IT outsourcing

IT outsourcing -

the effect of formal control mechanisms and client capabilities

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Summary
Successful outsourcing of IT projects to specialized suppliers is of critical importance to organizations. Many studies have investigated antecedents of IT outsourcing success, although research seems to have overlooked the combined impact of control (outcome, process) and client capabilities. We surveyed 137 project managers supervising IT outsourcing projects. The results of our study confirm that process control as well as outcome control have a significant impact on IT outsourcing success. The findings of our study contradict the common knowledge and widely held belief that IT management capabilities of clients are important for achieving IT outsourcing success.

Keywords: IT outsourcing, process control, outcome control, IT management capabilities, supplier management capabilities

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Introduction
Successful projects, including IT projects, enable organizations to develop superior supply networks and improve operational management capabilities (e.g. Bergeron, Bureau and Raymond, 1991; Cao and Schniederjans, 2004; Setia and Patel, 2013). However, IT projects have shown poor performance in the last decade regardless of complexity; only 39% of the projects examined were successful, 18% failed and 43% had to deal with planning, budget and functionality problems (The Chaos Manifesto, 2013). Although IT projects are already complex, a strong increase in IT outsourcing is further increasing complexity. Managing supplier relationships is a key factor for outsourcing

success, although outsourcing success is determined by both the client and the supplier (Goo, Kishore, Nam, Rao and Song, 2007; Lee and Kim, 1999; Han, Lee, Chun and Seo, 2013). Improving project management in a client-supplier context, including the moderating factors, remains an important area of attention for researchers and managers.

For organizations it has become very common to outsourcing important IT projects to specialized IT service providers. The practice of IT outsourcing has also become an established field of research, considering the vast and growing number of publications on this topic. Many studies are devoted to describing and investigating the determinants, the risks and performance of IT outsourcing success (Delen, Peters, Verhoef and Van Vlijmen, 2016). Although several studies have shown that risks and control affect the performance of IT outsourcing projects (e.g. Keil, Rai and Liu, 2013; Liu, 2015; Liu and Wang, 2016), the importance of capability risks in outsourcing performance and relationship management barely receives attention (Han et al., 2013). Capability risks are risks related to the competence, knowledge and skills for managing outsourced projects and are among the top 10 risks in local and offshore outsourcing projects (Nakatsu and Iacovou, 2009). Managing such risks is fundamental to the success of outsourcing (Handley, 2012). Therefore, in this study we focus on the management capabilities to restrict those risks.

Clients and suppliers are likely to have different roles and concerns in making outsourcing projects successful (Pinnington and Woolcock, 1997). Clients are concerned about selecting the best supplier and their replaceability including the related costs and risks of switching (Whitten and Wakefield, 2006). Suppliers believe that the success of outsourcing projects is mainly dependent on the ability of the client to effectively acquire, distribute and utilize IT related resources (Feeny and Willcocks, 1998, Levina and Ross, 2003). In order to realize a successful outsourcing project, the IT capabilities of the client and supplier must be aligned, despite their different roles in outsourcing projects (Levina and Ross, 2003; Pinnington and Woolcock, 1997). In this study we focus on client capabilities that are considered critical in IT outsourcing success.

The purpose of this study is to investigate the success of IT outsourcing projects, where formal control mechanisms are applied and the complexity leads to many risks for clients and suppliers that must be managed. In the extant theory on control in IT outsourcing projects, the following gaps can be identified. First, the investigation of client capabilities in outsourcing relationships is limited, studies focusing on IT outsourcing are successful from a social and contextual perspective, while the importance of client capabilities is underexposed (Feeny and Willcocks, 1998; Kern and Willcocks, 2001). Han et al. (2013) found that client capabilities have a significant impact on IT outsourcing success. Further insight into the effect of these capabilities on the control-success relationship can enrich the theoretical model of Liu et al. (2017) and support managers in selecting effective formal control mechanisms and effective risk management. Second, our study extends previous research by investigating the effect of formal control mechanisms and the moderating effects of client capabilities on IT outsourcing projects. Third, in our study, the success of IT outsourcing projects is measured along the outsourcing success factors by Han et al. (2013) with the focus on the strategic, economic and technical benefits for

the client that are aimed at outsourcing IT projects. According to Han et al. (2013) customers may decide from a strategic vision to outsource IT to achieve objectives despite having high IT capabilities. This supports the aim of our study research to relate IT outsourcing success to the benefits for the client organization because a successful project in terms of time, budget and product quality does not have to be the main reason to outsource an IT project. This will be a valuable addition to Liu et al. (2017) and constitutes the starting point of our study. Liu et al. (2017) recommend further research into multiple perspectives for measuring IT outsourcing project success.

