

Performance of ICT outsourcing: analyzing client-vendor value-drivers and relationship quality

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Abstract

This study seeks to understand how the performance of outsourced ICT projects can be measured, in an attempt to ascertain how the attributes of client-vendor relationships might affect project performance. Literature was consulted through a content analysis of 39 research articles. It is theorized that value drivers (knowledge-sharing and relative competence level) and relationship quality (relational governance) influence project performance outcome. However, an analysis based on a quantitative empirical study suggests that project performance, measured in terms of cost savings, is negatively influenced by relational attributes and knowledge-sharing between client and vendor in terms of methodological capabilities, mediated by the vendor to client knowledge-sharing about HRM capabilities. Furthermore, time compliance was found to be negatively affected by relational attributes of the client-vendor relationship and vendor to client knowledge-sharing about technological capabilities. Finally, quality improvements was found to be negatively affected by vendor to client knowledge-sharing in terms of HRM. Limitations of the findings and the implications for research and IT outsourcing are then discussed.

Keywords: IT outsourcing, project performance, client-vendor relationships, knowledge-sharing, relative competences, relational governance

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1 Preface

This thesis was written as the final assignment as a part of the graduate program in Masters of Science in Business Administration and Computer Science at the Copenhagen Business School (CBS). The formal process began with the literature review during Autumn 2010, and the final analysis in early 2011. The main goal of this thesis was to examine a relatively undeveloped research topic: performance of outsourced ICT projects, and to seek to gain an understanding of how it was affected by antecedents and elements in client-vendor relationships.

IT outsourcing first came to my attention after following the course “Strategic IT Outsourcing,” which was offered at the CBS graduate program. The topic for this thesis was the result of thorough considerations into whether ICT projects that were outsourced, would exhibit varying performance due to client-vendor relation-specific factors.

I would like to thank my supervisor Professor Volker Mahnke from Department of International Economics and Management, for accepting the topic and the invaluable guidance provided throughout the writing process. My brother, who provided constructive criticism and finally from Department of Informatics, Associate Professor Ioanna Constantinou, who commented on proper use of specific analytical methods.

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2 Executive Summary

Procurement of activities with third party vendors has existed for a long time. Recently many firms have acknowledged that vertical integration by focusing on core capabilities, and disaggregating supportive activities can be required, in order to stay competitive in the global market. However, this does not mean that the capabilities of the firms have diluted, conversely, vertical integration has enabled firms to develop new related capabilities, and thus, threaten competitors on related markets as well. The mode of outsourcing has therefore followed the evolution of businesses, and therefore transformed from low risk into more high risk outsourcing of activities such as *Business Process Outsourcing*¹ (BPO), *Knowledge Process outsourcing*² (KPO), and so forth.

Much research has focused on analyzing the pros and cons of outsourcing, and especially whether value really can be obtained through outsourcing relationships. Theoretically many models and concepts have been employed to describe how value creation arise from outsourcing. However, despite the vast amount of literature and research available, the findings are sometimes ambiguous. The complexity and sheer number of factors involved in client-vendor outsourcing relationships, has made it difficult to corroborate findings throughout the literature.

The scope of this thesis is to uncover how prior literature has measured performance of outsourced *Information and Communications Technology*³ (ICT) projects, and understand whether those projects are influenced by client-vendor relationship specific attributes. Thus, the goal of this thesis is two-fold: first, to perform a thoroughly review of prior relevant literature, and two, to propose a model and analyze whether the model accurately reflects the theoretical assumptions, based on empirical data. Guided by a positivistic approach, this thesis seeks to contribute with knowledge creation, through synthesis of a theoretical model, and empirical findings, that will uncover whether ICT project performance is subject to client-vendor specific attributes.

¹“According to Scholl [11] business process outsourcing (BPO) consists of the outsourcing of supply (moving, storing, making and buying of goods and services) and demand (customer selection, acquisition, retention and extension) management, and certain enterprise services (human resources, finance and regulatory, IT and facilities management).” (Sen and Shiel, 2006)

²“KPO involves high-end processes like valuation research, investment research, patent filing, legal and insurance claims processing, medical diagnostics, clinical trials etc.” (Sen and Shiel, 2006)

³ICT is the umbrella term for all kinds of devices, services, and technologies that facilitate exchange and communication of information.

3 Introduction

The main purpose of this thesis is to delve into a relatively unexplored area of IT outsourcing⁴, measuring the performance of outsourced ICT projects. Therefore, the unit of analysis is on the individual project, and the perspective is that of the client, in other words the client-perspective in a client-vendor relationship. Given that a lot of research has been conducted in the area of outsourcing as well as IT outsourcing, it provides ample opportunity to serve as a scientific foundation for developing hypotheses which can be empirically tested. While the thesis rests on the theme of IT outsourcing, performance is a sub-theme within the context, and somewhat scarcely represented in academic literature. The specific pros and cons of this fact, as well as consequences, will be discussed throughout the thesis, and more thoroughly in the research method section.

The goal of the thesis is to gain an understanding of the factors that influence the performance of outsourced ICT projects, specifically in situations where the client has outsourced the software development or applications to a third-party vendor, only retaining the key personnel required to oversee the ongoing development and implementation. This will in turn serve as a foundation for creating a framework for antecedents or the means of achieving superior performance in ICT outsourcing projects.

In order to reach the specified goal, and acquire new scientific knowledge, it is firstly required to ascertain which variables to measure. Since, as mentioned earlier, the realm of measuring performance of outsourced ICT projects is sparsely represented in the literature, it is necessary to create an overview of the current state of the literature. The variables and hypotheses are derived from related (same context, but different unit of analysis) scientific literature. Thus, in order to develop new knowledge a triad is formed, and rests upon theory used to develop the dependent and independent variables and hypotheses, data collection gathered empirically, and the analysis of the acquired empirical data. What binds everything together will be the resulting model based on the analysis.

What this thesis aspires to accomplish, is an understanding of whether the developed hypotheses based on the current literature, can supported or rejected. In order to reach the goal of first uncovering prior literature, and secondly developing a model, a research question is proposed as follows:

3.1 Research question

“How can performance of outsourced ICT projects be measured, and how is it influenced by client-vendor specific attributes?”

⁴Definitions of outsourcing: A) “Outsourcing refers to the practice of transferring activities traditionally done within the firm to third party providers within the country or off-shore.” (Sen and Shiel, 2006), B) “Outsourcing is a phenomenon in which a user organization (client) transfers property or decision rights over information technology (IT) infrastructure to an external (vendor) organization (Loh and Venkatraman 1992b),” as cited in Levina and Ross (2003) and C) “Outsourcing is a relationship between supplier and a client in which the supplier assumes responsibility for one or more of the clients IT functions (Rajkumar and Mani, 2001)” as cited in Khan and Fitzgerald (2004)

4 Literature review

4.1 Theoretical foundations

Any firm choosing to pursue IT outsourcing faces a diverse and complex series of challenges, that requires not only dedication and commitment prior to contracting and during the ongoing relationship with the third-party vendor, but also if necessary, when ending a relationship without incurring additional losses. Underestimating the risks and possibly *hidden costs*⁵ (Barthelemy, 2001) associated with outsourcing, can result in unwanted adverse consequences for the firm. The next section will provide a brief overview of the theoretical foundations, which are the key concepts upon which many of the performance related articles are based upon. Following that section, the current research on performance measurement in IT outsourcing will be reviewed through a detailed content analysis of 39 selected research articles.

IT outsourcing represents an area of research that incorporates many aspects, that potentially have a profound impact on the firm. Thus, the literature on this particular topic has enabled researchers to employ a great variety of theories and concepts. A large body of literature has been dedicated to applying concepts like *Transaction Cost Economics* (Williamson, 1975), *Resource-Based View* (Barney, 1991; Peteraf, 1993), *Knowledge-Based View* (Kogut and Zander, 1992; Grant, 1996), *Relational View* (Dyer and Singh, 1998), and *Dynamic Capabilities* (Teece, Pisano, and Shuen, 1997), to analyze: value proposition, make vs. buy decisions, whether to internalize or outsource, differences in outsourcing between first-movers and second-movers, capabilities and boundaries of the firm, contractual hazards, transfer of knowledge, vendor selection, innovation in *New Product Development*⁶ (NPD), and contracting amongst many others. While decisions regarding procurement, whether to internalize or outsource and make vs. buy has received a lot of attention, measuring the performance of outsourcing relationships has relatively received much less.

The literature on *Information Technology Outsourcing*⁷ (ITO) has been examined extensively by researchers (Dibbern et al., 2004; Fjermestad and Saitta, 2005; Mahnke et al., 2005; Gonzalez et al., 2006; Lacity et al., 2009) and more recently by Lacity et al. (2010) and Alsudairi and Dwivedi (2010). Lacity et al. (2010) analyzed a total of 164 research articles which consisted of both quantitative (71), qualitative (80), and those that adopted a mixed methodology (13). The researchers derived two main constructs from the analysis based on ITO decisions and ITO outcomes as well as gaps in the literature. Lastly, they linked relationships between the dependent variables (DV) and independent variables (IV) which enabled them to discuss pros and cons of future research. This provides an extremely helpful guideline for doing a more specific literature review within the context of performance, as will become evident in the later sections.

⁵Barthelemy (2001) identified four areas of hidden costs: 1) vendor search and contracting, 2) transitioning to the vendor, 3) managing the effort, and 4) transitioning after outsourcing

⁶NPD is, broadly stated, the activities revolving around developing new products such as: initial design, creation and method, and marketing.

⁷ITO refers to the delegation of IT functions to a third party vendor.

4.1.1 Why firms outsource

The above mentioned theories and concepts have been applied frequently in the literature to understand the potential benefits and risks associated with outsourcing on multiple levels. It is frequently argued that firms seeking to reap the benefits of outsourcing, should vertically integrate on their core competencies, while performing vertical disintegration on the activities that are not considered essential to their business, also referred to as *strategic outsourcing* (Quinn and Hilmer, 1994). The rationale behind this concept is based on the fact that supportive activities are more costly to perform internally, relatively, compared to a firm that is specialized in those activities and uses them as part of their main business portfolio. Therefore, it is expected that it is relatively easier for those firms to achieve *economies of scale*⁸ and *scope*⁹, all things held equal, compared to firms where the activities are purely supportive.

4.1.2 Key concepts

The following section will provide an overview of many of the commonly applied theories and concepts in research.

Resource-Based View

According to the *Resource-Based View* (RBV) a firm is composed of heterogeneous resources, and if some of these can be classified as *valuable, rare, in-imitable, and non-substitutable* (VRIN¹⁰) (Barney, 1991), they might potentially be a source of a *competitive advantage* (CA) which, exploited, can form a sustained CA. The RBV has been adopted by many researchers in the context of IT outsourcing when discussing boundaries of the firm, consistent with the theory itself, given the unit of analysis is placed on the individual firm, predominantly reflected on the internal resources of the firm. The RBV offers assistance in identifying the key resources, so firms can focus on what they do best, while disaggregating their non-essential activities to third-party vendors. Therefore, the RBV indirectly promotes procurement of non-core activities. The later discussed *Relational View* (RV) addresses some of the criticism that RBV almost exclusively focus on the firm as a unit, and not the possible value-creation that is a result of collaboration across the boundaries of the firm through co-creation.

Knowledge-Based View

The *Knowledge-Based View* (KBV) is an offspring of the RBV and specifically address knowledge as the single most important resource to a firm. Where the RBV would argue that a firm is composed of heterogeneous resources,

⁸'Economies of scale refers' to a firm's ability to lower the average costs even though they producing larger quantities as they expand

⁹'Economies of scope' is achieved when a firm becomes more efficient (lower average total cost of production) with producing multiple outputs

¹⁰Valuable: ...resources are valuable when they enable a firm to conceive of or implement strategies that improve its efficiency and effectiveness, rare: ...implementing a value-creating strategy not simultaneously implemented by large numbers of other firms, in-imitable: ...valuable and rare organizational resources can only be sources of sustained competitive advantage if firms that do not possess these resources cannot obtain them, and non-substitutable: ...there must be no strategically equivalent valuable resources that are themselves either not rare or imitable (Barney, 1991)

where knowledge could be one of many, the KBV proposes that knowledge-based resources are the single most important - they also fulfill the RBV's VRIN criteria since knowledge can be valuable, rare, difficult to imitate and non-substitutable. Essentially this is particularly relevant in the software development context, since source code, documentation etc. can only be considered at best *declarative knowledge*, whereas the employees' *tacit knowledge* and *know-how* is much more pervasive and difficult to transfer. Seen from a firm level, knowledge evolves through time dependent on the human resources, in effect this means that no two firms have accumulated experience the same way, they all travel their own unique path, and their future actions are consequently rooted in their past exploitations. This is referred to as *path dependency*¹¹. With regards to IT outsourcing the KBV raises many issues regardless of whether it is *BPO* or *KPO*. When a client procures software development from a vendor, they face issues such as: employee retention and motivational difficulties, and losing essential *know-how* to vendors. In abstention-based outsourcing this is unlikely to arise as an issue, given that the activities the vendor is responsible for never previously have been held in-house. Due to the inherent difficulties for firms to obtain and develop knowledge-based competencies, alternatives exist that does not require heavy investments needed in order to reap the benefits. Within IT outsourcing this is known as the previously mentioned *KPO*. In research, the KBV is useful in analyzing how knowledge is synthesized and transferred in client-vendor relationships and the resulting risks that arise.

Relational View

Where the RBV and the KBV focus heavily on what constitutes a CA by focusing on the internal resources, the RV extends the boundaries of the firm, and asserts that valuable assets can be co-developed between firms as *relation-specific assets* (Dyer and Singh, 1998). Indeed firms do not exist in a vacuum, but are influenced by their competitive and supportive environment. The *business ecology* (Lansiti and Levien, 2004) puts the firm in a symbiotic relationships in a much larger network, which is an issue neither the RBV or the KBV addresses explicitly. In order to develop relationships and create *relational rents*, there are four different (not mutually exclusive) approaches firms can pursue: a) *relation-specific assets* b) *knowledge-sharing routines* c) *complementary resources and capabilities* and d) *effective governance*. The RV provides a framework for clients and vendors to understand how to enter relationships that delivers value that is beneficial to both parties, and not just one party, through the development of relational rents.

¹¹Path dependency is a rephrasing of the simple statement that firms persist in making what they have made in the past; for existing firms, knowledge advances on the basis of its current information and ways of doing things (Kogut and Zander, 1992)

Dynamic Capabilities

The *Dynamic*¹² *Capabilities*¹³ of the firm (Teece, Pisano, and Shuen, 1997) is based on the firm's capacity to renew its competences (dynamic) while adapting internal and external capabilities to a changing environment. This is important especially for firms in highly competitive markets, that are required to innovate rapidly in order to maintain competitiveness. *Related diversification* is easily explained by the dynamic capabilities of the firm, as a result of matching internal and external competences to a changing environment, which in turn enables firms to enter related markets through product diversification. As with the RV, the dynamic capabilities of a firm addresses both the internal and external competences, whereas the RBV and the KBV focus exclusively on CA as a result of an internally developed competence. Value-creation is therefore not limited to internal factors, but derived through externally developed competences as well. In the context of outsourcing this is particularly interesting in terms of value or competences created through client-vendor specific relationships.

Transaction Cost Economics

The most frequently used theory in ITO is Williamson's (1975) TCE (Dibbern et al., 2004), which has been applied, discussed, as well as criticized frequently in the literature. The concept is built around *transaction costs* in contracting, as determinants for which mode of governance a firm should adopt. Simplistically, if the transaction costs are higher on the market, a firm should internalize and follow the hierarchical mode of governance. Although governance was initially divided between hierarchies and markets, Williamson has since then recognized the need for a hybrid model. In TCE the agent is furthermore restricted by *bounded rationality*, a result of imperfect knowledge in general - an agent has limited resources to draw upon to make decisions. Bounded rationality influences the decision making of the agent and he/she might face problems like *adverse selection* in the vendor-selection process, vendors displaying *opportunistic behavior* and *moral hazard, hold up* which can occur if clients outsource activities with high *asset specificity* leading to higher *switching costs*, that has limited use in other contexts. Thus, for the agent it is imperative to exercise caution and use all available resources to minimize risks. In research, TCE is often applied in make vs. buy decisions, meaning what are the derived consequences of internalizing vs. the consequences of outsourcing activities to external vendors and the related risks. The research ranges from analyzing activities in terms of high/low asset specificity to client-vendor relationships and the previously mentioned derived risks.

Summary

The above mentioned theories and concepts are useful in understanding the different lenses that can be applied to studying the outsourcing phenomenon, and

¹²... the capacity to renew competences so as to achieve congruence with the changing business environment; certain innovative responses are required when time-to-market and timing are critical, the rate of technological change is rapid, and the nature of future competition and markets difficult to determine (Teece et al., 1997)

¹³... the key role of strategic management in appropriately adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment (Teece et al., 1997)

therefore serve as an important highlight for the background theory - indeed this will become apparent in the next session where many of the articles are based on these ‘key concepts’. The next section will specifically discuss performance in the context of IT outsourcing. The goal is to gain an understanding of the contemporary literature within our context, especially what kind of measurements, data collection methods, unit of analysis’ that researchers previously have adopted and used to analyze performance in IT outsourcing.

4.2 Performance in IT outsourcing

Literature in the specific context of measuring the performance of outsourced ICT projects, has its implications for synthesis of new knowledge and development of hypotheses for this thesis. This is however not entirely unexpected, given the sparse amount of research conducted within this area. Therefore, developing a theoretical foundation for this thesis requires an extensive literature review. Accordingly, articles from 15 different journals spanning over three sub-themes (IS, management, and product development) have been selected, which serves as the basis for the content analysis. The purpose is to determine which measurements researchers previously have applied in measuring the performance and the key findings. From IS eight journals were selected from the ‘Association for Information System’ (AIS), the recommended journals, also referred to as the ‘Senior Scholars’ Basket of Journals.’ These include the following eight journals: *European Journal of Information Systems*, *Information Systems Journal*, *Information Systems Research*, *Journal of AIS*, *Journal of MIS*, *MIS Quarterly*, *Journal of Strategic Information Systems*, and *Journal of Information Technology*. For the management theme articles from five different journals were selected: *Journal of Management*, *Academy of Management Journal*, *Strategic Management Journal*, *Organization Science*, and *Management Science*. The last theme, product development, is based on articles from two journals: *Journal of Product Innovation Management and Research Policy*. With a time frame for each journal spanning from year 2005 to 2010, a database search was conducted with the keywords ‘outsourcing’ and ‘performance’. Referring to table 1, a detailed overview is provided for each search: how many articles in total for the period, how many articles the search yielded, and finally how many were selected for the final content analysis. From a total pool of 5,326 articles only 39 articles were deemed relevant, meaning they fulfilled the following criteria: the context was IT outsourcing and the research or review conducted was in some way related to the performance aspect. The following section will present the collected articles with respect to framework, research focus, variables, theoretical framework, analytical method, and main contributions.

