. Nuotilla, K. Aaltonen and J. Kujala, "Challenges of adopting agile methods in a public organization," *Intl. Journal of Information Systems and Project Management,* vol. 4, no. 3, pp. 65–85, 2016.

[20] M. Suprapto, H.L.M. Bakker, H.G. Mooi and W. Moree, "Sorting out the essence of owner–contractor collaboration in capital project delivery," *International Journal of Project Management*, vol. 33, no. 3, pp. 664–683, 2015.

[21] M. Suprapto, H.L.M. Bakker and H.G. Mooi, "Relational factors in owner–contractor collaboration: The mediating role of teamworking," *International Journal of Project Management*, vol. 33, no. 6, pp. 1347–1363, 2015.

[22] M. Suprapto, H.L.M. Bakker, H.G. Mooi and M.J.C.M. Hertogh, "How do contract types and incentives matter to project performance?," *International Journal of Project Management*, vol. 34, no. 6, pp. 1071–1087, 2016.

[23] M. Bano, D. Zowghi and F. da Rimini, "User satisfaction and system success: an empirical exploration of user involvement in software development," *Empirical Software Engineering*, vol. 22, no. 5, pp. 2339–2372, 2017.

[24] I. Benbasat, D.K. Goldstein and M. Mead, "The Case Research Strategy in Studies of Information Systems," *MIS Quarterly*, vol. 11, no. 3, pp. 369–386, 1987.

[25] G. Walsham, "Interpretive case studies in IS research: nature and method", *European Journal of Information Systems*, vol. 4, no. 2, pp. 74–81, 1995.

[26] P. Runeson and M. Höst, "Guidelines for conducting and reporting case study research in software engineering," *Empirical Software Engineering*, vol. 14, no. 2, pp. 131–164, 2009.

[27] L. McLeod, S.G. MacDonell and B.Doolin, "Qualitative research on software development: a longitudinal case study methodology," *Empirical Software Engineering*, vol. 16, no. 4, pp. 430–459, 2011.

[28] L. Dubé and G. Paré, "Rigor in Information Systems Positivist Case Research: Current Practices, Trends, and Recommendations," *MIS Quarterly*, vol. 27, no. 4, pp. 597–636, 2003.

[29] D. Beach and R.B. Pedersen, *Causal Case Study Methods. Foundations and Guidelines for Comparing, Matching, and Tracing.* Ann Arbor, MI: University of Michigan Press, 2016.

[30] C. Trampusch and B. Palier, "Between X and Y: how process tracing contributes to opening the black box of causality," *New Political Economy*, vol. 21, no. 5, pp. 437–454, 2016.

[31] D. Waldner, "Process tracing and causal mechanisms," In *The Oxford handbook of the philosophy of social science* H. Kincaid, Ed. Oxford: Oxford University Press, pp. 65–84, 2012.

[32] D. Collier, H.E. Brady and J. Seawright, "Sources of Leverage in Causal Inference: Toward an Alternative View of Methodology," In *Rethinking Social Inquiry: Diverse Tools, Shared Standards*, 2nd ed., H.E. Brady and D. Collier, Eds., Lanham, MD: Rowman and Littlefield, pp. 161–99, 2010.

[33] S. van Evera, *Guide to Methods for Students of Political Science.* Ithaca, NY: Cornell University Press, 1997.

[34] R. Irvine and H. Hall, "Factors, frameworks and theory: a review of the information systems literature on success factors in project management," *Information Research*, vol. 20, no. 3, 2015. Paper 676. Available: http://InformationR.net/ir/20-3/paper676.html

[35] Y.W. Hung, S.C. Hsu, Z.Y. Su and H.H. Huang, "Countering user risk in information system development projects," *Intl Journal of Information Management*, vol. 34, pp. 533–545, 2014.

[36] E.G. McGuire, "Factors affecting the quality of software project management: An empirical study based on the Capability Maturity Model," *Software Quality Journal*, vol. 5, pp 305–317, 1997.

[37] R.M. Fontana, V. Meyer, S. Reinehr and A. Malucelli, "Progressive Outcomes: A framework for maturing in agile software development," *Journal of Systems and Software*, vol. 102, pp. 88–108, 2015.

[38] E. Bjarnason, K. Wnuk and B. Regnell, "Are you biting off more than you can chew? A case study on causes and effects of overscoping in large-scale software engineering," *Information and Software Technology*, vol. 54, pp. 1107–1124, 2012.

[39] M. Keil and E. Carmel, "Customer-developer links in software development," *Communications of the ACM*, vol. 38, pp. 33–44, 1995.

[40] A. Milne and N. Maiden, "Power and politics in requirements engineering: embracing the dark side?," *Requirements Engineering*, vol. 17, pp. 83–98, 2012.

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