Literature review and hypotheses development

IT outsourcing project success

The complexity of IT projects makes the definition of project performance and success debatable. Jun et al. (2011) have examined that IT project success is generally assessed from the two perspectives of Wallace et al. (2004) and Markus and Mao (2004), these are process performance and product performance. Process performance is measured by the extent to which the project is completed within the set budget and planning and product performance is measured by the extent to which the project results meet the desired functionality and quality.

It is also possible to assess the success of IT projects based on criteria such as user satisfaction, project team satisfaction, effectiveness, organizational success and sustainability (e.g. Nidumolu, 1996; Shenhar and Dvir, 2007; Chong and Mahama, 2014; Carvalho et al. 2015). The project performance dimensions mentioned relate to different aspects of IT project success that do not necessarily correlate with each other. Jørgensen (2016) has established a low correlation between "customer benefits" and other IT project performance dimensions in his research. He also states that much research into the relationship between project characteristics and IT project success is mainly focused on the traditional "project management triangle" where success is defined in terms of time, budget and product quality and the performance dimension "customer benefits" is often ignored.

Investigation on IT project success from the advantages for the customer organization therefore seems to be an underexposed subject despite the fact that it can be expected that a successful project does not necessarily have to contribute to the benefit for clients. Jørgensen (2016) even states that the observation that an IT project has been completed within budget and planning and meets the specified product quality is far from the guarantee that the project is a success from the perspective of the client. Barki et al. (2001) state that a project that is completed within the set budget and planning can result in a qualitatively poor IT system; and a project that is not completed within the set budget and schedule can result in an IT system with a high quality.

Previous studies have mainly measured IT project success in accordance with the traditional "project management triangle" (Jørgensen, 2016), in which IT project success is defined in terms of time, budget and product quality. A second stream can be recognized in the study by Han et al. (2013). They have used the definition of Grover et al. (1996) and Lee and Kim (1999) that indicate that outsourcing is motivated by strategic,

economic and technical benefits; so outsourcing success can be judged on the basis of the extent to which these benefits are achieved. Grover et al. (1996) define strategic advantages as the clients ability to focus on its core activities by outsourcing routine IT activities. Economic benefits refer to the clients ability to leverage the expertise and economies of scale from the personal and technical resources from suppliers and manage costs through clear contracts. Technical benefits refer to the ability of the customer to obtain cutting-edge IT and the avoidance of risks related to technological aging due to the rapidly changing IT world. Although IT Outsourcing Project Success in relation to formal control mechanisms and client capabilities is still little operationalized according to the model of Han et al. (2013), this research states that it is important to gather more empirical evidence for this. The expectation is that a successful outsourced IT project will not have the desired value as long as the choice to outsource did not or insufficiently have lead to the organizational objectives. In line with Han et al. (2013), Grover et al. (1996) and Lee and Kim (1999), the definition of IT outsourcing project success in this study is based on the extent to which strategic, economic and technical benefits are realized by the client organization.

Control and success in IT outsourcing projects

Control in an outsourcing context is the mechanism that the outsourcing organization (the controlling party) uses to supervise and control the activities of the organization to which activities are outsourced (the controlled party) in order to achieve the desired objectives (Choudhury and Sabherwal, 2003; Tiwana and Keil, 2009). Control is carried out by the client organization based on various control mechanisms to ensure that the supplier behaves in a way that contributes to the realization of the outsourcing objectives (Kirsh et al., 2002; Tiwana, 2008). In previous studies control mechanisms are divided into formal and informal control mechanisms. Formal control mechanisms are the rules, goals, and obligations that are explicitly described in the contract and specify the expected behavior, processes and output norms (Ouchi, 1979). Formal control mechanisms, intensively exercised in managing outsourcing relationships (Liu et al., 2017), influence the behavior of the controlled organization by assessing the performance of processes and results and rewarding the controlled organization as agreed (Keil et al., 2013). In earlier studies process control and outcome control are described as the two forms of formal control mechanisms (Ouchi, 1979; Kirsch et al., 2002). Process control (also called behavior control) is implemented by the client organization to evaluate the performance of the supplier based on the extent to which prescribed procedures and methods have been followed by the supplier (Tiwana, 2008). Outcome control is exercised by the client organization by assessing supplier performance based on the extent to which the desired goals and outputs have been achieved, regardless of the applied process (Henderson and Lee, 1992; Tiwana and Keil, 2009).