An organizing framework (figure 1) based on the 39 research articles was developed. Analyzing the articles and organizing them within the same context, provides a considerably more sensible overview on several levels. Firstly, articles were grouped according to the way research was conducted, meaning antecedents, elements, and outcomes. Relating this topology to client-vendor relationships, is fundamental to the understanding of how the literature is organized. Antecedents can be described as the preceding circumstances (ex ante), in the most static sense, while elements (in situ) are the more dynamic exchanges between events that moderate each other or influence outcomes (ex post). The framework also includes the possibility of outcomes to influence elements (arrow 5). While it

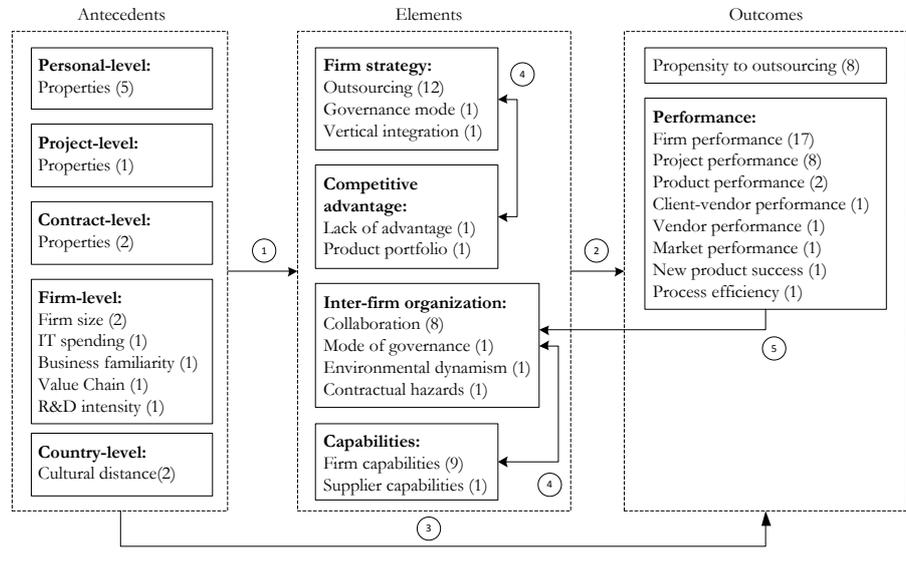
Table 1: Frequency analysis of outsourcing and performance articles by journal source (2005-2010)

<i>Journal</i>	<i>No. of articles</i>	<i>Search</i>	<i>Selected</i>
<i>Information Systems</i>			
European Journal of Information Systems	347	2	5
Information Systems Journal	161	0	1
Information Systems Research	173	2	2
Journal of AIS	162	1	1
Journal of MIS	256	6	6
MIS Quarterly	241	6	6
Journal of Strategic Information Systems	184	13	2
Journal of Information Technology	181	51	2
<i>Management</i>			
Journal of Management	289	0	1
Academy of Management Journal	440	1	2
Strategic Management Journal	437	5	3
Organization Science	340	0	0
Management Science	885	5	1
<i>Product Development</i>			
Journal of Product Innovation Management	463	2	2
Research Policy	767	1	1
<i>Others</i>			
Business Source Complete		225	3
Recommended articles		4	2
Total:	5,326	323	39

may seem somewhat counter-intuitive that outcomes can influence elements, it makes sense when viewing time as a constant, where an outcome can influence ‘future’ elements, that eventually will influence outcomes. One such article exists and found that client-vendor collaboration was influenced by project performance outcomes. By viewing the framework it quickly becomes apparent that the majority of the articles are based in the elements and outcomes section. Specifically, focus is on the elements, firm strategy, inter-firm organization, and capabilities, and their influence on each other and outcomes. In outcomes, focus is predominantly on firm performance and project performance. It should be noted however, that the numbers are not mutually exclusive, given an article can have focus on more than one relation, which often was the case with the selected articles.

Extending the framework and aiding in describing in more details the research focus of all the articles, a summary can be seen on figure 2. For each article the method, unit of analysis, and findings were condensed and aggregated into its relevant section. While liberties have been taken, due to lack of information, the overall validity of the elements remains wholly intact. The right column represents the frequency of the particular topic in the overall framework, and is therefore not related to the overall number of articles. As previously noted the elements-outcomes relationship is representative for a large majority of the articles. Especially in terms of firm strategy, collaboration, and capabilities’ influence on performance in IT outsourcing. These findings are entirely consistent

Figure 1: Organizing framework derived from content analysis of the literature of all 39 articles



when compared to the more developed literature on general IT outsourcing, where firm strategy is often observed for how it moderates the impact of outsourcing. The second highest occurrence of topics is the analysis of how antecedents influence outcomes (arrow 3), this is related to how firm-level and personal-level factors influence performance. The remaining topics are dispersed evenly amongst the relationships, providing some support of the broad focus adopted by researchers when analyzing performance of outsourcing.

Where possible, and meaningful, the dependent and independent variables of the articles that used a quantitative measurement model, were classified in their respective tables accordingly (table 3 and table 4). In several cases the articles used more than one dependent variable, thus the numbers represented in the table are mutually exclusive. The by far most frequently represented variables (dependent) were objective performance (11) and subjective performance (6). In almost all of the articles the dependent variables employed would be unique to the study, and the only shared variables between studies would be found by the independent variables. Following the objective and subjective performance measurements, the third highest frequency of occurrence was related to a cost perspective. The remaining variables differed tremendously and few could be grouped meaningfully. With respect to the independent variables, they offered much more compliance when related to classification themes. Financial (10), strategic (7), performance (7) and outsourcing (7) related variables were the top four most adopted measurement types, with vendor and contract based measurements following closely. The use of independent variables varied incredibly from few independent variables to multiple. In some cases the dependent and independent variables were used interchangeably.

The theoretical foundations (table 5) upon which the research articles rested, varied also, though with some observed similarities. Although ‘other framework’

Table 2: Research focus of all 39 articles'

<i>#</i>	<i>Research focus</i>	<i>Frequency</i>
1.	To analyze how antecedents influence elements (Arrow 1)	5
	Personal level factors that influence firm capabilities	1
	Firm level factors that impact firm strategy	1
	Firm level factors that influence the use of collaborative agreements	1
	Country level factors that influence firm capabilities	1
	Country level factors that influence mode of governance	1
2.	To analyze how elements influence outcomes (Arrow 2)	25
	Consequences of firm strategy on performance	8
	Impact of collaboration on performance	5
	Impact of firm capabilities on firm performance	3
	Influence of organizational learning capabilities on performance	2
	Influence of environmental dynamism on performance	1
	Influence of environmental dynamism on propensity to outsourcing	1
	Influence of contractual hazards on propensity to outsourcing	1
	Influence of firm capabilities on propensity to outsourcing	1
	Influence of portfolio size on performance	1
	Impact of outsourcing on performance	1
	Influence of strategy on propensity to outsourcing	1
3.	To analyze how antecedents influence outcomes (Arrow 3)	14
	Firm level factors that influence performance	3
	Personal level factors that influence firm performance	3
	Personal level factors that influence propensity to outsourcing	2
	Contract level factors that influence firm performance	1
	Firm level factors that influence propensity to outsourcing	2
	Country level factors that influence performance of projects	2
	Project level factors that influence firm performance	1
4.	To analyze how elements influence each other (Arrows 4)	5
	Relationship between firm strategy and firm capabilities	3
	Relationship between CA and collaboration and firm capabilities	2
5.	To analyze how outcomes influence elements (Arrow 5)	1
	Impact of performance on collaboration	1
6.	Literature review articles	1
	Total:	51

(11) shared the highest frequency with TCE (11), many of the discussed theoretical concepts such as: RBV (8), agency theory (7), and KBV (3) were also applied. While it may seem surprising that many of the articles did not subscribe to a single or more well-known theories, most of them did discuss them as a part of their literature review.

Observing the applied analytical methods in all of the empirical articles it was already establish that 29 articles adopted a quantitative measurement model, and the remaining majority of articles (6) adopted a qualitative measurement model. The last two categories are based on framework and theory development, (2) and literature review articles (2). This is especially important to this thesis - that the majority of researchers adopted a quantitative approach. This relates to the generalizability of findings and ways of comparison they allow. Qualitative articles tend to be more strict and difficult to compare, since they are often highly dependent on the context in which they were analyzed. A further discussion on the impact of analytical method on this thesis will be provided in the methodology section.

Table 3: Dependent variables employed by the 29 articles that use a quantitative measurement model involving at least one independent variable

<i>Dependent variable</i>	<i>No. of times used</i>
Objective performance	11
Subjective performance	6
Cost	4
Satisfaction	2
Contract	2
Supplier factors	1
Decision Support Systems (DSS)	1
Online Transaction Processing (LPT)	1
Firm size	1
Successful relationship	1
Willingness to report bad news	1
Consulting fees	1
IT outsourcing decision	1
Market reaction to IT outsourcing announcements	1
Managerial likelihood of outsourcing	1
Penalty	1
Relational norms	1
Harmonious conflict resolution	1
Mutual dependence	1
Trust	1
Strategic flexibility	1
Product portfolio	1
New product success	1
Integrative capabilities	1
IT usage in NPD projects	1
Speed to market	1

4.2.1 Performance in software development

There are many factors involved in outsourcing software development to a vendor, and balancing those factors are critical prerequisites that need to be resolved in order to achieve successful outcomes. Issues can arise in terms of transferring knowledge from the client to vendor (or reverse in the case of insourcing), vendor fulfillment of milestones, delays, cost, documentation, and quality. The performance related issues have been addressed in a few of the selected articles.

Innovation and New Product Development

Innovation and NPD differentiates itself from standardized outsourcing on several levels. Three articles emphasize the impact on performance caused by these differences in terms of: antecedents to achieving superior performance, evaluating supplier performance, and adoption of IT tools.

It is imperative to emphasize the notion, that while managing outsourced projects once they are underway is important, determining the antecedents to achieving superior performance is of equal importance to the client and the vendor. Stanko and Calantone (2009) applied both TCE and RBV in order to understand the influence of outsourcing on performance in the context of NDP or innovation. They identified several antecedents to outsourcing, that have not

Table 4: Independent variables employed by the 29 articles that use a quantitative measurement model involving at least one independent variable

<i>Independent variable</i>	<i>No. of times used</i>
Financial	10
Strategy	7
Performance	7
Outsourcing	7
Vendor	6
Contract	6
Strategy	5
IT	5
Customer	4
Theory of the contracting organization	4
Client	4
Personnel	4
Cost	3
Culture	3
Process	3
Vertical integration	2
Trust	2
TCE	2
Capabilities	2
Agency theory	2
Learning	2
Investment	2
Supplier	2
Familiarity	2
CEO	2
Technology	2
Software development	2
Conflict	2
Norms	2
Knowledge-based theory	1
Governance structure	1
Project	1
Leverage	1
Mutual dependence	1
Environmental dynamism	1
Strategic significance	1
Number of services initiated, but not finalized	1

previously been addressed here including *appropriability*¹⁴ and the path to CA. Stanko and Calantone (2009) also recognize the gap in the outsourcing literature as highlighted by the following quote:

“Until this point, research has mainly examined the decision to outsource or internalize, leaving many important questions outstanding with respect to how to best manage outsourced projects once they are underway.” (Stanko and Calantone, 2009)

They also identified various implications of performance: outsourcing’s impact

¹⁴The extent to which results from innovative activities can be protected and are not easily diffused within an industry (adapted from Veugelers & Cassiman, 1999) as cited in Stanko and Calantone (2009)

Table 5: Theoretical frameworks used by all 39 articles

<i>Theoretical framework</i>	<i>No. of times used</i>
Other framework	11
Transaction cost economics	11
Resource-based view	8
Agency theory	7
None or not specified	3
Knowledge-based view	3
Resource dependency theory	1
Dynamic capabilities	1
Relational governance	1
Contractual governance	1
Valuechain framework	1
The balanced scorecard	1
The information processing view of the firm	1
Game theory	1
Capability sourcing	1
The contracting organization	1
Absorptive capacity	1
Five-factor model	1
Sensemaking	1

on *speed*, *quality* and *profit*¹⁵, appropriateness of outsourcing, and assessing the long term implications of outsourcing decisions.

le Dain et al. (2009) developed, in the same context of innovation in NPD, a supplier's performance evaluation framework. The role a vendor takes in NPD is according to le Dain et al. (2009) dependent on the nature of the project, which can be either *collaborative development*¹⁶ or *collaborative design*¹⁷. They argue that supplier evaluation consists of evaluating the firms' capabilities and performance. Measuring performance should be done accordingly in each phase of their supplier's performance evaluation framework. Therefore the following should be measured in terms of a) relevance of cost estimation in phase 1, b) compliance with the target cost in phase 2, and c) the price stability in phase 3. The proposed framework serves as a useful addition to analyzing supplier performance seen from a client perspective, which is relevant especially in this thesis, given that the case-study is applied from the client perspective.

Barczak et al. (2008) were unable to find support for their performance related hypothesis (greater usage of IT tools would lead to higher performance and speed to market), but they were able to establish the following relationship: the greater the embeddedness of IT in a firm and the more formal the NPD process, the higher the IT usage in NPD projects. Although this does not lead to any outcome based results, there could be an important relation to level of CMMI and adoption IT and its influence on performance.

¹⁵Given the article reviews research it unfortunately has not applied or described the metrics in detail

¹⁶... the ability of an original equipment manufacturer to develop competitive, customer-focused product in partnership with its first tier supplier (Wyatt et al., 1997, p. 34) as cited in le Dain et al. (2009)

¹⁷... the customer provides functional requirements (performance, interface requirements, space constraints...), and the supplier takes responsibility for the supplied item from the design to the manufacturing ramp-up (le Dain et al., 2009)

Table 6: Main contributions by all 29 articles that use a quantitative measurement model

<i>Author</i>	<i>Main contribution(s)</i>	<i>DV/IV</i>
Seddon et al. (2007)	Cost savings was found to be positively associated with satisfaction, while specialization, market discipline, and flexibility was not.	Satisfaction/specialization, market discipline, and cost savings
Duan et al. (2009)	External valuation of BPO announcements: primary business processes have a stronger positive impact on firm valuation than those of supportive processes. In abstention-based BPO no difference was observed between primary/supportive and in case of disintegration-based BPO the valuation effect was greater for primary than supportive.	Stock abnormal return/value chain position and process ownership
Berg and Stylianou (2009)	Companies engaged in a differentiation strategy will consider supplier factors more important and companies that employ a differentiation or niche strategy will put less emphasis on cost factors. Finally there was observed variation when considering firm size. Compared to smaller companies, larger considered supplier and technology factors less important compared to cost factors.	Supplier factors, DSS, OLPT, firm size, and cost factors/cost leader, niche, differentiator, supplier factors, internal factors, technology factors, and cost
Bharadwaj et al. (2010)	BPO outcome and outsourcing management competence of the client positively affects the likelihood of building a successful relationship between the client and the service provider.	Successful relationship/BPO outcome, client outsourcing management competence, service provider's BMPC, and service provider's ITMC
Keil et al. (2007)	In measuring the cultural differences between USA and South Korea: Controlling for culture, a blame-shifting opportunity will be associated with a greater willingness to report bad news than if no such blame-shifting opportunity is present. Korean's are more willing to report bad news when there is an opportunity, than when there is not. US subjects are more likely to report bad news, compared to Korean's, when an opportunity to shift blame is present.	Willingness to report bad news/blame-shifting opportunity (present or absent) and national culture (mianzi-dominant culture, in which lian aspect of face is salient)
Iyer et al. (2006)	In their asset management/margin management framework (2x2) they showed that underperforming (low asset management or margin, or both) firms feel pressured to perform, consequently consulting expenditures were found to be a consequence of firm performance.	Consulting fees/median fees, earnings margin, asset turnover, market-to-book, cash reserve, receivables, inventories and fixed assets
Hall and Liedtka (2005)	Poor overall firm performance was shown to drive large-scale IT outsourcing decisions while operating expenses was found to be positively associated with subsequent large-scale IT outsourcing decisions. Cash levels were negatively associated with large-scale IT decisions, while CEO stock option grants were positively associated. On a personal-level holding option grants as a constant, higher proportions of annual CEO compensation to CEO compensation was associated with increased incidence of large-scale IT outsourcing.	IT outsourcing decision, firm performance, firm operating expense levels, leverage, CEO stock option grants, and high levels of annual to total compensation
Bardhan et al. (2006)	Plants with higher levels of IT spending and those who pursue high-quality strategies are more likely to outsource production processes. Ex post performance of outsourcing includes the likelihood of realizing lower plant costs and achieving greater improvements in product quality. Furthermore plants with higher IT spending are more likely to achieve lower plant costs and realize greater improvements in product quality. Finally plants with high degree of supplier integration are more likely to realize improvements in product quality.	Production outsourcing, plant cost, and production quality/IT spending, low-cost strategy, high-quality strategy, hybrid strategy, and supplier integration
Oh et al. (2006)	The market's reaction to IT outsourcing announcements will be inversely related to the size of the IT outsourcing contracts, and positively related when the stated goal is cost reduction. The stock market's reaction to IT outsourcing announcements were also found to be inversely related to the degree to which the outsourced resources were asset specific. Finally, the reaction to outsourcing was positively related to the size of the IT service provider for a given contract size.	Market reaction to IT outsourcing announcements/contract size, monitoring difficulty, asset specificity, cultural similarity, and vendor size

Table 7: Main contributions (continued)

<i>Author</i>	<i>Main contribution(s)</i>	<i>DV/IV</i>
Tiwana and Bush (2007)	TCE: the higher the managers perceive the vendor's cost advantage to be, relative to the clients, the higher the likelihood that they will outsource it, given a competitive vendor market. Conversely the higher the threat of opportunism perceived by the manager, the less the likelihood that the process will be outsourced. Furthermore, higher levels of perceived technological complexity is associated with higher likelihood of outsourcing. Agency: the higher observability (of the vendor) present the more likely outsourcing will occur. KBV: managerial perceptions of their firm's internal technical knowledge in the project's domain, the lower the likelihood of outsourcing, while the more requirements can be specified, the higher the likelihood that it will be outsourced. Lastly, the higher the project requirements volatility, the lower the likelihood it will be outsourced.	Managerial likelihood of outsourcing/TCE, agency theory, and knowledge-based theory
Ramachandran and Gopal (2010)	Managerial judgment of project process performance is influenced by diagnostic inputs such as size-adjusted project cost and duration and judgment is influenced by anticipated input risk factors even in the presence of more diagnostic objective process performance metrics.	Subjective assessment of process performance/requirements instability, technological complexity, and inadequacy of trained personal, and contract type
Ramasubbu et al. (2008)	Increasing investments into know-how will increase productivity and investments into know-why will improve the quality of the software development.	Project performance/process investments, and work dispersion
Gefen et al. (2008)	Vendors with higher business familiarity were awarded more TM contracts and the contractual relationship was managed differently in terms of controls, but not on the monetary side.	Price, penalty, and type of contract/business familiarity
Goo et al. (2009)	By investigating the relationship between formal contracting and relational governance, their findings include favoring developing structured SLAs even when facing difficulty in defining contractual content ex ante. Well structured SLAs has the potential to develop relational attributes in the sense that formal contracts may affect the self-enforcing nature of relational governance.	Relational norms, harmonious conflict resolution, mutual dependence, trust, and commitment/foundation, change, and governance characteristics of SLAs, harmonious conflict resolution, mutual dependence, relational norms, and trust
Rai et al. (2009)	Offshore IS project success is positively influenced by having a client member on the offshore team (client participation), information exchange by mutual visits, and trust. Conversely, cultural dissimilarities will negatively influence offshore IS project success.	Cost overruns/client norms, cultural values, and dummy variables (client rep., client meet, and team meet), and trust
Mani et al. (2010)	When a misfit between IR and IC occurs exchange performance is impaired. Additionally, transformational BPO will be associated with higher levels of dissatisfaction, compared to transactional BPO, when a misfit occurs.	Exchange performance/governance structure, relational processes, and relational technologies
Liu and Yetton (2009)	Vendor-based project sponsorship has a positive effect on vendor performance (quality), but not on time and cost, which works independently from sponsorship.	Project performance capability/sponsor %, sponsor responsibility %, and project performance
Gwebu et al. (2010)	Firms that outsourced their logistics-related IT demonstrated an improvement in performance on the inbound processes. Firms that outsourced their IT demonstrated an improvement in performance on their supportive processes. On measuring process-level and firm-level performance, the authors suggest process-level measurements to more accurately portray an improvement derived from outsourcing.	Inbound processes, operating processes, outbound processes, and supporting processes/performance (logistics, operation, outbound logistics, and IT)
Gilley and Rasheed (2000)	No support for peripheral outsourcing leading to improved firm performance and core outsourcing leading to negative firm performance.	Firm performance/core outsourcing, peripheral outsourcing, business-level strategy, environmental dynamism, strategic significance, and outsourcing intensity