The positive relationship between formal control mechanisms and IT Outsourcing Project Success has been demonstrated in studies by Liu et al. (2017), Keil et al. (2013), Kang et al., (2012), Gopal and Gosain (2010), Tiwana (2008) and Rustagi (2004). However, formal control mechanisms and the specific forms of process control and output

control in relation to IT Outsourcing Project Success from the perspective of the benefits for the client organization have been studied to a limited extent. More empirical research and in-depth insights into these relationships are therefore necessary for further development of this domain. In addition, conflicting findings were found in previous studies regarding the relationships between outcome control and process control and IT outsourcing success and performance. For example, Liu et al. (2017), Henderson and Lee (1992) and Klein et al. (2006) found that process control has a positive and significant effect on IT outsourcing project performance while the results of Tiwana and Keil (2009) indicate that an increased practice of process control has no significant relationship with performance. Gopal and Gosain (2010) also state that process control has a significant relationship with project efficiency but not with quality.

Control is effective for improving the performance of IT outsourcing projects (Daityari et al., 2008; Tiwana, 2008). Various studies by Liu et al. (2017), Keil et al. (2013), Kang et al. (2012), Stouthuysen et al. (2012), Gopal and Gosain (2010), Tiwana (2008), Rustagi (2004) have provided empirical evidence that formal control mechanisms have a positive effect on the performance of both domestic and international IT outsourcing projects. This study states that the formal control mechanisms process control and outcome control also have a positive correlation with IT Outsourcing Project Success from the perspective of the benefits for the client organization.

Outcome control emphasizes the importance of achieving the objectives of outsourcing projects. With outcome control, client organizations can give their feedback for corrections efficiently by evaluating the realized results (Klein et al., 2006; Love and Josephson, 2004). Suppliers are also motivated to carry out the required actions if project goals and requirements are not achieved, resulting in high output, efficiency and reliability (Gopal and Gosain, 2010). Outcome control enables suppliers to maintain unambiguous scopes and objectives and thus achieve results in line with customer expectations (Barnes and Targett, 1999). Outcome control significantly increases the efficiency of suppliers to complete activities which increases the performance of outsourcing projects (Bello and Gilliland, 1997). The predetermined evaluation criteria also ensure that suppliers carry out appropriate activities that lead to positive results (Gopal and Gosain, 2010). That is why this study proposes the following hypothesis:

H_1: Outcome control has a positive impact on the success of IT outsourcing projects.

With process control, client organizations (the controlling party) focus on the suitability and importance of process execution. Applying process control by client organizations ensures that suppliers (the controlled party) take appropriate steps and procedures to minimize errors and unnecessary adjustments and therefore increase performance (Gopal and Gosain, 2010; Lui and Wang, 2014b). By evaluating the extent to which prescribed procedures and rules have been adopted and followed to achieve project goals, suppliers can effectively carry out project activities and client organizations are able to easily monitor project progress (Henderson and Lee, 1992). That is why this study proposes the following hypothesis:

H_2: Process control has a positive impact on the success of IT outsourcing projects.

Client capabilities

Capabilities are the ability of organizations to integrate and utilize valuable resources (Amit and Schoemaker, 1993). A more specific form of capabilities are client capabilities to acquire, distribute and apply IT-related resources and assets (cf. Han et al., 2008; 2013). Client capabilities in an outsourcing context are the ability, knowledge and skills to manage IT outsourcing projects and to reduce risks (Nakatsu and Iacovou, 2009). Effective management capabilities are essential for the success of IT outsourcing projects (Handley, 2012). Still, limited research has been conducted on the effect of client capabilities on the relationship between control mechanisms and IT outsourcing project success. The specific client capabilities investigated in this study are IT Management capabilities and Supplier Management capabilities. These variables originate from the study by Han et al. (2008; 2013).

IT management capabilities

To utilize the technical expertise of the supplier, the technical and IT management capabilities of the client organization are important (e.g Han et al., 2013). IT management capability is knowledge regarding when and how IT is rolled out effectively and profitable to realize organizational objectives (e.g. Mata et al., 1995). Technical IT capabilities are the technical knowledge and skills to understand, use, and integrate IT applications. Client organizations should have the ability to identify IT functional requirements. Also, buying firms should have the ability to align their IT strategy with the changes in the environment. IT management capabilities, i.e. ompetences, knowledge and skills on IT management, are likely to have a positive impact on the success of IT outsourcing projects. We hypothesize:

H_3: IT management capabilities have a positive impact on the success of IT outsourcing projects.

Various studies have supported the claim that outcome control is positively associated with the success of IT outsourcing projects (See our Hypothesis 1). Organizations that effectively use outcome control, consistently emphasize project completion according to specifications and agreements. The assumption is that the client organization must also have in-house IT capabilities in order to be able to effectively monitor the work done by suppliers (Han et al., 2008). Therefore, the effect of outcome control will be stronger when client organizations are able to manage their own IT function and their own IT activities. We hypothesize:

H4: IT management capabilities have a positive moderating effect on the relationship between outcome control and the success of IT outsourcing projects.

Supplier management capabilities

Client organizations with low supplier management capabilities are not able to monitor the behavior of suppliers and evaluate the project status correctly because of insufficient skills and knowledge to manage outsourcing projects (Choudhury and Sabherwal, 2003). Insufficient supplier management capabilities can also lead to conflicts between client and supplier organizations due to disagreement about customer-defined processes (Liu et al., 2017), which may be caused by insufficient participation of the supplier organization in drawing up and tuning these processes.

For an optimal participation of suppliers in IT outsourcing supplier management is important (Liu et al., 2017). Supplier management capability is the ability to look beyond existing contracts and explore long-term opportunities to create a win-win situation (Feeny and Willcocks, 1998). Managing the work done by the supplier must stimulate a proactive cooperation of the supplier, resulting in a better performance (Shi et al., 2005). Unsatisfactory IT outsourcing performance might be caused by clients who are not able to properly contract suppliers and evaluate their performance. We hypothesize:

H_5: Supplier management capabilities have a positive impact on the success of IT outsourcing projects.

The control theory shows that an effective application of control depends on the knowledge and capabilities of the controlling and controlled party (Eisenhardt, 1985; Kirsch et al., 2002). Our study assumes a moderating effect of both the clients' IT management *capabilities (H4)* and the supplier management *capabilities* on the relationship between formal control and IT outsourcing success. We therefore hypothesize that supplier management capabilities are likely to strengthen the positive effect of outcome control on IT outsourcing success.

H6: Supplier management capabilities have a positive moderating effect on the relationship between outcome control and the success of IT outsourcing projects.

Figure 1 shows the conceptual model for this study, investigating the direct effects of control (process and outcome) and client capabilities (IT management capabilities and Supplier management capabilities) on the success of IT outsourcing. The model also includes expected moderating effects of client capabilities on the relationship between outcome control and IT outsourcing project success. We do not anticipate moderating effects of client capabilities on the impact of process control, because process control emphasizes the proper following of rules and procedures.

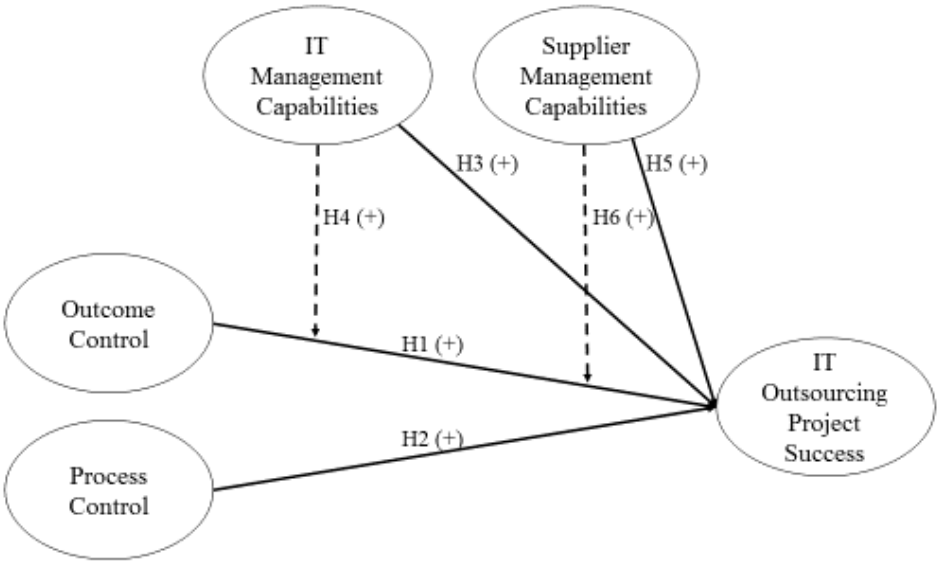

Figure 1: Conceptual model

Methodology

Data collection method

The collection of data took place through an electronic survey amongst a sample of IT project managers. To test the hypotheses, we collaborated with the Dutch branch of a large, internationally operating IT organization specialized in information, data and analytics. We invited their local project managers to participate in the study. These managers of client organizations supervise IT outsourcing projects. Respondents were asked to answer questions about client capabilities and a specific IT project. The IT project should meet the following selection criteria:

- The IT outsourcing project must have been completed up to one year ago or in a final phase. This increases the accuracy of the answers from the questionnaires because the experiences are fresher in the memory of the respondents, reducing respondent bias.
- The IT outsourcing project must have a minimum project duration of one month. This makes it plausible that the client organization has applied various forms of control.
- The IT outsourcing project must have a minimum economic value of 50,000 Euros. This also makes it plausible that the client organization has applied various forms of control.