Table 8: Main contributions (continued)

<i>Author</i>	<i>Main contribution(s)</i>	<i>DV/IV</i>
Mayer and Salomon (2006)	In the presence of strong capabilities, contractual hazards (from hold-up) and internal governance decrease and contractual hazards from appropriability and internal governance is unaffected.	Subcontract/contractual hazards and technological capabilities
Nadkarni and Herrmann (2010)	Found that CEO emotional stability, extraversion, and openness to experience was positively related to strategic flexibility while conscientiousness was negatively related. Agreeableness was found to have an inverted-U relationship with strategic flexibility. Lastly, strategic flexibility was found to be positively related to firm performance, and acted as a mediator between CEO personality and firm performance.	Strategic flexibility and firm performance/ CEO personality
Rothaermel et al. (2006)	The interaction between vertical integration and strategic outsourcing has a positive effect on number of related product in the firm's portfolio. The effects of strategic outsourcing on the size of a firm's product portfolio, new product success, and firm performance are characterized by diminishing returns such that the relationships resemble an inverted U-shape, while for vertical integration only product portfolio follows same pattern. Finally, a firm's product portfolio effects new product success and firm performance to the extent that it also resembles an inverted U-shape.	Product portfolio, new product success, and firm performance/vertical integration and strategic outsourcing
Weigelt (2009)	Higher degree of outsourcing results in lower integrative capabilities and performance. Prior experience with technologies mitigates the negative effects on capabilities and performance.	Integrative capabilities and performance/ degree of outsourcing and prior experience with related technologies
Novak and Stern (2008)	For a project with both initial and ongoing quality dimensions, initial performance is lower, and performance improvement is higher, for higher levels of vertical integration. However, initial performance won't be hampered for firms that have higher levels of ex ante experience or knowledge, or both. The impact of outsourcing in performance will be muted in the absence of a globally innovative external contractor. The impact of vertical integration on performance improvement will be higher in environments where opportunities for learning are higher.	Performance/vertical integration, ex ante capabilities, level of external expertise, and opportunities for learning
Barczak et al. (2008)	The greater the embeddedness of IT in a firm and the more formal the NPD process the higher the IT usage in NPD projects.	IT usage in NPD projects, speed to market, and market performance/speed to market, market performance, IT infrastructure, IT embeddedness, IT usage, NPD process formalization, %colocation team members, %outsourcing NPD projects, and length of time on job
Tsai and Wang (2009)	Larger firms may have an innovative advantage compared to smaller firms and internal effort in R&D activities have a significant effect on innovation performance	Techn. innovative performance/firm's investment in internal R&D
Jiang et al. (2006)	There was not found any significant improvement in the outsourcing firm's productivity and profitability (compared to control firms, that did not outsource)	Cost efficiency, productivity, and profitability/outourcing
Thouin et al. (2009)	IT with low asset specificity costs more than outsourcing it and results in greater financial performance	Financial performance of an IHDS/level of low asset specificity IT outsourcing
Bustinza et al. (2010)	Correct externalization leads to increased core competitive capabilities and development of CA that is positively linked to firm performance	Competitive capabilities and firm performance/benefits of outsourcing and impact on competitive capabilities

Software development processes

Outsourced software development projects are in most cases conducted through tested standardized software development processes, that promote transparency and documentation of the development effort. Two articles analyze how the performance of software development may be affected by offshoring, and the fit between information capabilities and information requirements.

In the context of software engineering or software development processes Ramasubbu et al. (2008) measured how the negative effects of offshore outsourcing could be mitigated in software development projects. They performed a quantitative study of 42 software development projects in a large CMM (*Capability Maturity Model*¹⁸) level five certified firm. They measured the DVs *productivity* and *quality* through IVs such as *process investments*, *work dispersion*, *learning investments*, *software size* and more. Where productivity is: “the ratio of the software size (output) delivered in the projects to the total effort (input) invested in the project,” and quality is: “the inverse error rate or the ratio of software code size to the number of unique problems reported by the customers during the acceptance tests and during the warranty period before the project is finally accepted.” Process is defined as: “activities, methods, practices, and transformations that people use to develop and maintain software and its associated products.” Their findings include:

“... investments in the structured key process areas specified by the CMM framework tend to mitigate the negative effect of work dispersion on productivity and quality.”

“While investments in conceptual learning contributed to improved quality, operational learning investments were associated with improved productivity.” (Ramasubbu et al., 2008)

In describing *operational learning* and *conceptual learning* they refer to the former as being focused on obtaining *know-how*, whereas the latter is primarily related to obtaining *know-why* (cause-and-effect relationships). This can to an extent be related to *single-loop* and *double-loop* learning by Argyris and Schon (1978). Thus, the researchers found that while increasing investments into know-how will increase productivity, investments into know-why, on the other hand will improve the quality of the software development. Finally, they found that investments into process improvement models such as the CMM can mitigate the negative effects caused by work dispersion. Anecdotal evidence has also previously suggested, that vendors subscribing to process improvement models such as the CMMI perform well as a result of the formal methods adopted, as prescribed by the framework. Furthermore, the stringent requirements to documentation makes development efforts less susceptible to *requirements creep*¹⁹. The highlighted measurements are useful in trying to understand the difference in performance between projects, for example where one is standardized whereas the other is innovation-based - the nature of a development project has an impact on the effort and specializations required to successfully complete them.

¹⁸The Carnegie Mellon Software Engineering Institute’s CMM has been superseded by the newer version, the ‘Capability Maturity Model Integration’ (CMMI) - there are five different levels (1-5) that firms can be certified where one is the lowest and five is the highest

¹⁹Changes to a projects scope as a result of (but not limited to) poor documented or undefined requirements

Where Ramasubbu et al. (2008) realized that different types of knowledge resulted in different types of improvements to development processes, Mani et al. (2010) focus on *exchange performance* as a result of the fit between *information capabilities* CA and *information requirements* (IR). Exchange performance was measured as a service satisfaction on four different levels of a Likert-scale from one to seven: reliability, responsiveness, systematization, and innovation. The control variables includes: firm size, tenure, mutual trust, environmental dynamism, outsourcing experience, and industry effects. The researchers found that there was a higher level of dissatisfaction when a misfit between IR and IC occurred in transformational BPO than in transactional BPO. Some of these effects are likely to be attributed to the nature of the difference between transactional and transformational BPO. Since transformational BPO creates greater interdependence, a failure of transformation BPO will more likely result in a negative perception (satisfaction) towards the vendor, compared to a transactional exchange of services. It is therefore expected that transactional BPO will perform better than transformational BPO when measured on levels of satisfaction. While objective measurements can often be attributed, and a result to many different causes, non-objective measurements like satisfaction may potentially enable respondents to evaluate criteria based on their own value-assessment on what is important and what is not.

Managerial judgment

The performance of software projects may be affected by managerial influence though their subjective assessment and evaluation of projects. Furthermore the failure to report bad news by the involved parties may also negatively influence the performance.

On a managerial level Ramachandran and Gopal (2010) analyzed the ex ante and ex post subjective assessment of *process performance*²⁰ based on how managers were influenced by *diagnostic*²¹ and *non-diagnostic*²² information. They found that judgment and subsequently perceived performance would be influenced by diagnostic inputs such as size-adjusted project cost and duration, and that judgment could be influenced by anticipated input risk factors even in the presence of more diagnostic objective process performance metrics. This is referred to as the *input bias*²³. A manager's perceived assessment of performance of a project can have a fundamental impact on future projects in a firm, if he/she is subject to input bias. This study highlights an important area relevant in the terms of adopting subjective measurements of performance - ex ante and ex post subjective assessments may diverge if a manager is influenced by input bias, thus potentially coloring the ex post performance assessment.

Recognizing that a project can be severely hampered by the failure of managers' ability to report 'bad news', Keil et al. (2007) sought to understand the cultural differences between the US and South Korea in terms of willingness to report bad news (DV). When controlling for culture, when a blame-shifting

²⁰Control over project costs, control over project schedule, and adherence to audit and control standards.

²¹Set of data that a decision maker should predicate his or her judgment on because it helps discriminate between outcomes of interest.

²²Information that may be available to the decision maker but does not represent the most accurate, timely, or suitable input into the judgment task.

²³Systematic misuse of input information in making judgment of outcomes.

opportunity was present, it was associated with a greater willingness to report bad news, compared to if no such blame-shifting opportunity was present. Thus, both the US and the South Korean participants in the research experiment would opportunistically be more willing to displace the focus of failure by blaming another party. Cultural differences did however exist and the American participants were found to be more likely to report bad news, compared to the South Koreans, when an opportunity to shift blame was present. If one looks exclusively at the performance or projects, by proposing a system that would allow for more opportunities for blame-shifting, bad news could potentially be reported more often. This could however have adverse effects on client-vendor relationships, if some client-side managers, when given the chance, are more prone to blame vendors for failures, which some anecdotal evidence indeed suggests.

4.2.2 Performance in strategic outsourcing

The vast majority of the articles selected from the various journals all focus on the implications of outsourcing either core or peripheral²⁴ activities. The majority of the empirical findings, although distinctly different measures were adopted, fail to corroborate the concept of strategic outsourcing - vertical integration on core activities while performing vertical dis-integration of non-core activities. Despite the discrepancies they all offer interesting insights into different kinds of metrics, that can be applied to measure performance of general IT outsourcing.

Core vs. peripheral outsourcing

Four of the selected articles analyze how outsourcing of core activities versus peripheral activities results in different performances measured as: firm valuation, firm performance, financial and non-financial performance of outsourcing relationships, and core capabilities.

In the context of ITO, Duan et al. (2009) studied 298 BPO announcements from year 1998-2005 and included abstention-based outsourcing, which they refer to as “not make”, meaning the outsourcing of activities that have not previously been held in-house. In order to study the performance, they used purely objective (financial) measurements being *stock abnormal return*²⁵ in response to a BPO decision (DV). While they could not find support for their first and third hypothesis, that BPO will positively impact firm valuation, they nevertheless found some interesting results. They found that BPO of primary activities had a stronger impact on firm evaluation, than those of supportive processes. Furthermore, their findings suggested that in abstention-based BPO the valuation effect of primary BPO was no different than that of supportive BPO. Finally, they found that when performing disintegration-based BPO, the valuation effect was greater for primary BPO than that of supportive. Consequently, firms that outsource primary activities are perceived to achieve higher performance than that of peripheral activities. One could speculate that there is not any perceived increase in value for firms outsourcing abstention-based BPO whether it being the primary or support activities. If the activities have not previously been held in-house, it could suggest that they are not part of the firm’s current primary core activities. Another study adopting the same approach by measuring the

²⁴Also frequently called support

²⁵Abnormal Return = Actual Return - Normal Return

market's reaction to IT outsourcing announcements, found that announcements were inversely related to the size of the IT contracts and positively related, when the stated goal was cost reduction (Oh et al., 2006). Furthermore, they found that the announcements were inversely related to the degree to which the outsourced resources were asset specific. The stock market reaction thus favors contracts with the purpose of cost savings, and perceive them negatively when outsourcing asset specific resources, in line with TCE - evidently the findings of Oh et al. (2006) directly contradict Duan et al. (2009) on external valuation of primary/core activities.

Using TCE as basis for measuring firm-level performance, Thouin et al. (2009) analyzed 1,444 Integrated Healthcare Delivery Systems (IHDS) in 2003. They measured the DV financial performance, defined as "the ratio of total annual revenue to total annual cost for an IHDS." The IV was level of networking and telecommunication services outsourced. As for control variables they used: IT budget, PC availability, data center integration, and IT personnel. Their findings include:

"Internal IT that is low in asset specificity has a greater cost than IT that is outsourced resulting in greater financial performance of low asset specificity IT that is outsourced. Findings lend preliminary support for organization to look first to shift low asset specificity IT to outsourced vendors prior to investing in internal IT." (Thouin et al., 2009)

Hence, they lend support to the fact that procuring non-core (and low asset-specific) activities from external vendors result in greater financial performance. Even though it might seem as a direct contradiction to the previously discussed studies (Weigelt, 2009; Novak and Stern, 2008), their findings rest on different assumptions. Weigelt (2009) measured the rate of adoption of end-users or consumers, whereas Thouin et al. (2009) measured the financial performance. Indeed most anecdotal evidence has suggested that activities that are standardized can smoothly be outsourced. Lastly, the services outsourced were different with regards to users. In the former it was customer-facing technologies whereas the latter was primarily focused on infrastructure (networking etc.) outsourcing.

In a quantitative survey Gilley and Rasheed (2000) measured the financial as well as non-financial performance of outsourcing-relationships. They distinguish between two types of outsourcing: *peripheral* and *core outsourcing*. They refer to outsourcing reliance as a function of breadth (ratio of outsourced activities to total activities performed) and depth (average percentage of each outsourced activity that is being provided by external suppliers) of the outsourced activities, also called *outsourcing intensity*. Contrary to newer findings (Thouin et al., 2009; Bustinza et al., 2010; Duan et al., 2009), Gilley and Rasheed (2000) were unable to find support for their hypotheses that peripheral outsourcing intensity has a positive effect on firm performance, and core outsourcing intensity has a negative effect on firm performance.

Bustinza et al. (2010) sought to determine whether or not correct externalization of activities would ensure increased core competitive capabilities, as well as understanding the impact outsourcing decisions have on the development of CA, and capabilities linked to firm performance. They divided performance into two sub-measurements, *firm performance* and *organizational performance*. The

former is based on objective measurements such as ROA²⁶, ROE²⁷, ROI²⁸ and so forth. The latter is based on a number of complaints, degree of loyalty of customers, time between request and delivery for service and a few more. The study was quantitative and consisted of 213 questionnaires (using a seven-point Likert scale) that was received from service companies based in Spain. Both hypotheses were supported and further strengthen the notion that correct outsourcing can lead to increased firm performance through the development of competitive capabilities. This challenges the findings of Weigelt (2009), that outsourcing compromises firms' integrative capabilities and performance, but corroborates the previously discussed findings of Thouin et al. (2009).

Firm capabilities

Another interesting quantitative study conducted by Weigelt (2009) looked through archival and survey data from 94 U.S. banks that participated in two sequential surveys on the topic of Internet outsourcing strategies. The goal was to find out whether or not outsourcing had an impact on a firm's *integrative capabilities*²⁹. Weigelt (2009) makes an interesting distinction between manufacturing industry process outsourcing and customer-facing technologies. While the former may be shielded from the consumer or customer, it is not possible when outsourcing customer-facing technologies. This has, as will be evident, a profound effect in this industry (financial), where the clients are in direct contact with the technologies developed by externally contracted vendors. The DV was integrative capabilities and performance in the market. The performance in the market is measured in terms of customer adoption (percentage of the bank's total customer base that regularly checks balances online) while the integrative capabilities are assessed on a seven-point Likert scale as follows³⁰:

“...bank (a) is capable of customizing standardized off-the-shelf technology to its Internet applications, (b) is capable of developing future applications of Internet banking services, and (c) has adequate IT skills to operate Internet banking in-house.” (Weigelt, 2009)

The IVs were the degree of outsourcing measured from 0-100 and prior experience in related technologies. Weigelt (2009) found that the more firms outsourced, the lower their subsequent integrative capabilities and performance would be on the market. However, he also found that prior experience in related technologies could mitigate some of the negative effects on both integrative capabilities and performance. Although these findings seemly contradict those of Duan et al. (2009), they are not directly comparable due to the differences in applied measurements. Additionally, these findings suggest that vertical integration (findings include lower rate of customer adoption with more outsourcing) is more beneficial to firm performance than vertical dis-integration, proposed by the concept of strategic outsourcing. In fact, Novak and Stern (2008) provide some support of the findings that the negative effects can be mitigated by prior

²⁶Return On Assets = Net Income / Total Assets

²⁷Return On Equity = Net Income / Shareholder's Equity

²⁸Return On Investment = (Gain from Investment - Cost of Investment) / Cost of Investment

²⁹... a firm's capacity to use and assimilate a new technology into its business processes and build upon it (Helfat and Raubitschek, 2000) as cited in Weigelt (2009)

³⁰Weigelt (2009) page 604 - “Dependent variables”

experience in related technologies. One of their key findings include that for higher levels of vertical integration, initial performance would be lower, but subsequent performance improvements would be higher. However, the initial performance drop could be alleviated by higher levels of ex ante experience or knowledge (or both) as Weigelt (2009) stipulated. In relation to vertical integration Rothaermel et al. (2006) studied the impact of vertical integration and strategic outsourcing on *product portfolio, new product success, and firm performance*. They found that the interaction between vertical integration and strategic outsourcing had a positive effect on the number of related products in the firm's portfolio.

Firm strategy

A batch of articles has explored the intricate relationship between firm strategy and the subsequent impact or consequences for performance.

Adopting a firm-level approach, Gwebu et al. (2010) sought to understand the performance implications of outsourcing through Porter's *value chain* model. Thus, the following processes were analyzed: *inbound processes, operating processes, outbound processes, and supporting processes*. The authors found that firms that outsourced their logistics-related IT demonstrated an improvement in performance on the inbound processes, and firms that outsourced their IT demonstrated an improvement in performance on their supportive processes. Interestingly though, the authors noted that in terms of measuring performance, process-level measurements should be more accurate than firm-level.

In terms of strategy in client-vendor relationships, Berg and Stylianou (2009) found that firms engaged in differentiation strategy would consider supplier factors more important. Furthermore, firms engaged in differentiation or niche strategy would put less emphasis on cost factors. Finally, when comparing firm size, compared to smaller firms, larger firms considered supplier and technology factors less important compared to cost factors. Bardhan et al. (2006) also studied the effects of firm strategy³¹ on performance. They found that for plants that had higher levels of IT spending and pursued high-quality strategies would be more likely to outsource production processes. Additionally plants with higher IT spending would be more likely to achieve lower plant costs and realize greater improvements in quality. Finally, the level of supplier integration had an effect, such that the higher the integration, the higher the subsequent improvements in quality. This corroborates to an extent Berg and Stylianou (2009) that proposed that firms pursuing a niche-strategy (or differentiation) would place less emphasis on cost factors.