A total number of 150 managers were selected. After a first mailing, the survey was also brought to the attention of the respondents a second time. Finally, all persons who had not yet completed the questionnaire were contacted by telephone with a (personal) request to complete the questionnaire. The survey resulted in 137 usable responses yielding a response rate of 91%.

Measures

The five variables included in our conceptual model are: IT outsourcing project success (ITOPS), process control (PC), outcome control (OC), IT management capabilities (ITMC), and supplier management capabilities (SMC). All operationalizations were derived from scales that were used and validated in prior academic studies, in particular Han et al. (2013) and Liu et al. (2017). The items consist of statements to which respondents have to indicate to what extent they agree with the statement based on a five-point Likert scale ranging from 1 (fully disagree) to 5 (fully agree). The items were described in English and translated into Dutch. The Dutch translations were then translated back into English and differences were resolved.

IT outsourcing project success (ITOPS) is measured in terms of strategic, economic and technical benefits. To measure IT outsourcing project success nine items were adapted from Han et al. (2013). In accordance with Liu et al. (2017), *process control* (PC) is measured based on three items that emphasize the expectations of the client that the supplier will follow (written) procedures, rules, and sequence of steps. The four items for *outcome control* (OC) were also derived from Liu et al. (2017) and assess the weights that the client firm places on various aspects of project completion, e.g. within time, within budget, and conform the goals of the project. The six items for *IT management capabilities* (ITMC) and the five items for *supplier management capabilities* (SMC) were derived from Han et al. (2013). All items are listed in Appendix A.

Sample characteristics

Some background variables were included in the questionnaire to get insight in sample characteristics. Company size was measured by the number of employees. About 93% of the projects were outsourced by companies with 1,000 or more employees. A large part (43%) of the companies contracted more than 100,000 employees. The IT projects were carried out in different industries, although the majority took place at public organisations (28.5%), financial institutions (29.2%) and retail organisations (28.5%). The money involved in the IT outsourcing projects varied, 62% cost more than 1 million Euro, and 38% resulted in costs between 100,000 and 1 million Euro. All respondents had more than one year of experience with IT outsourcing, and more than half (56.2%) had more than five years of experience. More than half (54%) already had 1 to 3 years of experience with the supplier prior to the IT outsourcing project. More in general, respondents exist of experienced IT project managers possessing first-hand knowledge of and insights in IT outsourcing projects. Therefore, they appear appropriate to answer specific questions on the client firm management capabilities with respect to IT and their supplier.

Results

In analyzing our conceptual model and testing our hypotheses we took four controlling variables into account. These controlling variables are: experience with IT outsourcing (in years), project size (in Euros), duration of already existing IT supplier relationships (in years), and the size of the client firm (in number of employees).

The experience with IT outsourcing or the presence of an already existing relationship between a client and supplier can influence the extent to which outsourcing benefits are achieved (Lee and Kim, 1999). Also it is likely that project managers are more dedicated and motivated to achieving project success the more sizeable the project (Lacity et al., 2009; 2012) or the client firm (Ang and Straub, 1998).

The four controlling variables correlate very weak (less than 0.20) or weak (0.20 to 0.39) with the dependent variable IT outsourcing project success (Evans, 1996) and have non-significant effects. Correlations range from a minimum of 0.107 (for project size) to a maximum of 0.362 (for experience with IT outsourcing). See Appendix B for the correlationmatrix. p-Values range from a minimum of 0.104 (for project size -> ITOPS) to a maximum of 0.840 (for size of the client firm -> ITOPS). Therefore we will not refer to these controlling variables in our further analyses.

Further analyses are done using structural equation modeling (SEM). SEM is a method enabling researchers to estimate complex interrelationships between observed and latent variables (Hair et al., 2017, 2018; Sarstedt et al., 2017). Our study aims at developing theory, since we explore a theoretical extension of established theories. Therefore, our research is exploratory in nature. Consequently, for analyzing our conceptual model partial least squares SEM (PLS-SEM) is to be preferred over covariance based SEM (CB-SEM), since CB-SEM is confirmatory in nature. Additionally, we have to deal with a small sample size and a non-normal data distribution. PLS-SEM is able te deal with small sample sizes without imposing distributional assumptions on the data (Hair et al., 2017, 2018; Sarstedt et al., 2017). This makes PLS-SEM more suitable than CB-SEM or other tools (e.g. a moderated hierarchical regression analysis).