Jiang et al. (2006) analyzed the operational performance of 51 publicly traded firms on three levels: *cost efficiency, productivity, and profitability*. They refer to cost efficiency as the ratio of outputs to inputs. There may be an inherent problem with applying profitability as a measurement for performance, due to the fact that compared to revenue, profit can be manipulated since it is a summed figure and has multiple dependencies such as on depreciation of assets. Revenue on the other hand is harder to manipulate (Olson et al., 2008). The performance was measured by comparing the performance of firms outsourcing with firms not outsourcing. They were unable to find any significant improvements in

³¹Low-cost strategy, high-quality strategy, hybrid strategy, and supplier integration

the outsourcing firms (compared to the non-outsourcing) in terms of either productivity or profitability. However, they were able to provide evidence for cost savings for firms outsourcing, this is to an extent contradicted in Seddon et al. (2007) that were unable to establish a relationship between satisfaction and cost savings in outsourcing.

Iyer et al. (2006) proposed a 2x2 framework (asset management/margin management) that suggest that firms that would under-perform in one or both areas, would feel pressured to perform. Consequently, consulting expenditures were found to be a consequence of firm performance. Thus, firms under-performing would be more likely to spend more on consulting expenditures, all things held equal. On a related note Hall and Liedtka (2005) found that poor overall firm performance was shown to drive large-scale IT outsourcing decisions, while operating expenses was found to be positively associated with subsequent large-scale IT outsourcing decisions. The fact that these few cases support the argument that under-performing firms are more willing to take risk, is consistent with Tversky and Kahneman (1974) that argue that people are *risk averse* when faced with gains, but *risk seeking* in face of loss. This seems to have an impact on a firm's propensity to outsource.

Managerial judgment

On a managerial level Nadkarni and Herrmann (2010) sought to understand how *CEO personality*³² influence a firm's *strategic flexibility* and *firm performance*. They found that CEO emotional stability, extraversion, and openness to experience was positively related to strategic flexibility, while conscientiousness was negatively related. Finally, strategic flexibility was found to be positively related to firm performance, and as a mediator between CEO personality and firm performance. As some of the previous studies also has found, managerial level factors potentially impede or improve project level and firm level performance. Much anecdotal evidence does suggest that without top-level support projects are much more likely to fail.

The last article within this theme by Tsai and Wang (2009) sought to understand how a firm's investment in internal R&D influence its technological innovative performance. In terms of firm size the authors found that larger firms may have an innovative advantage compared to smaller firms and that internal efforts in R&D activities has a significant effect on innovation performance.

4.2.3 Performance in client-vendor relationships

The last batch of articles measure the performance in different ways specifically in client-vendor relationships. These range from client-side perceived satisfaction to vendor-based sponsorship's effect on project performance.

Cost and satisfaction

Seddon et al. (2007) measured *satisfaction* in a quantitative study with 235 respondents, who were senior IT managers in large Australian organizations in late 1999. On choice of DV (satisfaction) they argue:

³²Emotional stability, extraversion, openness to experience, agreeableness, and conscientiousness.

“By contrast, although goals may differ from organization to organization, a manager assessing satisfaction will use his/her own organization’s goals, which means that satisfaction is always a valid measure (Cullen et al., 2006).” (Seddon et al., 2007)

By using Domberger’s theory of ‘The Contracting Organization’ which describes four types of benefits of contracting: *specialization*³³, *market discipline*³⁴, *flexibility*³⁵, and *cost savings*³⁶, they analyzed satisfaction with each type. They found that satisfaction was linked with specialization and market discipline, but not with flexibility and cost savings. This offers further support for applying satisfaction as a variable for measuring the performance of outsourced IT projects. Ultimately, the involved personnel will form an opinion on each project, and this will be reflected in their satisfaction of the process.

With TCE, agency theory, and KBV as theoretical foundations, Tiwana and Bush (2007) analyzed the *managerial likelihood of outsourcing* and found that the higher the manager perceive the vendor’s cost advantage to be and the higher the level of perceived technological complexity, relative to the client, the higher the likelihood that they will outsource it, given a competitive vendor market. Conversely, the higher the threat of opportunism perceived by the manager, the less the likelihood that the process will be outsourced. From an agency perspective, the higher the observability, the more likely it is that outsourcing will occur. Finally, they found that the more difficult it was to specify requirements, the lower the likelihood outsourcing would occur. As previously discussed, firms’ propensity to outsourcing is, as suggested above, highly influenced by several factors.

Relationship building

On a contractual level Gefen et al. (2008) analyzed outsourcing contracts in a bank in order to understand *business familiarity* as a form of risk mitigation. More specifically they looked at the contractual controls employed by the clients and the effects business familiarity had on those controls. Of the controls frequently used, they identified three types: 1) splitting large pricey projects into smaller ones, 2) adding penalties to control quality, and 3) choosing between fixed price (FP) or on a time and material (TM) basis. With regards to business familiarity they identified several aspects:

“Knowledge based on prior relationships and the implied future trust it brings about.”

“Trust is the willingness to rely on a business partner based on its past trustworthy behavior.” (Gefen et al., 2008)

They found that business familiarity had an impact on the contractual relationship between the client and the vendor, but not the monetary side. Thus,

³³Concentrating on those activities in which the organization has established a distinctive capability, letting others produce supporting goods and services (Seddon et al., 2007)

³⁴Identifies conditions in which the purchaser is separated from the provider and a formal transaction takes place under contract (Seddon et al., 2007)

³⁵The ability to adjust the scale and scope of production upwards and downwards at low cost and rapid rate (Seddon et al., 2007)

³⁶Lower resource costs of service delivery compared to in-house production (Seddon et al., 2007)

vendors with whom the client had business familiarity with were awarded more TM contracts. These findings are interesting in terms of understanding the performance of projects with regards to contracting. In a largely qualitative study by Dey et al. (2010) they analyzed 15 different contracts in individual firms. They divided contracts into four different types: fixed-priced (FP), time-and-materials (TM), performance-based, and contracts negotiated under a bargaining game. They highlighted the gap between contracting and performance with the following quotation:

“Despite the vast literature in contracting, issues related to contract choice and performance for software projects remain largely unclear.” (Dey et al., 2010)

Their findings corroborate previous research that has stipulated that FP leads to poor performance. Indeed they found that under fixed-price contracts, developers would invest lower effort and less time than in the first-best scenarios. If a client was in possession of an effective and efficient process of monitoring and auditing, a TM contract could perform better than a FP. The last two, being quality-level agreements and profit-sharing contracts, were shown to achieve first-best performance. In the latter, the cost and benefits associated with the software development are allocated to the two parties according to their relative bargaining power. In the related context of offshoring, the findings of Rai et al. (2009) suggests that offshore IS project success is positively influenced by having a client member (representative) on the offshore team, information exchange by mutual visits, and trust. Cultural dissimilarities however, will negative influence offshore IS project success. Vlaar et al. (2008) sought to understand which sociocognitive acts and communication processes members of distributed work teams used to advance their understanding. The findings are best described by their concluding comments on *sensemaking*:

“... we show that knowledge and experience asymmetries, and requirements and characteristics - such as complexity, instability, ambiguity, and novelty - prompt members of onsite and offshore vendor teams to engage in acts of sensegiving, sensedemanding, and sensebreaking.” (Vlaar et al., 2008)

Unlike many previous studies, Bharadwaj et al. (2010) analyzed how *BPO outcome* (amongst others) could influence client-vendor relationships (*successful relationship*). The authors found that BPO outcome and *outsourcing management competence of the client* positively affects the likelihood of building a successful relationship between the client and the service provider. This offers some intriguing complexities given the difficulty in assessing a vendor ex ante. Goo et al. (2009) suggests that developing a well-structured SLA³⁷ ex ante will help develop relational attributes in situ, as opposed to relying on relational governance and thereby increasing the risk of hold-up.

³⁷Service Level Agreement - the formally defined contract between client and vendor stipulating responsibilities and expected deliverables.

Vendor sponsorship and capabilities

One of the more relevant articles to our context, was Liu and Yetton (2009) who examined the effects of vendor-side project sponsorship on *project performance*³⁸. The data collection consisted of a quantitative survey with senior managers in the Australian IT services industry. They hypothesized that vendor-based project sponsorship would have a positive effect on vendor project performance (quality) and that vendor project performance (time and cost) would be independent of the vendor-based sponsorship. They measured *sponsor %*³⁹ and *sponsor responsibilities*⁴⁰ effect on the DVs quality, cost, and time. They found support for both hypothesis. In other words, vendor-based sponsorship will only influence the quality of project but neither cost and time. While it is commonly expected that sponsorship has a positive impact on project performance, it is surprising that cost and time is unaffected. In our context the findings are relevant, in the sense that they suggest projects that include vendor-based sponsorship will perform (on quality) better.

Although the paper by Mayer and Salomon (2006) does not address the specific context of measuring performance, they nevertheless lend support in terms of useful quantitative measurements. Mayer and Salomon (2006) went through 405 service contracts from a single firm in order to determine which projects were *subcontracted* (DV) by looking at the *contractual hazards* and the *technological capabilities*. Their findings include perceived lower contractual hazards when faced with a vendor that has superior technological capabilities. The reasons for this is attributed to the fear of leaking capabilities through appropriability, if the capabilities between the client and vendor are asymmetric and favor the client. However, when the vendor is superior, the client have less fear of losing capabilities to the vendor, because they are lower.

Glitches

In order to measure the performance of outsourced software development projects, one can also look the opposite direction - what to measure when something goes wrong. With projects as the unit of analysis, Hoopes and Postrel (1999) carried out an interpretive case-study of a software firm, and identified *glitches* that occurred in several projects. Since glitches can have a detrimental effect on software development projects, identifying what cause them, can be a source of understanding what antecedents are required for projects to perform well. Hoopes and Postrel (1999) define glitches as:

“Glitches are defined as costly mistakes that could have been avoided if some of the parties involved had understood things that were known by other participants.” (Hoopes and Postrel, 1999)

The glitches were measured as “cost of a glitch” in work months. The results were divided into two - wasted effort or unused work and unplanned overruns,

³⁸Project performance capability is a vendor’s capability to satisfy expectations on cost, time and quality, as measured by each respondent’s perceptions of overall performance, relative performance against competitors, and client satisfaction (Liu and Yetton, 2009).

³⁹... the percentage of IT projects within the business unit that have been assigned a project sponsor

⁴⁰... the aggregate across four questions measuring sponsorship responsibilities: having formal decision-making power and command over resources; overseeing projects for corporate control; taking care of stakeholders’ interests; and being assessed on project outcomes

which was the additional effort required to fix flaws and bugs in the code. These problems were revealed by looking at the time sheets submitted by the developers attached to each of the projects. In the study the costs caused by the glitches varied from one work month to 13.4. Even though the causes were heterogeneous they resulted from the same type of problem - a *gap in shared knowledge*. Thus, they concluded that:

“Taking all these factors into account, we conclude that gaps in shared knowledge had a negative and significant effect on the economic performance of the Company.” (Hoopes and Postrel, 1999)

Software development efforts in client-vendor relationships have many dependencies that are required to function. It is not entirely unreasonable to suggest that investments into process improvement models in software development such as the CMMI could minimize the risk of glitches occurring.

4.2.4 Summary

As evident by the literature review on the performance related articles, there is a limited amount of research available, especially when the unit of analysis is on the project level where only a handful was available.

Regarding the performance of projects, and software development in general, offshoring has shown to impact performance negatively. However, previous research has also shown that many of the negative effects can be mitigated by investments into operational and conceptual learning as well as formal process improvements models such as the CMMI (Ramasubbu et al., 2008). Subsequent performance assessment has also shown that managers are susceptible to input bias, which occurs when managers consider non-diagnostic input in situations where pure diagnostic is available - this could be ex post in a development effort where objective measurements are accessible (Ramachandran and Gopal, 2010). Whether bad news is reported has also shown to impact performance, which is directly related to whether or not an opportunity exists for managers to shift blame (Keil et al., 2007).

On the key findings related to the strategic outsourcing section, some research suggest that outsourcing leads to improved performance (Thouin et al., 2009; Bustinza et al., 2010; Novak and Stern, 2008; Bardhan et al., 2006; Gwebu et al., 2010) and improved external valuation (Duan et al., 2009; Oh et al., 2006). However, in contrast to these findings, it is suggested that firms that outsource peripheral activities do not perform better (Gilley and Rasheed, 2000), and that outsourcing has a negative effect on the integrative capabilities and performance, (Weigelt, 2009) and initial performance (Novak and Stern, 2008), although some of these negative effects can be alleviated by prior experience with technology and knowledge. Consequently it is not possible to establish a clear consensus on whether or not outsourcing is positively or negatively associated with performance. This is best highlighted by Duan et al. (2009), that found that external valuation would be higher for primary activities, while Novak and Stern (2008) found that the more asset specific the activity to be outsourced, the less favorable the stock market would perceive the transaction. Thus, seen from a performance perspective the concept of strategic outsourcing only receives limited corroboration in the literature based on empirical findings presented.

Of the articles related to client-vendor relationships, different approaches were adopted making a direct comparison between the findings somewhat complicated. Seddon et al. (2007) found empirical support for benefits of contracting related to market discipline and specialization, but not for neither flexibility or cost savings. The fact that cost savings was not associated with satisfaction is interesting because previous research has shown that objective measurements (financial) suggest that they are in fact related (Jiang et al., 2006). Gefen et al. (2008) shows that business familiarity is associated with more TM contracts being awarded and Dey et al. (2010) found that FP contracts were inferior to TM if the client possessed an effective and efficient process of monitoring and auditing. Additionally, performance-based contracts and contracts negotiated under a bargaining game was shown to deliver first-best performance. Somewhat related is Mayer and Salomon (2006) that found that in face of vendors with strong capabilities the perceived moral hazards were reduced. Effectively, when clients are faced with vendors that possess strong capabilities with whom they have business familiarity with, they perceive lower levels of risks. According to Bharadwaj et al. (2010) client-vendor relationships are also more likely to be successful if the BPO outcome is successful. From a TCE perspective perceived cost of vendors and opportunism was shown to influence the managerial likelihood of outsourcing (Tiwana and Bush, 2007). Finally, Liu and Yetton (2009) analyzed how vendor-based sponsorship increased the quality of projects, but not time and cost. Whether vendor-based sponsorship, business familiarity and strong capabilities can minimize the risks of glitches and misfits between IR and IC (Mani et al., 2010) occurring is interesting itself, but has not been studied empirically.

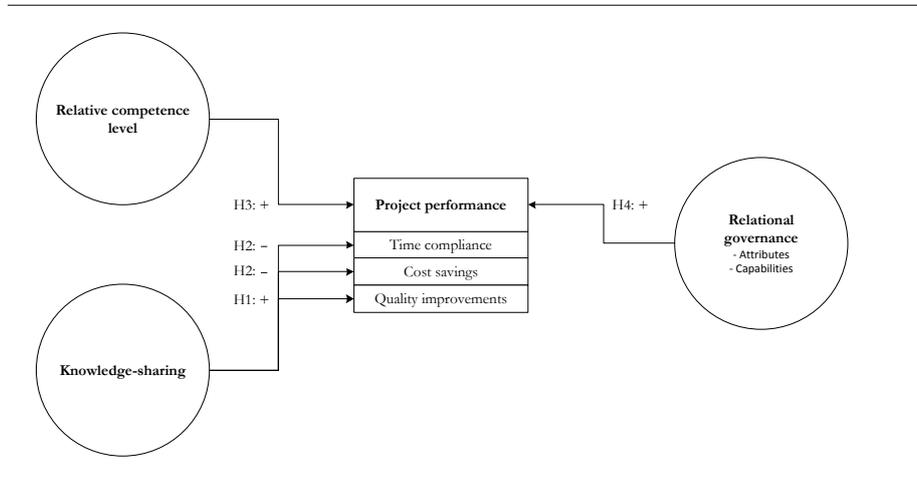
4.3 Hypotheses development

Having conducted a thorough content analysis and literature review of the research related to performance of IT outsourcing, this section will, based on the literature review, propose a set of hypotheses. The hypotheses' main purpose lies with investigating the relationship between antecedents and outcomes, and how these are influenced by moderating elements in ICT projects outsourced to an external vendor. The main theme is based on knowledge-sharing between client and vendor, relational governance, and relative competences.

4.3.1 Knowledge-sharing

The transfer of knowledge between client and vendor in outsourcing relationships is but one of several important components, that is required to work seamlessly in order to achieve the desired performance. It is difficult to decompose knowledge, but it has been frequently proposed that it consists of a *tacit* and *explicit* element. The ability to combine these elements is of great value in a relationship, because they are dependent on each other - they however vary greatly in their transferability. Where explicit knowledge can be transcribed easily and transferred, this is not the case with tacit knowledge, thus the reason why it also has been referred to as *sticky* knowledge. One of the central competitive dimensions of firms are their ability to create and transfer knowledge efficiently (Kogut and Zander, 1992). Accordingly, Kogut and Zander (1992) propose that knowledge can be transmitted without loss, once the syntactical rules required

Figure 2: Project performance model



for deciphering it are known. In this also lies the organizations codifiability, which refers to the firms ability to structure knowledge into more manageable constructs, that can be more easily transferred between organizations. In more practical terms, when firms wish to outsource ICT projects, there are several levels that are affected when knowledge-sharing is to occur between the client and vendor. The *declarative* part consists of the written documents such as source-code, documentation, guides, requirement specifications, etc. while the tacit part is the knowledge only retained by the individuals in the organization. Finally, *procedural knowledge* is the knowledge that can be applied to a given task and thus, differs slightly from declarative knowledge. How well organizations can manage knowledge, profoundly affects their ability to perform inter-organizational knowledge-sharing.