Analyzing and evaluating PLS-SEM results is based on a two-step approach as suggested by Hair et al. (2017, 2018; Sarstedt et al., 2017). First, we analyse our measurement models and, second, we evaluate our structural model, to assess the quality of the results using SmartPLS3 software (Ringle et al., 2015).

Analyzing the measurement models

Cronbach's alpha values and composite reliability values are well above the threshold value of 0.70 (Hair et al., 2017), suggesting that internal consistency reliability of each latent variable is acceptable. Average Variance Extracted (AVE) values are above the threshold value of 0.50, demonstrating unidimensionality and suggesting that convergent validity of each latent variable is acceptable. See Table 1.

Evaluating the structural model

To assess and evaluate the structural model estimates we examine collinearity, size and significance of path coefficients, and R^2 values. A measure of collinearity is the variance inflation factor (VIF). To assess collinearity, we consider VIF values above 5 in the predictor constructs as indicative of a potential collinearity problem. VIF values in our study are well below the threshold value of 5, indicating that collinearity is not a critical issue (See Table 1). Table 2 presents the estimates of path coefficients of the proposed model, t-values, p-values, significance levels and confidence intervals.

Table 1: Reliability and validity measures

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)	VIF*
IT Management Capabilities (ITMC)	0.880	0.907	0.619	3.603
IT Outsourcing Project Success (ITOPS)	0.904	0.927	0.680	
Outcome Control (OC)	0.824	0.884	0.657	1.706
Process Control (PC)	0.894	0.935	0.829	1.304
Supplier Management Capabilities (SMC)	0.857	0.890	0.733	1.652

* VIF values will be discussed in the next section

Table 2: Size and significance of the structural model path coefficients

	Path Coefficient	t-Value	p-Value	Significance Level	97.5% C.I. (low)	97.5% C.I. (high)
OC -> ITOPS	0.511	6.614	0.000	***	0.369	0.657
PC -> ITOPS	0.137	2.500	0.012	*	0.031	0.246
ITMC -> ITOPS	0.192	1.651	0.099	n.s.	-0.015	0.441
Mod_ITMCxOC -> ITOPS	-0.125	1.566	0.117	n.s.	-0.280	0.031
SMC -> ITOPS	0.170	3.116	0.002	**	0.047	0.268
Mod_SMCxOC -> ITOPS	-0.157	1.789	0.074	n.s.	-0.297	0.055

C.I. = Confidence Interval; n.s. = not significant; ***: p≤0.001; **: p≤0.01; *: p≤0.05

Testing the hypotheses

Figure 2 shows the structural model including the size and significance of path coefficients, as well as R^2 values. The R^2 value indicates the model's explanatory power and (with a value of 0.62) can be considered moderate to substantial (Hair et al., 2017, 2018; Sarstedt et al., 2017). The Q^2 value (Predictive Relevance) is larger than 0 (i.e., 0.370) and suggests that the model has predictive relevance for the endogenous variable ITOPS. Three of the six hypothesized paths are statistically significant as summarized in Table 3.

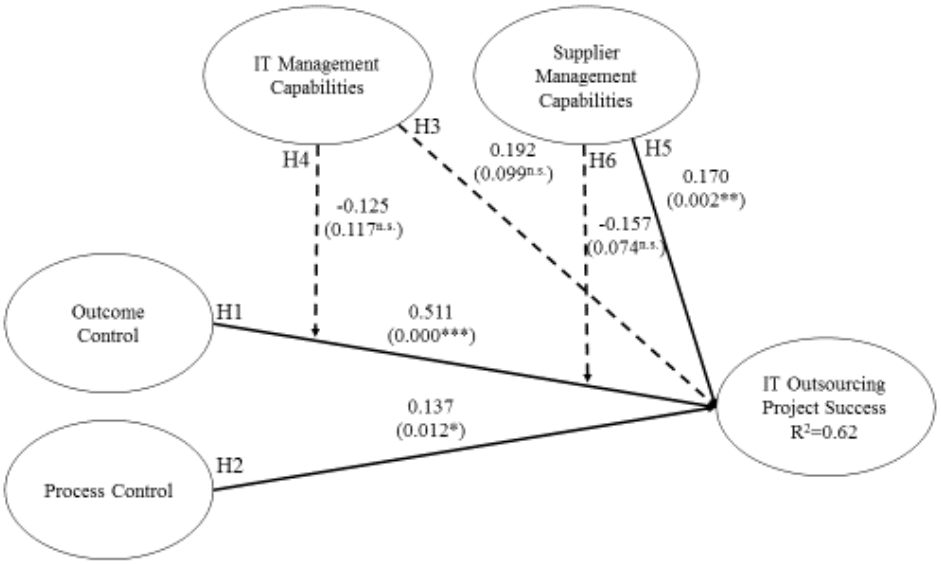

Figure 2: Empirically validated model

Table 3: Results of hypotheses tests

Hypotheses		Results
H1	Outcome control has a positive impact on the success of IT outsourcing projects.	Supported
H2	Process control has a positive impact on the success of IT outsourcing projects.	Supported
H3	IT management capabilities have a positive impact on the success of IT outsourcing projects.	Not Supported
H4	IT management capabilities have a positive moderating effect on the relationship between outcome control and the success of IT outsourcing projects.	Not Supported
H5	Supplier management capabilities have a positive impact on the success of IT outsourcing projects.	Supported
H6	Supplier management capabilities have a positive moderating effect on the relationship between outcome control and the success of IT outsourcing projects.	Not Supported

Conclusions and discussion

IT systems can be of critical importance to organizations and have significant impact on competitive advantage and profits. The management of IT projects has proven to be demanding and full of risks. Many companies have decided to outsourcing their IT projects to specialized suppliers. However, outourcing the development of IT systems often turns out to be problematic, running over time and budget, resulting in poor performance. Many studies have investigated antecedents of IT outsourcing success,

although research seems to have overlooked the combined impact of control (outcome, process) and client capabilities. We surveyed 137 project managers supervising IT outsourcing projects and empirically validated our conceptual model. The statistical analysis indicates that our model explains 62% of IT outsourcing project success.

The findings of our study contradict the common knowledge and widely held belief that IT management capabilities of clients are important for achieving IT outsourcing success (e.g Han et al, 2013). Our contra intuitive finding seems hard to explain. Obviously, we expect that IT management capabilities are useful for achieving IT outsourcing success. Apparently, it is not necessary that outsourcing companies themselves have high levels of (technical) IT management capabilities. Instead, we found a significant impact of supplier management capabilities on IT outsourcing performance. Successful outsourcing requires a client organization capable of adequately managing the IT service providers. The difference between success and failure can be partly found in the supplier management capabilities (cf. Delen et al., 2006; Han et al., 2013), and not as much in the IT management capabilities.

Control theory assumes that an effective application of control requires knowledge and capabilities of the controlling party (e.g Eisenhardt, 1985; Kirsch et al., 2002). Our model includes two moderating effects on the relationship between outcome control and IT outsourcing project success. However, we did not find significant impacts of the two client capability variables. IT management and supplier management capabilities apparently do not strengthen the positive impact of outcome control on the outsourcing success. The ability to assess supplier and outsourcing performance (supplier management capabilities) and the actual evaluation and monitoring of outsourcing performance (outcome control) are relatively independent functions, emphasizing different aspects of IT outsourcing.

Limitations and recommendations

The results of this study lead to a number of recommendations for follow-up research. First, a future study could investigate whether informal control mechanisms affect the strategic, economic and technical benefits for client organizations. In our study we focus on two types of formal control, i.e. output control and process control. Social control (i.e. shared values, beliefs, and goals, expressed through formal and non-formal communication channels) is an informal type of organizational control that is suggested to affect outsourcing success (Kang et al., 2012; 2014). Understanding the influence of informal control mechanisms can potentially lead to more control options for client organizations and more accurate considerations to choose specific control mechanisms.

Second, the effect of IT management capability and supplier management capability could change with increasing outsourcing and the relationship becomes more mature. Some management capabilities (must) adapt to meet changing client circumstances during the course of outsourcing (Plugge et al., 2016). Given the research population of this study in which 72.3% have more than 3 years experience with IT outsourcing and 94.9% have an existing IT outsourcing relationship, we recommend additional research

with a more diverse and experienced research population on IT outsourcing and relationships.

Third, our study included two important client capabilities, i.e. IT management capabilities and supplier management capabilities. Other client firm capabilities have been suggested to have a positive impact on IT outsourcing success (Lacity et al., 2009). For example, contract negotiation capabilities, described as the extent to which a client is able to effectively bid, select, and negotiate effective contracts with suppliers is expected to successfully improve outsourcing performance. Also the capabilities of the supplier to whom activities are outsourced are expected to contribute to positive outsourcing outcomes (Lacity and Willcocks, 2012; Plugge et al., 2016) and are recommended to include in follow-up research.