It is expected that knowledge-sharing will affect ICT project performance such that the higher the inter-organizational knowledge-sharing is, the higher impact on project performance (quality). This may be dependent on the nature of the project, depending on whether it is a *maintenance*, *reengineering*, or NPD effort Gopal and Koka (2010) and how performance is measured. The difference between the projects is characterized by their requirements and platform. Conversely, the efforts required to solve maintenance types of projects is much lower than that of innovative or NPD projects, that require specialized knowledge and places much higher demands on developing requirement specifications early in the process. For this reason maintenance projects have a relatively low asset specificity, meaning they can be transferred relatively easily between vendors without incurring too many additional costs. This is possible since most of the knowledge required can be documented in form of declarative knowledge such as source code and documentation. Additionally, it is possible to judge the outcomes of the projects more easily in maintenance projects, since functional requirements can be measured explicitly. Indeed Thouin et al. (2009) supports the notion that outsourcing IT with low asset specificity leads to higher financial performance and Jiang et al. (2006) also linked outsourcing with cost efficiency. These findings suggest that maintenance projects are more likely to be successful. I do not anticipate work dispersion (Ramasubbu et al., 2008) to negatively affect

maintenance projects to the same extent that innovative projects are - as described earlier, since requirements can be specified clearly they greatly mitigate the negative effects work dispersion have on coordinating work and transferring critical knowledge between the client and vendor. As Ramasubbu et al. (2008) found, process investments and investments into operational learning leads to higher productivity, this is facilitated by the normative development methods that greatly increases the transparency in software development. NPD projects however differ greatly from maintenance projects and reengineering projects in scope, requirements, and effort required. In innovative projects it is extremely difficult to specify all the needed requirements prior to the development, and it is not unusual to perform prototyping using exploratory development methods early in the initial stages to lower risks and uncertainty. For these reasons, unlike maintenance projects, innovative projects are characterized by having high asset specificity. The consequences of this is increasing switching costs in case the client is required to change vendor, thus, increasing the bargaining power of the vendor and locking-in the client. Even though the nature of the project may vary, knowledge-sharing will nevertheless have an impact on ICT project performance. The impact however, is expected to be different depending on how performance is measured. Inspired by the golden triangle of cost, time, and quality, it is expected that knowledge-sharing will have a positive as well as a negative impact. The positive influence will be on quality. The ability of the client and vendor to share knowledge about the expected delivery, will help shape the perception of the final product of the vendor, thus improving quality of the final product. Conversely, intense knowledge-sharing between the two parties can negatively influence cost savings and time compliance, thus leading to the first two hypotheses:

H1: A high level of knowledge-sharing between client and vendor will positively influence project performance outcome in terms of quality

H2: A high level of knowledge-sharing between client and vendor will negatively influence project performance outcome in terms of time and cost

Subsequently it is also expected that knowledge-sharing between the client and vendor will lower the risk of a misfit between IR and IC occurring (Mani et al., 2010), gaps in shared knowledge (Hoopes and Postrel, 1999), and possibly increased productivity and quality facilitated by investments into know-how and know-why accordingly (Ramasubbu et al., 2008).

4.3.2 Relative competences

Based on the *Competence Perspective* (Mahnke et al., 2005) the competences of the client and vendor will in most cases be asymmetric such that the vendor will possess a relatively higher level of competences, compared to the client. This is expected, given that the client usually is motivated to obtain access to expertise/skills not possessed in-house (Lacity et al., 2010). The fundamental issue with relative competences is rooted in the transactional approach, since the transaction costs should be lower in the market as opposed to in the hierarchy. Thus, the competences of the vendor should in most cases be higher than that of the client, otherwise it will be difficult for the vendor to achieve the required

economies of scale and scope. If that is not the case the client and vendor will be on comparable levels, increasing the transaction costs, and thus canceling the purpose of outsourcing arrangement facilitated by the asymmetry in relative competences. For these reasons the core competences of the client and vendor should not converge to the extent that they could perform the same task equally well, with the same amount of resources. There is however, an inherent problem with the proposed view. As previously discussed, firms disaggregate non-core activities to external vendors in order to vertically integrate, since the effort required by the client to solve the non-core activity is higher, than that of the vendor given their core capabilities are not converging. A high level of relative competences of the vendor, compared to the client could indicate that the client is entirely unfamiliar with software development. Conversely as previously discussed, a low level of relative competences could indicate a congruence. Previous research has shown that when the vendor displays strong capabilities, the client will perceive less contractual hazards (from hold-up) and internal governance decrease (Mayer and Salomon, 2006). For this reason clients will perceive vendors who possess competences higher relative to themselves more favorably, compared to vendors with low relative competences. Essentially it is a double-bladed sword when the vendor possesses a high level of capabilities compared to the client, due to the information asymmetries that arise. While the vendor may be able to resolve conflicts and deliver faster and better products than vendors with low capabilities, they may also become susceptible to displaying opportunistic behavior. Oppositely, if the vendor is, however unlikely, in possession of competencies lower than the client, the subsequent performance will be negatively influenced. This is not entirely unheard of. Firms struggling to survive or firms trying to enter a new market with low turnovers are often pressed to accept or bid on contracts for outsourcing deals, that stretch their competencies - usually outside their comfort zone. Engaging in deals with clients under these circumstances often result in poor performance, because of the enormous amount of work the vendor has to perform in order to lower the transactional attributes such as uncertainty and measurement difficulty (Lacity et al., 2010). On average however, it will be expected that a high level of relative competences will have a positive effect on performance, as stated below in the third hypothesis:

H3: A high level of relative competences between client and vendor will positively influence project performance outcome in terms of time, cost, and quality

4.3.3 Relational governance

The relationship between the client and vendor in an outsourcing relationship is formally enforced by a SLA and informally by relational governance. In general, firms try to lower their transactional risks, such as: moral hazard, hold-up, opportunism, and adverse selection, by constructing an extremely detailed SLA. However, firm-specific differences play a role in how much firms wish to formally protect themselves, versus rely on relational governance. In some cases it is entirely accepted for both parties to submit detailed drafts for contracts and then negotiate on the details, on the other hand in other it is frowned upon and seen as a display of distrust. In research, structured SLAs has shown the potential to co-create relational attributes and thereby informally enforce relational governance

(Goo et al., 2009). Prior research has also shown that on a managerial level managers are subject to influences from perceived opportunism of the vendor, and perceived technological complexity (Tiwana and Bush, 2007), biased by input, such that non-diagnostic assessments influence performance assessments even when faced with more appropriate diagnostic information (Ramachandran and Gopal, 2010). Managers are also influenced by whether an opportunity to shift blame is present, when reporting bad news (Keil et al., 2007), something that is likely to be factored into ex ante considerations, when evaluating projects based on whether relational governance exists between client and vendor.

In this thesis relational governance is decomposed into two subcomponents being relational attributes and relational capabilities. The former describes the attributes of the client-vendor relationship, whether it displays signs of relational governance. The latter describes the capabilities of the relationship, thus if it exhibits signs of being able to perform tasked not formally governed. The relational attributes consists of five submeasures: risk sharing, trust level, conflict resolution, conflict intensity, and mutual understanding. Relational capabilities consists of four submeasures: cooperation, relationship flexibility, relationship quality, and incentive alignment. Prior research strongly⁴¹ suggests that relationship characteristics such as trust and relationship quality have a positive impact on general ITO outcomes (Lacity et al., 2010). Prior research and anecdotal evidence also suggests that by entering close relationships as opposed to at arms-length, firms are able to extract more value from each other, than under normal circumstances. This view is however threatened by the fact that close-quarter collaboration may decrease performance, because both parties can more easily exploit each other, than under arms-length negotiations.

H4: A high level of relational governance will positively influence project performance outcome in terms of time, cost, and quality

Having proposed four different hypotheses the next section will propose the methodological aspects of the thesis, and how it will affect the specific methods for the data collection process.

⁴¹ “More than 80% of the evidence is positive and significant.” (Lacity et al., 2010)

5 Case description

The subject firm (referred to hereafter as ‘the Company’) is a client of Mavo Consulting, who provided the empirical data for this thesis. The methodological consequences of this choice will be discussed in more detail in the method section. The Company, whose real identity will be kept confidential, sent out a questionnaire developed by Mavo Consulting, to a large number of its clients. The specific details of the questionnaire developed by Mavo Consulting and subsequent analysis is also discussed further in the empirical section. The following section will provide a brief description of the holding Company, followed by a more detailed description of its recent acquisition, now subsidiary, whose clients were the targeted audience for the data collection.

5.1 The Company

The Company is an international enterprise software company founded in the late 60s, and currently serve more than 10,000 customers around the world. Having more than 6,000 employees, the Company also offers a wide range of technological solutions, most of which are related to infrastructural business software. The products offered by the firm are based on their in-house developed software suites such as: database management systems, process improvement software, and business process⁴² analysis software. Although the Company in its infancy was mainly focused on developing software management systems, in the recent years the Company has expanded opening subsidiaries in multiple locations around worldwide. Currently, the Company holds a prominent presence on the global market of enterprise software providers being amongst the 25 largest. The main focus in this context however, is placed on their consulting services, which is provided by a subsidiary of the Company.

5.2 Consulting services

The consulting services provided by the Company are offered by one of their subsidiaries that was acquired just a few years ago. The subsidiary (prior to the acquisition by the Company) had almost 3,000 employees of whom almost half were dedicated exclusively to the consulting business. Originally having developed models for process identification, the subsidiary is known for having internally developed (also prior to acquisition) a business process analysis platform for *Business Process Management*⁴³ (BPM), as well as an open source alternative, though with fewer features and more limitations. The purpose of the software is to analyze clients’ business processes, determine process inefficiencies, and identify potential process improvements. In most cases the clients already have an *Enterprise Resource Planning*⁴⁴ (ERP) system implemented, thus the platform

⁴² “The business process is the end-to-end coordinated set of collaborative and transactional work activities carried out by both automated systems and people to produce a desired result or achieve a goal.” (Fingar and Bellini, 2005)

⁴³ “BPM in its contemporary context is a holistic vs. piecemeal approach to the use of appropriate process-related business disciplines that are used to drive business performance improvements, not just across the departments in a single company, but also across multi-company value delivery systems.” (Fingar and Bellini, 2005)

⁴⁴ “...ERP, doesn’t live up to its acronym. Forget about planning it doesn’t do that and forget about resource, a throwaway term. But remember the enterprise part. This is ERP’s true

functions as an extension to the already established ERP system. One of the core problems with ERP, lies with its inherent functional and standardized approach, and difficulty in streamlining the software through customization to each firm. Therefore, processes are usually fit into the standard components of the ERP systems and not the other way around. The platform developed by the subsidiary, overcomes these limitations and seeks to help clients reach their business goals. This is enabled by the platform that allows the process management software to be integrated into the existing ERP systems. Usually the process follows several stages where vendor and client map business processes to the platform, optimize processes, and finally streamline the processes. Stated differently, the software enables clients to overcome the restrictions imposed by many ERP systems that are not uniquely tailored to the target organization, by proper identification and management of each organization's business processes. For these reasons the subsidiary perfectly complements the Company's capabilities by providing consulting services together with a proprietary as well as open source software modeling tool.

ambition. It attempts to integrate all departments and functions across a company onto a single computer system that can serve all those different departments' particular needs." (Wallace and Kremzar, 2001)

6 Empirical research

Having highlighted in the previous sections how theory and research has been shaped around measuring the performance of ICT outsourcing projects, and proposed a set of hypotheses, this section will discuss the empirical research. The first part, the research methodology, will be described briefly the two most common philosophical assumptions that guide most research, followed by choice of methodology and method for this thesis. The second part consists of the practical instrument development data and data collection. The final part of this section will analyze and discuss the results of the data collection.

6.1 Research methodology

In social science researchers subscribe to a research methodology that prescribes how research is conducted, and ultimately has an impact on method (e.g. how data collection is performed). In general there are two different philosophical assumptions, these are based on two different underlying epistemologies: interpretive research and positivistic research (Orlikowski and Baroudi, 1991). These two approaches are vastly different from each other, and are usually compared with respect to how they differ in terms of *ontology*, *epistemology*, *human nature*, and *methodology* (Burrell and Morgan, 1979). In terms of ontology, reality can be regarded as either implicit (realism - interpretive) or explicit (nominalism - positivistic) and these assumptions concern the very essence of the phenomenon under investigation. With regards to the epistemological assumptions, this is related to whether knowledge on one hand is acquired (positivistic) or experienced (interpretive). Thus, an interpretive researcher would argue that information written on a stone is not knowledge unless individuals exist to interpret the information. At the heart of this discussion is the notion of whether knowledge is objective or subjective. Human nature is based on voluntarism or determinism, where the former is the controller and the latter is the controlee. Thus, the interpretive approach would be to regard man as being completely autonomous and free-willed. However, the positivistic approach to this would be that man is completely determined by the situation and environment in which he is located. Thus, we arrive at the fundamental difference (methodology) between positivism and interpretivism, where the former which is nomothetic⁴⁵ argues that there exist causal-chains and underlying patterns, that can be discovered with the scientific method, and the latter, being ideographic⁴⁶ argues that non such patterns exist, and that people cannot be predicted entirely. There exists multiple variations and other philosophies, but these are the two most basic and well-known. Although it could be confusing as to why this is relevant, it will become more clear in the next section, where choice of methodology is discussed.

⁴⁵“The nomothetic approach to social science lays emphasis on the importance of basing research upon systematic protocol and technique. It is epitomized in the approach and methods employed in the natural sciences, which focus upon the process of testing hypotheses in accordance with the canons of scientific rigour.” (Burrell and Morgan, 1979)

⁴⁶“The ideographic approach to social science is based on the view that one can only understand the social world by obtaining firsthand knowledge of the subject under investigation.” (Burrell and Morgan, 1979)

6.1.1 Choice of methodology

This thesis has subscribed to the previously described positivistic approach and loosely on the scientific method, also known as the *hypothetico-deductive method*. This method consists of four steps: 1) gathering data or observations about a phenomenon or something unknown, 2) developing proper hypotheses that can explain the observations, 3) deducting consequences for the explanation and formulate an experiment to see if the predicted consequences are observed, and 4) waiting for corroboration, if there is, go to step 3 and if not, falsification has occurred and new hypotheses should be developed. There is however one difference for the application of this method for this thesis. The data collection is based on a quantitative survey (questionnaire), thus cause and effect cannot be observed, since that requires an experiment form of study. In non-experimental quantitative surveys as the one conducted for this thesis, cause-and-effect relations cannot be determined, however, correlation between two variables and predictability of a relationship can be establish if the collected data allow for such analysis. For this thesis the positivistic objective of the scientific method is supported⁴⁷, by searching for connections and relationships between knowledge-sharing, relational governance, relative competences, and performance of outsourced ICT projects.

There has been much debate on whether or not one can confirm an hypothesis or whether you can only reject the null-hypothesis⁴⁸, should the research be constructed as such. The concept of falsification runs deep in the scientific method, and it was derived from Carl Popper who argued that:

“Only if we cannot falsify them in spite of our best efforts can we say that they have stood up to severe tests. This is why the discovery of instances which confirm a theory mean very little if we have not tried, and failed, to discover refutations. (Popper, 1965)” As cited in Peca (2000)

A classic example of the black swan easily highlights this problem of induction. If one were to observe 100 white swans, one could induce that swans were white, however it would only take one black swan to falsify the induction and thus disproving the theory. For this reason Carl Popper argues that one should try to falsify rather than look for confirming evidence.

6.1.2 Choice of method

Methodology and method is inter-connected in the sense that methodology in most cases determines what the proper methods for data collection would be. With the discussion on philosophical assumptions in mind, there are two distinct different approaches for collecting data. For the interpretive approach researches would in most cases subscribe to the qualitative data collection methods, while the positivistic approach would be to subscribe to the quantitative approach - for positivists strength truly lies in numbers. Instead of delving into a discussion

⁴⁷ “The ultimate purpose of research is scientific explanation - to discover and document universal laws of human behavior. Another important reason is to learn about how the world works so that people can control and predict events.” (Neuman, 2006)

⁴⁸H0: Null hypothesis = No difference H1: Alternative hypothesis

on the specific ways of collecting data, the selected data collection method will be described in more detail.

The survey strategy is mostly associated with positivism Oates (2006). As previously noted, positivism seeks to gain an understanding of underlying patterns and generalization, this being the reason why the method is frequently adopted by positivistic researchers. Constructing a survey requires planning of six different activities: 1) data requirements, 2) data generation method, 3) sampling frame, 4) sampling technique, 5) response rate, and non-responses, and 6) sample size (Oates, 2006). Through the next sections some of these steps will be described in more detail.

For these reasons a quantitative survey based on a questionnaire was chosen. Data collection is always a tradeoff/compromise between breadth and depth, and though some of this can be alleviated through triangulation, it can never completely be eliminated.

6.2 Instrument development

Having proposed a set of hypotheses, the goal of this section is to perform a measurement of those variables. The instrument development required for measuring the dependent variables cost, time, and quality, and the independent variables knowledge-sharing, relational competence, and relational governance, was provided by Mavo consulting. The case company, a client of Mavo consulting, sent out a survey to a large number of their own clients as described briefly in the case description.

Project performance

Performance of a software project can be measured on many levels, thus one could not ask respondents directly and explicitly to rate the ‘performance’ of a project by itself. That would distort the answer given that it would be impossible to decompose the construct meaningfully. Therefore, from the literature review articles were consulted and Liu and Yetton (2009) amongst others were found, and measured project performance by adopting the golden triangle of cost, time and quality, which was adopted from (Gardiner and Stewart, 2000).

Cost, or in this case *cost savings*, will rate how well a project performs in terms of the ability to minimize costs. Time, and in this case *time compliance* will rate the project with respect to its timeliness, whether it is on time if it is an ongoing project, or if it was finished on time for a completed project. Quality - *quality improvement* will measure how well a project enables improvement of quality. In general terms these subscales are in compliance with Gardiner and Stewart (2000) that proposed cost, time, and quality as a measure of performance.

All the proposed variables for measuring performance are measured on a 5-point Likert scale. Ordinal data of this kind has consequences for the subsequent analysis, because the numbering from 1-5 is discrete. It is important to note that in a discrete dataset the difference between 1-2 and 2-3 and so on may not be spaced equally by the respondents, thus a respondent may not evaluate the difference from 1-2 the same as that for 4-5. The consequences of this is that some argue that calculating means instead of modes is not proper when performing descriptive statistics. More on this topic will be discussed in the

analysis. The performance subscales will be measured from low to high, so 1 will be low and 5 being the highest.

Knowledge-sharing

Measuring the first independent variable knowledge-sharing will be performed from both sides, thus from both the client to vendor perspective, as well as the vendor to client perspective. This will ensure that possible asymmetries in the relationships can be measured more precisely. It should however be noted that the ratings are based only on responses from the client - the vendor is not included.

In this thesis knowledge-sharing between both parties will be measured based on the capabilities of the client and vendor to deploy human resources, their IS technological capabilities, and their IS methodological capabilities. These three measurements are based on Lacity et al. (2010); Levina and Ross (2003), but the reliability of constructs remains untested.

Human resource management (HRM) capability refers to the organizations ability to identify, acquire, develop and deploy human resources in a way that ensures optimal performance (Lacity et al., 2010). This is a prerequisite and important facilitator that affects knowledge-sharing between organizations. *IS technological capabilities* and *IS methodological capabilities* both measured independently, will rate from both sides their capabilities client and vendor respectively, in terms of technological and methodological expertise. It is expected that respondents will chose to base their measurements on CMMI and their providence of technical expertise.

HRM capability, IS technological capability, and IS methodological capability will also be measured on a 5-point Likert-scale. On the scale 1 indicates a low level of knowledge-sharing, while 5 indicates the maximum level of knowledge-sharing.

Relative competence level

The second independent variable relative competence level, is based on the variables from knowledge-sharing (HRM capability, IS technological capability, and IS methodological capability), but enables the capture of a more dynamic relationship between competences in general. The competences will be measured relatively from the client to the vendor, meaning the client will rate the capabilities of the vendor relatively to their own.

The same way as in knowledge-sharing, the variables will be measured on a 5-point Likert scale from 1-5 with 1 indicating a low relative competence and 5 being a high relative competence.

Relational governance

The last independent variable *relational governance* has but one goal, that is to capture whether the relationship between the client and vendor displays signs of relational governance. Relational governance as opposed to formal governance, can be more difficult to measure, given it relies on relational attributes, that are in most cases are not transcribed formally (e.g. in documents or contracts/SLAs).

Relational governance consists of nine subscales that form the construct, they are: *risk sharing*, *trust level*, *conflict resolution*, *incentive alignment*, *relationship quality*, *relationship flexibility*, *conflict intensity*, *cooperation*, and

mutual understanding. Risk sharing is rated in terms of whether or not the client perceives willingness from the vendor with sharing risk. Trust level is to the extent the client finds the vendor trustworthy or not (Poppo and Zenger, 2002). Conflict resolution is how well the client and vendor can solve conflicts. Incentive alignment seeks to determine the extent to which the client and vendor possess incentive to perform well. Relationship quality (Lee and Kim, 1999) and flexibility (Klepper, 1995) rates the relationship itself and how flexible the vendor is. The final three variables employed are conflict intensity, cooperation (Poppo and Zenger, 2002), and mutual understanding (Lee and Kim, 1999).

Given the sheer amount of variables relational governance is further divided into two constructs, that each measures relational governance, though with slightly different nuances. The first, relational attributes, consists of five sub-components: risk sharing, trust level, conflict resolution, conflict intensity, and mutual understanding. This will measure the attributes of the relationship in terms of fairness of obligations towards the relationship. The second, relational capabilities, consists of four sub-components: cooperation, relationship flexibility, relationship quality, and incentive alignment. This construct measures the capabilities of the relationship, meaning how well has the client indicated the relationship performs.

Each of the described nine variables will be rated on a 5-point Likert scale from 1-5 concurrent with the rest of the measured variables. 1 will signify a low response while 5 will signify the highest, thus removing the need to recode any of the scales in the subsequent analysis.

Controls

In order to determine whether or not that dataset will be influenced by additional factors, a total of six different control variables have been employed: *client location*, *client industry*, *% of project man hours outsourced*, *contract type*, *contract status*, and *vendor competition*. Client location and client industry both are categorical (nominal) variables in string format while project man hours outsourced is a percentage. Contract type is dummy variable denoted by being 1 for repeat contract and 0 for a new contract. Contract status, which also is a dummy variable is denoted by being 1 for signifying an ongoing contract while 0 signifies a completed contract. Finally, vendor competition is ordinal based on a 5-point Likert scale. 1 indicates low vendor competition and 5 indicates a high vendor competition.

6.3 Data analysis & results

The data analysis will progress by first providing an overview through descriptive statistics revolving around the sample size, responses, missing values, and other introductory items. Afterwards, reliability tests, correlations, simple linear regression, and mediation will be discussed in more detail.

6.3.1 Missing Values

The collected data consists of a total of 153 responses, however there are missing values as indicated by table 9, that reduces the amount of valid responses substantially. A reduction in sample size affects the analysis such that it could

bias the results, especially in surveys where the number of samples are low. There exists several strategies, that cope with missing values. In some cases missing values are replaced by a series mean. In this case there are several variables that have a considerable portion of missing data. As apparent by looking at table 9 the knowledge-sharing and relative competence constructs are most affected, whereas the control variables and relational governance are, relatively, unaffected.

Table 9: Variables and missing values

<i>Variable</i>	<i>Missing (n)</i>	<i>%</i>
Client location	0	0
Client industry	0	0
% of project man hours	1	0.7
Contract type	0	0
Contract status	0	0
Vendor competition	1	0.7
Cost savings	0	0
Quality improvements	0	0
Time compliance	0	0
Knowledge-sharing (VC) HRM	10	6.5
Knowledge-sharing (VC) IS technical	29	19
Knowledge-sharing (VC) IS methodological	30	19.6
Knowledge-sharing (CV) HRM	28	18.3
Knowledge-sharing (CV) IS technical	54	35.3
Knowledge-sharing (CV) IS methodological	55	35.9
Relative competence Level HRM	27	17.6
Relative competence Level technological	43	28.1
Relative competence Level methodological	43	28.1
Risk sharing	1	0.7
Trust level	0	0
Conflict resolution	1	0.7
Incentive aligned	8	5.2
Relationship quality	0	0
Relationship flexibility	0	0
Conflict intensity	16	10.5
Cooperation	0	0
Mutual understanding	2	1.3
Total	321	

Other alternatives include imputation or multiple-imputation which is a process of determining an artificial replacement based on some rather complicated calculations. When the number of missing values is relatively low, there are an additional two alternatives: listwise and pairwise deletion. The former is the removal of any cases that has missing values, making it only relevant for large sample sizes with a low amount of missing numbers. The latter will only omit calculations for variables missing values, thus entire cases will not be removed based on one missing value.

For this thesis, the series mean method has been chosen. Thus, for all the missing values they will be replaced by the series mean, for the variable. Therefore, the sample size and mean will not be compromised. However, mode and standard deviation will be marginally influenced. A less invasive series mean

replacement method was also tested⁴⁹, but the resulting sample size was still low.

6.3.2 Distribution I

With regards to the distribution of the responses please refer to table 10. It is quite clear that incentive aligned is not normally distributed. It has a high mean (4.13) coupled with a low standard deviation (0.955) it shows that the spread of the distribution is narrow, further confirmed by the mode (5). Surprisingly incentive aligned was not very affected by the missing values, as it ‘only’ had 5.3% missing. The rest of the variables’ mean range from 2.53 (knowledge-sharing (CV) HRM) to the highest being the previously mentioned incentive aligned (4.13). Otherwise, the majority of the variables have a mean converging close to or on 3. This will be discussed further with each control variable and construct and subcomponents.

Table 10: Variables with mean, mode, and standard deviation (SD)

<i>Variable</i>	<i>Mean</i>	<i>Mode</i>	<i>SD</i>
Client location			
Client industry			
% of project man hours	61, 23		
Contract type			
Contract status			
Vendor competition	3.01	3	1.184
Cost savings	2.77	3	1.048
Quality improvements	3.20	3	1.015
Time compliance	2.77	2	1.184
Knowledge-sharing (VC) HRM	2.76	3	1.071
Knowledge-sharing (VC) IS technical	3.27	3	1.210
Knowledge-sharing (VC) IS methodological	3.33	3	1.061
Knowledge-sharing (CV) HRM	2.53	3	1.017
Knowledge-sharing (CV) IS technical	3.15	3	1.047
Knowledge-sharing (CV) IS methodological	2.86	3	1.051
Relative competence level HRM	2.66	3	1.071
Relative competence level technological	3.25	3	1.194
Relative competence level methodological	3.16	3	1.178
Risk sharing	3.29	5	1.351
Trust level	3.03	3	1.256
Conflict resolution	3.36	3	1.206
Incentive aligned	4.13	5	0.955
Relationship quality	3.63	4	0.986
Relationship flexibility	2.69	2	1.166
Conflict intensity	3.33	5	1.241
Cooperation	3.71	4	1.056
Mutual understanding	2.97	3	1.175

Missing values are replaced by the series mean; n = 153

⁴⁹Calculating missing values for cases with only one missing variable. This was performed per construct, such that knowledge-sharing would be calculated as such: $KS = \text{mean.5}(\text{var1}, \text{var2}, \text{var3}, \text{var4}, \text{var5}, \text{var6})$

Country location

Regarding results per country of origin, the 153 responses were spread over a total of 26 different European countries, where most of the answers were clustered around Germany (11.8%), Spain (11.1%), Sweden (8.5%), United Kingdom (8.5%), Poland (7.8%), and France (7.2%) with the rest of the answers fragmented across Europe. The clustering of answers on few countries and the fragmentation of answers amongst the rest of the countries (remaining 20 countries), may have an impact on the answers. Were conditions optimal, answers would be distributed evenly amongst the countries, such that the responses were equally weighted. For this thesis however, the sample size is problematic in terms of controlling for the country location effect on answers. Thus, comparing countries with few responses such as Bulgaria (1), Denmark (1), Ireland (1), Netherlands (1), Portugal (1), and Russia (1), with each other will not yield any satisfactory results. A larger sample size is required for each country, otherwise results may be highly biased by the few clustered responses.

Client industry

The second control variable client industry displays even more fragmentation than country location. Spread across 78 industries with only few clusters such as automotive (24), chemicals (15), pharmaceuticals (11), building (6), and medical (5). The fragmentation of answers amongst the responses is not problematic, because it signifies the breadth of the data set. Therefore, observing similarities across the responses may yield a stronger significance with regards to the generalizability as compared to responses from a single country, that may be biased. It should be noted that the vast majority of responses are in industries not related to IT. Consequently, their main capabilities do not revolve around IT, but instead functions as non-core support activities.

% of project man hours outsourced

The third control variable % of project man hours outsourced, indicates the percentage (in whole numbers) for a given project that it outsourced to a vendor. The responses for this variable is dispersed randomly with few outliers being 20% (13), 90% (16), and 95% (14). The minimum amount of hours in percentages outsourced to a vendor is 15% and only one respondent answered to having outsourced 100%. Again, the amount of variation is not necessarily a disadvantage as such, given the distribution is not high skewed. As previously mentioned, only one respondent failed to answer on this variable resulting in a 99.3% response rate. Thus, the answers remain virtually unaffected.

Contract type and contract status

The fourth and fifth control variable contract type and contract status controls for the contractual attributes of the software project. For contract type, 0 means the contract is new, while 1 means it is a repeated contract. Likewise for contract status 0 means the contract has ended, while 1 means that it is ongoing. For both the variables there were registered no missing values, that could influence the responses.

Table 11: Contract type (1=repeat; 0=new)

<i>Group</i>	<i>Frequency</i>	<i>Percentage</i>
0	113	73.9
1	40	26.1
Total	153	100.0

As seen on table 11, 73.9% of the projects are based on new contracts while only 26.1% are repeat contracts. In the later analysis this variation will be controlled for, given projects based on repeat contracts vs. new contracts may perform differently, or influence the relationships between the measured constructs.

Table 12: Contract status (1=ongoing; 0=completed)

<i>Group</i>	<i>Frequency</i>	<i>Percentage</i>
0	134	87.6
1	19	12.4
Total	153	100.0

Contract status (table 12) has a similar unequal distribution as contract type, in favor of 0 being the contract has completed (87.6%) and only few ongoing contracts (19%). Interestingly this indicates that the majority of the projects are based on single contracts that have been completed. This possibly influences the project performance judgment, given the ex post judgment of project performance may vary given the available objective measurements, which are not present in situ, for ongoing projects.

Vendor competition

The last control variable, vendor competition (table 13), is the only control variable based on a 5-point Likert scale. As indicated by table 10 it is normally distributed, as indicated by the mode of 3, and the mean of 3.01 and finally the SD of 1.184. This variable will control for whether or not vendor competition will influence subsequent project performance. The basic idea is that extreme vendor competition will advocate a pressure on vendors to perform, given clients have more bargaining power, relatively, compared to markets, where only few vendors are available. In these markets the bargaining power of the vendor will decrease in favor of the vendor, which could possibly adversely influence the project performance.

Having briefly discussed descriptively the responses based on the control variables the next part will discuss the dependent variable project performance and its subscales.

Table 13: Vendor competition

<i>#</i>	<i>Frequency</i>	<i>Percentage</i>
1	19	12.4
2	33	21.6
3	45	29.4
4	40	26.1
5	16	10.5
Total	153	100.0

Project performance

Project performance has three sub-components, being the previously discussed, cost savings, time compliance, and quality improvements based on the golden triangle. On table 14 the frequencies of each subscales are represented in more detail than in table 10, that only showed the mean, mode, and SD.

Table 14: Project performance: cost, time, and quality

<i>Variable</i>	<i>#</i>	<i>Frequency</i>	<i>Percentage</i>
Cost savings	1	17	11.1
	2	47	30.7
	3	50	32.7
	4	32	20.9
	5	7	4.6
		153	100.0
Time compliance	1	23	15.0
	2	49	32.0
	3	31	20.3
	4	40	26.1
	5	10	6.5
		153	100.0
Quality improvements	1	9	5.9
	2	25	16.3
	3	59	38.6
	4	46	30.1
	5	14	9.2
		153	100.0

In terms of distribution around the median (3) cost savings and quality improvement have the highest frequency and subsequently percentage of responses on 3. Why the mode is also 3 for the listed variables. Only time compliance differs slightly as the majority of responses are based on 2 (32.0%) and 4 (26.1%) such that the mode is 2 and a total of 58.1% of responses are placed on either 1 or 2 and 50% on 4 and 5. With respect to missing values these are the only variables that together have a response rate of 100%. Coupled with an acceptable distribution of answers, the reliability analysis will give a clear indication of the validity of the proposed construct.

Knowledge-sharing

Knowledge-sharing is measured on six subcomponents whereof three are unique: HRM capabilities, IS methodological capability, and IS technological capability based on one set for client to vendor comparison and vendor to client comparison. Of all the constructs knowledge-sharing is most affected by missing values as was apparent on table 10. In fact none of the measured subcomponents of knowledge-sharing has missing values < 5%. Knowledge-sharing (VC) HRM was the lowest with 6.5%. The highest are the ones rated by client to vendor especially IS technological and methodological capability which are 35.3% and 35.9% respectively. This is a considerable amount of missing values that inevitably will have an effect on the validity of the scale.

Relative competence level

The third construct, relative competence level (table 16), is also affected by missing values on all three subcomponents, with 17.6%, 28.1%, and 28.1% on HRM competences, technical competences, and methodological competences respectively. As with the previous construct, knowledge-sharing, the amount of missing values will affect the reliability of the construct negatively. The adopted series mean replacement method will affect the distribution such that the frequency will be clustered around three.

Relational governance

The final construct, relational governance (attributes and capabilities), is based on nine unique subcomponents. Remarkably there are only few missing values for this construct, comparably to the two previous constructs. For trust level, relationship quality, relationship flexibility, and cooperation there were no missing values registered and for mutual understanding (1.3%), conflict resolution (0.7%), and risk sharing (0.7%) there were only a small number of missing values. Incentive aligned (5.2%) was close to the 5% borderline, while conflict intensity was the only variable with a more substantial amount of missing values (10.5%). From the amount of subcomponents it is not expected that the amount of missing values will have any significant effect on the reliability of the constructs, which will be calculated in the next section.

6.3.3 Construct reliability

For each construct the reliability has been calculated using Cronbach's alpha as an indication of reliability. Given this is an exploratory study with measures that in some cases has not previously been tested, a Cronbach's alpha of 0.6 will be considered acceptable for reliability of a construct. In normal cases an alpha above 0.7 is considered appropriate and the closer to 1 it is, the more reliable it is. However, if the alpha is too close to 1.0, one should consider the measures in questions, are not simply variations of the same question.

For knowledge-sharing the Cronbach's alpha is 0.540 for all six subcomponents, which is below the 0.6 determined as the lower limit for this thesis, due to its exploratory nature. As indicated by the table, reliability of the construct cannot be further improved by removing any of the subscales. Dividing the scale into two subconstructs one for client and one for vendor, will not yield an alpha of

Table 15: Knowledge-sharing: HRM, IS technological, and IS methodological

<i>Variable</i>	<i>#</i>	<i>Frequency</i>	<i>Percentage</i>
Knowledge-sharing (VC) HRM capability	1	24	15.7
	2	30	19.6
	3	63	41.1
	4	29	19.0
	5	7	4.6
		153	100.0
Knowledge-sharing (VC) IS tech. capability	1	16	10.5
	2	20	13.1
	3	62	40.6
	4	24	15.7
	5	31	20.3
		153	100.0
Knowledge-sharing (VC) IS method. capability	1	8	5.2
	2	24	15.7
	3	65	42.5
	4	32	20.9
	5	24	15.7
		153	100.0
Knowledge-sharing (CV) HRM capability	1	31	30.3
	2	25	16.3
	3	73	47.7
	4	20	13.1
	5	4	2.6
		153	100.0
Knowledge-sharing (CV) IS tech. capability	1	12	7.8
	2	22	14.4
	3	77	50.3
	4	23	15.0
	5	19	12.4
		153	100.0
Knowledge-sharing (CV) IS method. capability	1	19	12.4
	2	22	14.4
	3	79	51.6
	4	20	13.1
	5	13	8.5
		153	100.0

the desired 0.6 either. At present it was not possible to establish a meaningful grouping of the knowledge-sharing subcomponents that would create a construct with an alpha above the required 0.6.

With a score 0.552, relative competence level could not surpass the 0.6 limit, thus facing analysis based on each subcomponent instead. As seen on table 17 the alpha cannot be improved by deleting any of the subcomponents either. For this construct there was also a substantial amount of missing values that could have contributed to the low calculated alpha.

The last construct relational governance with its nine individual and discrete subcomponents managed to achieve an alpha as high as 0.737 (table 17). This is

Table 16: Relative competence level: HRM, IS technological, and IS methodological

<i>Variable</i>	<i>#</i>	<i>Frequency</i>	<i>Percentage</i>
Relative comp. HRM capability	1	26	17.0
	2	29	19.0
	3	69	45.1
	4	20	13.1
	5	9	5.9
			153
Relative comp. IS tech. capability	1	17	11.1
	2	19	12.4
	3	64	41.8
	4	25	16.3
	5	28	18.3
			153
Relative comp. IS method. capability	1	16	10.5
	2	24	15.7
	3	65	42.5
	4	22	14.4
	5	26	17.0
			153

the highest alpha attained by all the constructs and based on the a relatively small number of missing values (11.1%). Thus, relational governance surpasses the 0.6 limit. An alpha of 0.737 is very acceptable for a construct that has a total of nine diverse subcomponents. As previously discussed a high alpha could be the result of variations of the same question, which is not the case with this construct. Lastly, removing subcomponents from the construct would not result in a higher alpha as indicated by the table.

However, further analysis will not be performed with the construct based on the suggested nine components, but instead of five for relational attributes and four for relational capabilities as indicated in table 18. The resulting alpha for both subconstruct are marginally lower, but within the 0.6 limit at 0.658 for the relational attributes and 0.629 for the relational capabilities.

Of a total of four constructs, only two had an alpha > 0.6 , that being relational governance with its two subconstructs relational attributes and relational capabilities. The independent variables knowledge-sharing and relative competence level were unable to attain an alpha high enough to support the reliability of the constructs. However, the further analysis will be based on the reliable constructs as well as on the subcomponents of knowledge-sharing and relative competence level. Whether the failure of the two constructs to achieve the desired level of reliability is due to the subcomponents or the missing data is pure speculation at this point.