This study has a number of practical recommendations with regards to IT outsourcing, formal control mechanisms and client firm capabilities. Client organizations can use both process control and outcome control as a control mechanism to increase the success of IT outsourcing projects from the perspective of the strategic, economic and technical benefits for the client. Although both control mechanisms appear to be effective for managing IT outsourcing project success, outcome control seems to be more effective. Management could focus on outcome control for managing their IT outsourcing projects. Also, in line with our findings, companies should not simply rely on internal IT management capabilities. Top management should acknowledge the critical importance of the purchasing function when it comes to monitoring and managing IT outsourcing projects.

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Appendix A Measurement of variables

Variable	Item wordings
IT outsourcing project success (ITOPS) [a]	ITOPS1: As a result of the project, the client firm has been able to refocus on core business.
	ITOPS2: As a result of the project, the client firm has enhanced its IT competence.
	ITOPS3: As a result of the project, the client firm has increased access to skilled personnel.
	ITOPS4: As a result of the project, the client firm has reduced the human resource management cost. [c]
	ITOPS5: As a result of the project, the client firm has increased efficiency in IT expenses. [c]
	ITOPS6: As a result of the project, the client firm has increased efficiency in expenses.
	ITOPS7: As a result of the project, the client firm has reduced the risk of technological obsolescence [c]
	ITOPS8: As a result of the project, the client firm has increased access to key information technologies
	ITOPS9: As a result of the project, the client firm is satisfied with the overall benefits from IT outsourcing
Outcome control (OC) [b]	OC1: The client firm placed significant weight upon the timely completion of project tasks.
	OC2: The client firm placed significant weight upon project completion within budget.
	OC3: The client firm placed significant weight upon project completion to the satisfaction of the client.
	OC4: The client firm evaluated the performance of the vendor by the extent to which project goals were accomplished.
Process control (PC) [b]	PC1: The client firm expected the vendor to follow an understandable written sequence of steps specified by the client toward the accomplishment of project goals.
	PC2: The client firm expected the vendor to follow articulated rules and procedures specified by the client toward the accomplishment of project goals.
	PC3: The client firm assessed the extent to which existing written procedures and practices were followed during the outsourcing process.
IT management capabilities (ITMC) [a]	ITMC1: The client firm has the ability to standardize information technologies.
	ITMC2: The client firm has the ability to integrate various information technologies.
	ITMC3: The client firm has the ability to understand IT trends.
	ITMC4: The client firm has the ability to indentify IT functional requirements.
	ITMC5: The client firm has the ability to leverage IT as a strategic competency.
	ITMC6: The client firm has the ability to update IT strategy constantly with the changes in the business environment.
Supplier management capabilities (SMC) [a]	SMC1: The client firm has a standardized process for vendor selection.
	SMC2: The client firm has the ability to evaluate outsourcing performance. [c]
	SMC3: The client firm has the ability to manage outsourcing processes. [c]
	SMC4: The client firm has a systematic process for contract management.
	SMC5: The client firm has a systematic process for vendor management.

[a] Adapted from Han et al. (2013); [b] Adapted from Liu et al. (2017); [c] Item not included in our analyses for reasons of (lack of) reliability and/or validity

Appendix B Correlations and descriptive statistics

	Controls				ITMC	ITOPS	Outcome control	Process Control	SMC
	C1_OO	C2_EITO	C3_PO	C4_BITOR					
C1_OO	1.000								
C2_EITO	0.734	1.000							
C3_PO	0.266	0.114	1.000						
C4_BITOR	0.513	0.458	0.371	1.000					
ITMC	0.629	0.782	0.079	0.478	1.000				
ITOPS	0.314	0.362	0.107	0.171	0.451	1.000			
Outcome control	0.333	0.404	0.027	0.169	0.386	0.712	1.000		
Process Control	0.010	0.044	-0.160	-0.209	-0.042	0.300	0.348	1.000	
SMC	0.421	0.355	0.134	0.273	0.446	0.367	0.321	0.055	1.000
Mean	2.956	3.285	3.409	2.518	3.561	4.237	3.431	3.336	2.951
Standard Deviation	1.024	0.871	0.815	0.820	0.865	0.755	0.563	1.458	1.084

$Ci_{(i=1-4)}$ are control variables

C1_OO = size of firm in employees (4 categories)

C2_EITO = experience in IT Outsourcing in years (4 categories)

C3_PO = size of project in Euros (4 categories)

C4_BITOR = duration of existing supplier relationship in years (4 categories)