6.3.4 Distribution II

While the distribution has been loosely described in the section with descriptive statistics, a more detailed analysis has to be conducted in order to satisfy the requirements of the subsequent correlations and regressions. Because a skewed

Table 17: Reliability analysis of constructs I

<i>Variable item</i>	<i>Cronbach's alpha</i>	<i>Item-total corr.</i>	<i>Alpha if deleted</i>
Knowledge sharing	0.540		
1		0.342	0.466
2		0.306	0.484
3		0.229	0.520
4		0.257	0.507
5		0.300	0.487
6		0.275	0.498
Relative competence level	0.552		
1		0.464	0.301
2		0.312	0.535
3		0.325	0.512
Relational governance	0.737		
1		0.408	0.715
2		0.450	0.706
3		0.369	0.721
4		0.454	0.709
5		0.375	0.719
6		0.371	0.720
7		0.423	0.711
8		0.456	0.705
9		0.423	0.712

An alpha above 0.6 is required for proper reliability of the proposed constructs

or otherwise abnormal distribution may have adverse effects on the following analysis, the kurtosis and skewness of the measures have been analyzed. For this thesis a standard -2 to $+2$ range has been selected for determining whether the dataset at hand, is distributed normally. For kurtosis, values close to zero are considered normally distributed or also called mesokurtic. Positive values above zero are referred to as leptokurtic and indicates the peak is higher than the normal distribution with a heavier tail. Conversely, for negative values, also called platykurtic the peak is below the normal distribution with a lower peak and lighter tails. Essentially kurtosis represents the flatness or sharpness of a distribution, that is, the peak. The second measurement, skewness, indicates whether the dataset is skewed to one side with a trailing tail. For positive values the dataset is pulled in the positive direction and oppositely for negative, the dataset is pulled in the negative direction. As with kurtosis, values close to zero indicates normal distribution.

By conferring to table 19 the calculated kurtosis and skewness for all the dependent and independent variables can be seen. In terms of skewness, the variables are all within the proposed range below $+/- 1.0$ with no deviations. With regards to kurtosis, it is remarkable that they are all platykurtic. This means all the peaks are below the normal distribution and with lighter tails. However, most of the variables come in close to zero, only time compliance has a statistic above the 1.0 range (negative). Thus, it can be concluded with confidence, that all the variables and measures fall within the proposed range, and come close to being normally distributed. For these reason no further corrections to the data will be necessary, prior to the following calculations.

Table 18: Reliability analysis of constructs II

<i>Variable item</i>	<i>Cronbach's alpha</i>	<i>Item-total corr.</i>	<i>Alpha if deleted</i>
Relational attributes	0.658		
1		0.503	0.559
2		0.418	0.603
3		0.317	0.647
4		0.428	0.598
5		0.389	0.616
Relational capabilities	0.629		
1		0.495	0.494
2		0.525	0.478
3		0.286	0.659
4		0.358	0.594

Knowledge-sharing and relative competences was removed as further analysis will be based on their subcomponents.

Table 19: Calculated skewness and kurtosis

<i>Variable item</i>	<i>Skewness</i>		<i>Kurtosis</i>	
	<i>Statistic</i>	<i>Std. error</i>	<i>Statistic</i>	<i>Std. error</i>
Cost savings	0.124	0.196	-0.623	0.390
Time compliance	0.141	0.196	-1.033	0.390
Quality improvements	-0.226	0.196	-0.299	0.390
Knowledge-sharing (VC) HRM	-0.037	0.196	-0.539	0.390
Knowledge-sharing (VC) tech.	-0.232	0.196	-0.628	0.390
Knowledge-sharing (VC) meth.	-0.196	0.196	-0.336	0.390
Knowledge-sharing (CV) HRM	0.093	0.196	-0.394	0.390
Knowledge-sharing (CV) tech.	-0.111	0.196	-0.048	0.390
Knowledge-sharing (CV) meth.	0.128	0.196	-0.001	0.390
Relative competences HRM	0.209	0.196	-0.261	0.390
Relative competences tech.	-0.287	0.196	-0.525	0.390
Relative competences meth.	-0.106	0.196	-0.571	0.390
Relational attributes	-0.026	0.196	-0.451	0.390
Relational capabilities	0.093	0.196	-0.536	0.390

6.3.5 Correlation matrix

Under optimal conditions correlation would be performed based on the constructs, however with only two of them fulfilling the criteria of an alpha above 0.6 the rest of the variables will be correlated against the dependent variables cost savings, time compliance, and quality improvements. Therefore knowledge-sharing and relative competences will be measured by their subcomponents while relational attributes and relational capabilities as constructs. It is imperative to understand that correlation between variables or constructs not necessarily implies causality or cause and effect. Thus, correlation between two variables simply suggests that a change in one will result in a change in the other, and not that one variable causes the other variable to change.

As seen on table 20, the variables are listed horizontally and vertically, showing inter-item correlation between variables and constructs. The results show only few relevant correlations (first three columns), but a number of inter-item

Table 20: Correlation matrix

Variables	Cost	Time	Qual.	KS1	KS2	KS3	KS1	KS2	KS3	KS1	KS2	KS3	RC1	RC2	RC3
Time	0.451**														
Quality	0.279**	0.291**													
KS-VC1	-0.295**	-0.096	-0.216**												
KS-VC2	-0.045	-0.161*	-0.003	0.299**											
KS-VC3	0.093	-0.017	-0.037	0.202*	0.165*										
KS-CV1	0.128	0.031	-0.062	0.105	0.098	0.152									
KS-CV2	0.031	0.154	0.008	0.161*	0.087	0.148	0.245**								
KS-CV3	-0.183*	-0.107	-0.156	0.180*	0.220**	-0.001	0.153	0.236**							
Rel. comp. 1	-0.205*	0.028	-0.112	0.487**	0.172*	0.231**	0.019	0.151	0.107						
Rel. comp. 2	-0.077	-0.51	-0.008	0.240**	0.588**	0.081	-0.107	0.090	0.210**	0.346**					
Rel. comp. 3	0.034	-0.046	-0.079	0.108	0.011	0.589**	-0.047	0.199*	0.057	0.367**	0.178*				
Rel. att.	-0.182*	-0.214**	-0.074	0.229**	0.132	0.065	-0.083	0.033	0.065	0.131	0.129	0.160*			
Rel. cap.†	-0.113	0.006	-0.003	0.226**	0.021	0.072	-0.087	0.122	-0.068	0.104	0.042	0.108			

*Correlations are significant at the 0.05 level (2-tailed); **Correlations are significant at the 0.01 level (2-tailed); Legend: 1=human resource management, 2=IS technical capabilities, and 3=IS methodological capabilities; †Due to spatial constraints the correlation between relational attributes and capabilities was omitted, but resulted in a significant correlation at the 0.01 level (2-tailed) with a coefficient of 0.560.

significant correlations. On the table the two constructs: relational attributes (risk, trust, conflict resolution, conflict intensity, and mutual understanding), and relational capabilities (cooperation, relationship flexibility, relationship quality, and incentive alignment) are displayed together with the variables from knowledge-sharing and relative competences.

Project performance, which is measured in terms of cost savings, time compliance, and quality improvements was found to have only few correlations with the independent variables. Surprising all the correlations have negative coefficients.

Cost savings

As displayed on table 20, cost savings is negatively correlated with knowledge-sharing (VC) HRM, with a negative coefficient of -0.295 significant at the 0.01 level (2-tailed). The negative correlation implies that the higher cost savings is rated, the lower the subsequent knowledge-sharing between vendor and client, measured in terms of HRM. Oppositely stated, the less knowledge-sharing between vendor and client (HRM), the higher the subsequent cost savings. Again, correlations do not imply causality, thus further analysis is required in order to establish whether they affect each other directly. The second correlation is between cost savings and knowledge-sharing capabilities in terms of methodological from client to vendor. The correlation is negative with a coefficient of -0.183 , significant at a slightly lower level (0.05, 2-tailed). This correlation as with the previous, posits that the higher the rated knowledge-sharing between client and vendor in terms of methodological capabilities, the lower the subsequent cost savings. While this may seem highly counter-intuitive it will require further analysis, in order to establish whether a direct relation exists between them. Next, relative competencies measured in terms of methodological IS capabilities, was found to be negatively correlated with cost savings at the 0.05 level (2-tailed). The fourth correlation with cost savings is with relational attributes, which also is negative (-0.213), but at the 0.01 level (2-tailed). This correlation suggests that the lower the relational attributes of a client-vendor relationship, the higher the performance in terms of cost savings.

Time compliance

Time compliance is significantly correlated with two variables. The first being knowledge-sharing (VC) technological capabilities which is negatively correlated with time compliance at the 0.05 level (2-tailed) and a coefficient of -0.161 . Thus, the more knowledge the vendor shares with the client in terms of technical capabilities, the lower the time compliance of the project. Finally, time compliance was found to be significantly correlated with relational attributes at the 0.01 level (2-tailed). The coefficient is negative, indicating that the higher the relational attributes the lower the time compliance of the project.

Quality improvements

The final dependent variable, quality improvements, has but one significant correlation. The correlation is however significant at the 0.01 level (2-tailed) and is with knowledge-sharing (VC) HRM. The correlation is negative and signifies

that the higher the knowledge-sharing about HRM from vendor to client, the lower the subsequent quality improvements of the clients.

Despite the difficulties in obtaining Cronbach's alpha for the knowledge-sharing (0.540) and relative competences constructs (0.552), there are a number of inter-item correlations.

Knowledge-sharing

Knowledge-sharing capabilities (VC) HRM was found to be highly correlated (positively) with knowledge-sharing (VC) technological (0.299), relative competences HRM (0.487), relative competences technological (0.240), and relational attributes (0.299) at the 0.01 level (2-tailed). Finally knowledge-sharing capabilities (VC) HRM was correlated with knowledge-sharing (VC) methodological (0.202), knowledge-sharing (CV) technological (0.161) and methodological (0.180) and relational capabilities at the 0.05 level (2-tailed).

Next, knowledge-sharing capabilities (VC) technological was highly correlated with knowledge-sharing (CV) methodological (0.220) and relative competencies technological (0.588) at the 0.01 level (2-tailed) and correlated with knowledge-sharing (VC) methodological and relative competencies HRM at the 0.05 level (2-tailed).

The last subcomponent of knowledge-sharing (VC) being methodological, had only two significant correlations with relative competencies HRM (0.231) and relative competencies methodological (0.589) at the 0.01 level (2-tailed). Despite the number of significant correlations internally and between independent variables, knowledge-sharing (CV) could not achieve an alpha above 0.6. Likewise, knowledge-sharing (CV) capabilities had internal correlations between HRM and technological (0.245), technical and methodological (0.236), and cross-item between methodological and relative competencies technological (0.210) at the 0.01 level (2-tailed).

Relative competences

Relative competences was also found to be highly internally correlated between HRM and technological (0.346) and HRM and methodological (0.367) at the 0.01 level (2-tailed). In terms of cross-item correlations relative competences methodological was correlated with relational attributes at the 0.05 level (2-tailed). As with knowledge-sharing relative competences could not achieve an alpha high enough, for the construct to be regarded as sufficiently reliable.

Relational Governance

Relational governance, which consists of two subconstructs being relational attributes and capabilities was found to be highly inter correlated with a coefficient of 0.560 significant at the 0.01 level (2-tailed). Thus, when relational attributes are rated high, capabilities will also increase.

6.3.6 Simple linear regression

Having described in detail each variable through descriptive statistics, constructs by a reliability analysis, and lastly correlations between constructs and variables, the next step is simple linear regression. As discussed previously correlation

does not imply causality, simply that two variables or constructs change values correspondingly and simultaneously. In order to determine whether there is causality and if there is a relationship between the significant correlations, regression can be employed. Thus, statistical significance for a relationship can be determined and bring one even closer to establishing whether the proposed hypotheses are supported or not (rejection).

Cost savings

It quickly becomes apparent by consulting table 21 as also hinted in the correlation section, that there are only relationships between the dependent variable cost savings and three of the independent variables being knowledge-sharing capabilities (VC) HRM, knowledge-sharing capabilities (CV) methodological and relational attributes.

For the first of those regressions, knowledge-sharing (VC) HRM was successfully regressed against cost savings. The computed F statistics is 14.377, with an observed significance level of less than 0.01. However with an R^2 value of 0.087, knowledge-sharing (VC) HRM only accounts for 8.7% of the variance in cost savings, which is relatively low. For the second of the regressions, knowledge-sharing (CV) methodological was successfully regressed against the dependent cost savings. The F statistics was 5.254 and the significance at the 0.05 level. For the R^2 knowledge-sharing (CV) methodological is marginally lower than that of knowledge-sharing (VC) HRM with 0.034, thus only explaining 3.4% of the variance in the dependent variable cost savings. As established during the discussion in the correlation matrix section, both relationships are negative. For the last significant relationship, relational attributes was regressed against performance and resulted in a computed F statistics of 5.165 with an R^2 of 0.033. The significance was found to be at the 0.05 level (2-tailed). Exactly as the previous two regressions this relationship is also negative as indicated by the slope (negative β) for all the mentioned regressions.

Table 21: Results of simple linear regression (cost savings)

<i>Independent variable</i>	R^2	F	β	t
Knowledge-sharing (VC) HRM	0.087	14.377	-0.295	-3.792**
Knowledge-sharing (VC) tech.	0.002	0.306	-0.045	-0.554
Knowledge-sharing (VC) meth.	0.009	1.328	0.093	1.153
Knowledge-sharing (CV) HRM	0.016	2.499	0.128	1.581
Knowledge-sharing (CV) tech.	0.001	0.142	0.031	0.377
Knowledge-sharing (CV) meth.	0.034	5.254	-0.183	-2.292*
Relative competences HRM	0.042	6.602	-0.205	-2.569
Relative competences tech.	0.006	0.896	-0.077	-0.947
Relative competences meth.	0.001	0.177	0.034	0.420
Relational attributes	0.033	5.165	-0.182	-2.273*
Relational capabilities	0.013	1.952	-0.113	-1.397

Dependent variable: cost savings; * $p < 0.05$; ** $p < 0.001$

Time compliance

The next dependent variable is time compliance, which all the independent variables were regressed against as seen on table 22. Two significant relationships arise from the series of regressions. The first is with knowledge-sharing capabilities technological from client to vendor and time compliance. The relationship was found to be significant at the 0.05 level (2-tailed) with a negative slope. Consequently, this suggests that the higher the knowledge-sharing from vendor to client in terms of technological capabilities, the lower the subsequent time compliance. As with the previous established relationships the R^2 is relatively low and only accounts for 2.6% of the variation in time compliance. A more significant relationship has been found when regressing relational attributes against time compliance. The resulting significance was thus at the 0.01 level (2-tailed) with a negative slope of -0.214 . This suggests that the higher the relational attributes of the client-vendor relationship, the lower the subsequent time compliance of the involved project. While the relationship is significant, it also suffers from the limited explainability as seen by the low R^2 of 0.046.

Table 22: Results of simple linear regression (time compliance)

<i>Independent variable</i>	R^2	F	β	t
Knowledge-sharing (VC) HRM	0.009	1.414	-0.096	-1.189
Knowledge-sharing (VC) tech.	0.026	4.011	-0.161	-2.003*
Knowledge-sharing (VC) meth.	0.000	0.044	-0.017	-0.209
Knowledge-sharing (CV) HRM	0.001	0.142	0.031	0.377
Knowledge-sharing (CV) tech.	0.024	3.671	0.154	1.916
Knowledge-sharing (CV) meth.	0.012	1.757	-0.107	-1.325
Relative competences HRM	0.001	0.121	0.028	0.729
Relative competences tech.	0.003	0.386	-0.051	-0.621
Relative competences meth.	0.002	0.319	-0.046	-0.564
Relational attributes	0.046	7.218	-0.214	-2.687**
Relational capabilities	0.000	0.006	0.006	0.075

Dependent variable: time compliance; * $p < 0.05$; ** $p < 0.01$

Quality improvements

All the independent variables and constructs were finally regressed against the last dependent variable quality improvements. As hinted in the correlation matrix, where there was only one significant correlation, there was only found one significant relationship amongst all the regressions. Knowledge-sharing from vendor to client in terms of VC was successfully regressed against quality improvements, and found significant at the 0.01 level (2-tailed). The relationship is negative, as indicated by the negative slope coefficient (-0.216). As with the previous relationships, the explainability here is also rather low with an R^2 of 0.046. Thus, the independent variable only manages to explain 4.6% of the variance in the dependent variable quality improvements.

It is noteworthy that all of the significant relationships only manage to account for less than 10% of the variation in the dependent variables. Thus, the relationships exhibit strong significance but the strength of the relationship, as indicated by the R^2 is not equally as strong. Analyzing the subcomponents of

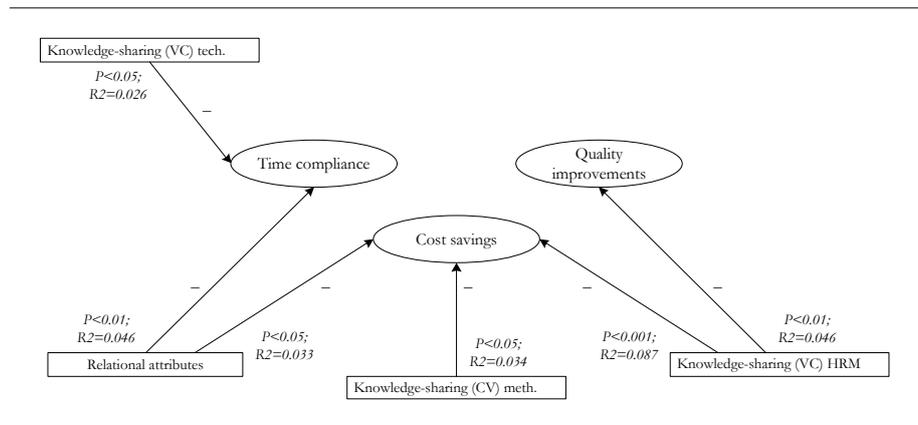
Table 23: Results of simple linear regression (quality improvements)

<i>Independent variable</i>	R^2	F	β	t
Knowledge-sharing (VC) HRM	0.046	7.356	-0.216	-2.712**
Knowledge-sharing (VC) tech.	0.000	0.001	-0.003	-0.038
Knowledge-sharing (VC) meth.	0.001	0.212	-0.037	-0.460
Knowledge-sharing (CV) HRM	0.004	0.576	-0.062	-0.759
Knowledge-sharing (CV) tech.	0.000	0.009	0.008	0.097
Knowledge-sharing (CV) meth.	0.024	3.758	-0.156	-1.939
Relative competences HRM	0.012	1.909	-0.112	-1.382
Relative competences tech.	0.000	0.011	-0.008	-0.104
Relative competences meth.	0.006	0.957	-0.079	-0.978
Relational attributes	0.006	0.838	-0.074	-0.915
Relational capabilities	0.000	0.001	-0.003	-0.034

Dependent variable: quality improvements; * $p < 0.05$; ** $p < 0.01$

performance, a stepwise regression was performance for all subcomponents. For cost savings by regressing quality improvements a significant relationship will show ($p < 0.05$). Time compliance was found to be significant at the 0.001 level. Together the two variables manage to account for 47.6% of the variation in cost savings by the R^2 of 0.476. In order to determine which variables account for the highest amount of variance in cost savings, a stepwise regression was made against the variable with both the independent variables as well as the dependent variables. The result show that time compliance, knowledge-sharing (VC) HRM, and knowledge-sharing (VC) methodological manage to achieve an R^2 of 0.539, thus accounting for 53.9% of the variance in cost savings. The two former were significant at the 0.001 level while the latter was found to be significant at the 0.05 level (2-tailed). Likewise for quality improvements the highest contributor of variance of the variable was determined to be time compliance and knowledge-sharing (VC) HRM with an R^2 of 0.346 when regressed against quality improvements. With respect to time compliance, cost savings, quality improvements,, knowledge-sharing (CV) technical, and relative competences was found to explain 52.8% of the variance with an R^2 of 0.528.

Figure 3: Project performance model results



Finally, in order to exclude the possibility for other factors to play a role in the relationships, tests against the control variables will be made. Of the six control variables two will be excluded based on the lack of proper distribution. Both client industry and client location is highly fragmented and any analysis would therefore be non-conclusive or highly biased, based on the few clusters in the responses. The remaining variables however have very few missing and results are acceptable for further analysis.

In order to determine whether the control variables influence the dependent performance variables, correlations were made against the variables. Only one significant correlation ($p < 0.05$ 2-tailed) was found between the dependent variable quality improvements, and the control variable vendor competition. Next, vendor competition was regressed against quality improvements and was found to be barely significant with $p = 0.041$ and an R^2 of 0.027. As observed with the previously established relationships, the low R^2 indicates that the independent variable has low explainability, despite it being significant.

Finally for the two dummy variables contract status and contract type, a means comparison was made by an independent t-test, but results showed that none of the dependent variables were affected by any of the dummy variables.

6.3.7 Mediation

At this point six relationships has been established between the three dependent and four of the independent variables. Summarizing the findings, time compliance was found to be negatively influenced by knowledge-sharing from vendor to client in terms of technical capabilities and relational attributes. Quality improvements was found to be negatively influenced by knowledge-sharing from vendor to client in terms of HRM. Finally, cost savings was found to be influenced by three different variables (all negatively): relational attributes, knowledge-sharing about methodologies from client to vendor, and knowledge-sharing about HRM from vendor to client.

Despite the low R-squares it has been established that the relationships are significant to varying degrees from the 0.05 level to a single at the 0.001 level.

At this point an analysis of mediation will be conducted. This is required since one of the relationships between the IV and DV could be mediated by another IV.

In a simple relationship an independent variable X will influence Y which is called the *total effect* and denoted c. Mediation is explained by introducing the variable M into the relationship between X and Y. The relationship between X and M is denoted a, between M and Y as b, and between X and Y controlling for M as c'. There are three requirements that have to be fulfilled in order to determined is M is a partial or complete mediator:

“Variable M is considered a mediator if (1) X significantly predicts Y (i.e., $c \neq 0$), (2) X significantly predicts M (i.e., $a \neq 0$), and (3) M significantly predicts Y controlling for X (i.e., $b \neq 0$).” (Preacher and Hayes, 2004)

Essentially the idea is to test whether the total effect of X on Y is significantly reduced upon adding the mediator M to the model. Mediation should not be confused with indirect effects. According to Preacher and Hayes (2004) mediation

assumes there is a significant relationship is established between X and Y, which is not a requirement in indirect effects.

A script for SPSS developed by Preacher and Hayes (2004, 2008) will be used to calculate whether a mediator exists. At present there are two alternatives, a Sobel script, which however assumes the data is normally distributed and only works with large samples, and the indirect script by Preacher and Hayes (2008) - both however utilizes bootstrapping procedures as well.

Due to the number of relationships and combinations available, only the significant relationship will be shown.

For the first test it will be determined whether the relationship between relational attributes (X) and time compliance (Y) is mediated by knowledge-sharing (VC) about technological capabilities (M). The Sobel test reveals that while X may explain Y ($p < 0.01$), X does not predict Y ($p = 0.1026$), and the mediator M does not predict Y controlling for M ($p = 0.0926$). The bootstrapping results were also not within the 95% confidence interval. Reversing the relationship with X being knowledge-sharing (VC) about technological capabilities and M being relational attributes, the calculations also failed to reach a significant level ($p = 0.1960$) and neither the bootstrapping results were acceptable.

For cost savings all the combinations were run between the dependent variable and the independent variables: relational attributes, knowledge-sharing (VC) HRM, and knowledge-sharing (CV) methodological. The results show that with knowledge-sharing HRM as a mediator, it reaches significance at the 0.05 level (2-tailed) for both relational attributes and knowledge-sharing (CV) methodological as IV. The first relationship is shown next.

Table 24: Direct and total effects

<i>Variable</i>	<i>Coefficient</i>	<i>S.E.</i>	<i>t</i>	<i>p</i>
b(YX)	-0.2352	0.1035	-2.2727	0.0245
b(MX)	0.3025	0.1047	2.8896	0.0044
b(YM.X)	-0.2615	0.0778	-3.3595	0.0010
b(YX.M)	-0.1561	0.1029	-1.5174	0.1313

X=Relational attributes; Y=Cost savings; M=Knowledge-sharing (VC) HRM

On table 24 the calculations of the direct and total effects can be seen. The first calculation is based on a normal regression of the independent variable (relational attributes) against the dependent variable (cost savings) to test whether there is an initial relationship, which is established. As previously mentioned, mediation can occur through indirect effects even if X does not cause Y. The next calculation shows that the independent variable predicts the mediator M (knowledge-sharing (VC) capabilities HRM). The second last calculation is based on a regression of the mediator M on Y (cost savings) while controlling for the independent variable relational attributes (M). If the relationship is not significant when controlling for X, the mediator and dependent variable could be caused by X instead of through mediation. Finally, the last calculations shows how well X can predict Y when controlling for M also called c' or the indirect effect. If the relationship is significant even when controlling for M, it is as best partial mediation.

The table clearly shows that X predicts Y ($p < 0.05$) and M ($p < 0.01$), and lastly, that M predicts Y controlling for X at the 0.001 level (2-tailed). Lastly, the relationship between X and Y ($p = 0.0245$) becomes statistically insignificant ($p = 0.1313$) when controlling for M as required for mediation.

Table 25: Sobel test: Indirect effect and significance using normal distribution

<i>Value</i>	<i>S.E.</i>	<i>LL 95 CI</i>	<i>UL 95 CI</i>	<i>z</i>	<i>p</i>
-0.0791	0.0370	-0.1517	-0.0066	-2.1370	0.0326

X=Relational attributes; Y=Cost savings; M=Knowledge-sharing (VC) HRM

On table 25 the Sobel test can be seen and the test is significant at the 0.05 level (2-tailed). However, as the Sobel test is usually not adequate because that it relies on normal distribution and a large sample size, therefore bootstrapping with 5,000 resamples was calculated with a confidence interval (CI) of 95% and 99%, as seen on table 26.

Table 26: Bootstrap†results for indirect effect

<i>Value</i>	<i>S.E.</i>	<i>LL 95 CI</i>	<i>UL 95 CI</i>	<i>LL 99 CI</i>	<i>UL 99 CI</i>
-0.0791	0.0433	-0.1814	-0.0126	-0.2159	-0.008

†Resamples = 5000; X=Relational attributes; Y=Cost savings; M=Knowledge-sharing (VC) HRM

LL and UL is short for lower limit and upper limit, and as seen on the table, the calculation is within the boundary, that is -0.1814 (LL) and -0.0126 (UL) at 95% confidence interval and at the 99% with a lower limit of -0.2159 and upper limit of -0.008 .

Figure 4 shows the results of the mediation model. The basic relationship between relational attributes (IV) and project performance in terms of cost savings (DV) is affected by knowledge-sharing client-vendor HRM capabilities (IV) and thus mediates the relationship between the aforementioned X and Y. As seen on figure 4 and evident by the negative coefficients of b and c', cost savings is negatively influenced. As previously mentioned the model fulfills the requirements for mediation. This can be seen by the significance for the relationship between X and Y when controlling for M also denoted as (YX.M). The total effect of X on Y has a significance of $p = 0.0245$, but when controlling for M the probability is reduced to $p = 0.1313$, thus becomes statistically insignificant. Had it been partial mediation the significance would be below 0.05.

Finally an analysis was run between the dependent variable cost savings and knowledge-sharing (CV) methodological (X) and the mediator knowledge-sharing (VC) HRM.

As seen on table 27 the requirements for mediation are at a glance fulfilled. The basic relationship between X and Y is significant ($p = 0.0233$). Furthermore X predicts M ($p = 0.0263$) and M predicts Y even when controlling for M ($p = 0.0007$). In determining whether it is complete or partial mediation, the relationship between X and Y is tested while controlling for M. As shown, the

Figure 4: Mediation model I

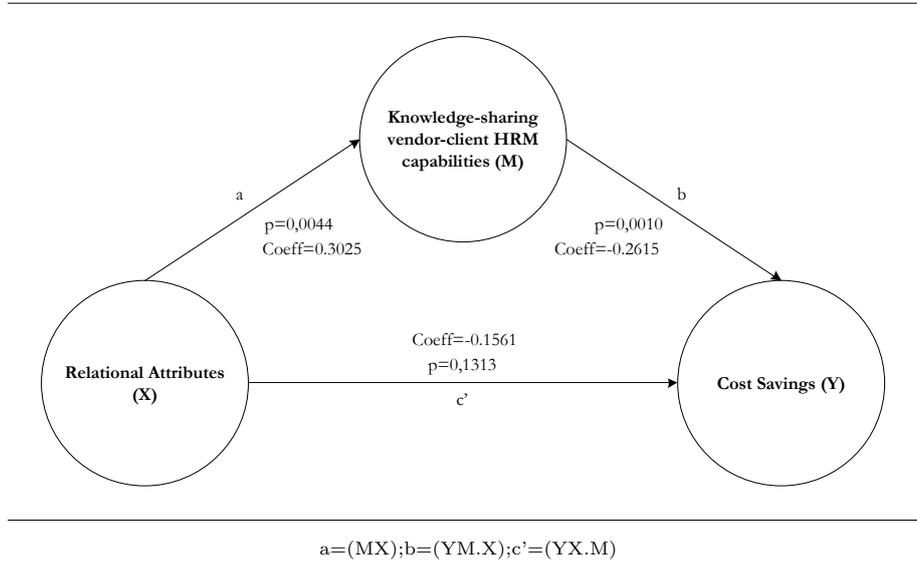


Table 27: Direct and total effects

Variable	Coefficient	S.E.	t	p
b(YX)	-0.1828	0.0798	-2.2922	0.0233
b(MX)	0.1930	0.0816	2.2440	0.0263
b(YM.X)	-0.2648	0.0768	-3.4457	0.0007
b(YX.M)	-0.1344	0.0783	-1.7157	0.0883

X=Knowledge-sharing (CV) Meth.; Y=Cost savings; M=Knowledge-sharing (VC) HRM

significance between the basal relationship ($p = 0.0233$) $b(XY)$ and the indirect effect $b(YX.M)$ becomes insignificant ($p = 0.0883$).

Table 28: Sobel test: Indirect effect and significance using normal distribution

Value	S.E.	LL 95 CI	UL 95 CI	z	p
-0.0485	0.0265	-0.1005	0.0035	-1.8271	0.0677

X=Knowledge-sharing (CV) Meth.; Y=Cost savings; M=Knowledge-sharing (VC) HRM

The Sobel test seen on table 28 reveals that the relationship is not significant at the 0.05 level (2-tailed). This is confirmed by the calculations not being within the 95% confidence interval. However, as previously mentioned the Sobel test required the distribution of data to be normally distributed, and even though it is already close to normal (no remarkable skewness or kurtosis), bootstrapping may come closer.

The results from bootstrapping as seen on table 29 suggests that the relationship is indeed significant at the 0.05 level, given it is within the 95% confidence interval. These are the cons of the Sobel test, since it relies on

Table 29: Bootstrap†results for indirect effect

Value	S.E.	LL 95 CI	UL 95 CI	LL 99 CI	UL 99 CI
-0.0485	0.0263	-0.1048	-0.0030	-0.1311	0.0121

†Resamples = 5000; X=Knowledge-sharing (CV) Meth.; Y=Cost savings; M=Knowledge-sharing (VC) HRM

normally distributed data and large sample sizes.

Figure 5: Mediation model II

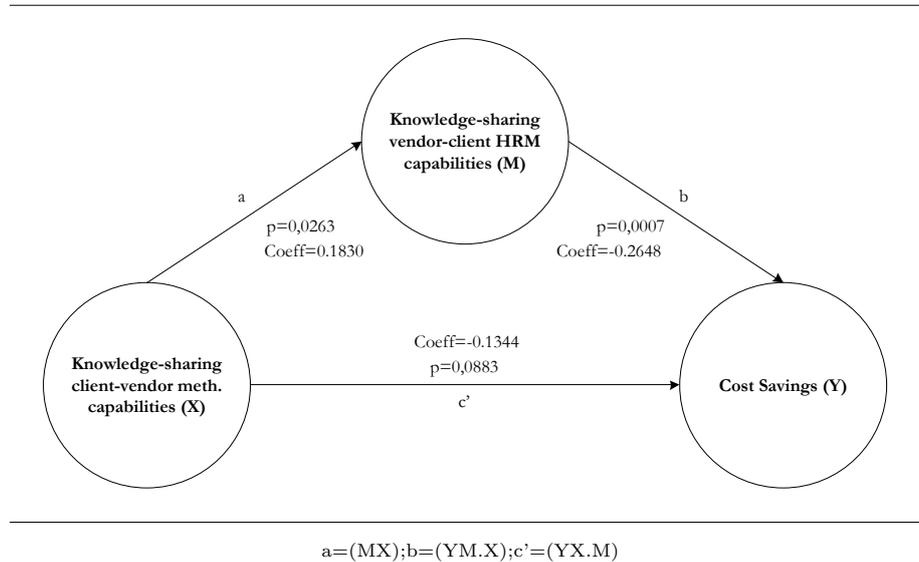


Figure 5 shows the results of the last mediation model. The basic relationship between knowledge-sharing (CV) methodological (IV) and project performance in terms of cost savings (DV) is affected by knowledge-sharing client-vendor HRM capabilities (IV) and thus mediates the relationship between the aforementioned X and Y. As seen on figure 5 and evident by the negative coefficients of b and c', cost savings is negatively influenced. Furthermore the model fulfills the requirements for mediation since the total effect of X on Y has a significance of $p = 0.0233$, but when controlling for M the probability is reduced to $p = 0.0833$, thus insignificant. Had it been partial mediation the significance would be below the 0.05 level.

6.4 Discussion

The purpose of the analysis in the preceding sections, was to determine whether client-vendor relationship value-drivers and relationship quality would affect project performance outcome measured as cost savings, time compliance, and quality improvements. A total of four hypotheses were proposed. The first stipulated that knowledge-sharing between client and vendor would positively influence project performance, measured in terms of quality. The second proposed

that knowledge-sharing between client and vendor would negatively influence project performance in terms of time and cost. The third proposed that the higher the relative competence level between client and vendor, the higher the project performance on all levels. These three hypotheses are based on the foundation for the value-drivers. The last proposed that relational governance would positively influence project performance on all levels. The relational governance construct was further decomposed into two subconstructs: relational attributes and relational capabilities. These construct capture two distinctly different attributes of a relationship, whether it is based on relational governance (attributes) and whether it has the required capabilities - these make up the definition of relationship-quality.

The first hypothesis based on the knowledge-sharing construct could not achieve the desired Cronbach's alpha of at least 0.6. Therefore, further analysis was conducted with each subcomponent of the construct, based on six different measures, whereof three were unique and each set based on client-vendor and vendor-client perspective. From the correlation matrix quality improvements was found to be negatively correlated with knowledge-sharing (VC) HRM capabilities (-0.216 , 0.01 level 2-tailed). In order to support the first hypothesis it would be expected that quality improvements would be positively correlated with the majority of the knowledge-sharing variables. Despite the single correlation, linear regression was to determine whether a relationship was present (significant). The regression analysis showed that relationship between knowledge-sharing (VC) HRM and quality improvements was indeed significant at the 0.01 level (2-tailed). However, the regression, while statistically significant, suffered from a rather low R^2 at 0.046. Therefore H1 is unsupported. Firstly, there was only a significant relationship between vendor to client knowledge-sharing in terms of HRM, secondly the slope coefficient was negative, and finally the R^2 was rather low.

The second hypothesis proposed that while quality should be positively influenced by knowledge-sharing, time and cost would be negatively influenced. The correlation matrix revealed that the cost savings was negatively correlated with knowledge-sharing (VC) HRM capabilities (-0.295 0.01 level 2-tailed) and knowledge-sharing KS (CV) methodological capabilities (-0.183 , 0.05 level 2-tailed). Time compliance was found to be negatively correlated with knowledge-sharing (VC) technical capabilities (-0.161 , 0.05 level 2-tailed). The regression with the dependent variable cost savings was found to be significant for both variables. For knowledge-sharing (VC) HRM at the 0.001 level (2-tailed) and at the 0.05 level for knowledge-sharing (CV) methodological. However, the relationships also suffer from the same problem as H1 with low R^2 values. For knowledge-sharing (VC) HRM it was 0.087 and for the knowledge-sharing (CV) methodological it was only 0.034. Regressing knowledge-sharing (VC) technical against time compliance also showed a significant relationship ($p < 0.05$), but with an even lower R^2 of just 0.026. Thus H2 receives at best only partial support from the empirical findings.

The third hypothesis stated that relative competences would positively influence project performance on all levels. Relative competences could not manage to achieve a Cronbach's alpha of at least 0.6 either. Relative competence level was based on the same knowledge-sharing capabilities, but relative to the vendor. As with the knowledge-sharing capabilities variables, the further analysis was conducted with each subcomponent of relative competences individually. The

correlation matrix revealed that just one of the three variables (HRM) was found to be negatively correlated with cost savings. However, the regression was statistically insignificant ($p > 0.05$). Support for this hypothesis would have required not only statistical significant but reverse correlation. Therefore, the empirical findings do not support H3.

The final hypothesis H4, was based on relational governance as an indication of relationship quality. The hypothesis stipulated that the higher the relational governance, the higher the subsequent project performance on all levels. Relational governance was decomposed into two subconstruct. The first construct, relational attributes, was based on five variables: risk sharing, trust level, conflict resolution, conflict intensity, and mutual understanding. The construct managed to achieve a Cronbach's alpha above 0.6 at 0.658. The second sub construct, relational capabilities, is based on cooperation, relationship flexibility, relationship quality, and incentive alignment. The construct also managed to obtain an alpha above the desired 0.6 at 0.629. Apart from the main construct project performance, relational governance, and its two sub constructs were the only constructs that managed to achieve an alpha above the desired 0.6. The correlation matrix following the reliability analysis showed that cost savings were negatively correlated (-0.182) and time compliance also negatively with a coefficient of -0.214 . Next, relational attributes was regressed against cost savings which showed a significant ($p < 0.05$), but negative ($\beta = -0.182$) relationship. Likewise for time compliance, relational attributes was regressed and also found significant ($p < 0.01$), and also negative with a slope of (-0.214). Both regressions however yielded low R-squares of 0.033 and 0.046 respectively. Based on the findings, it can be concluded that H4 cannot be supported either. Relational attributes, though with low explainability, negatively influences cost savings and time compliance.

Ultimately only H2 gained partial support. In the case of H1, H3, and H4 the relationships that were uncovered and significant were all negative, where it was expected to find a positive coefficients. Finally, a mediation analysis was performed and revealed that the relationship between relational attributes and cost savings were mediated by knowledge-sharing (VC) HRM capabilities. Furthermore, knowledge-sharing (VC) capabilities HRM was also shown to mediate the relationship between cost savings and knowledge-sharing (CV) methodological capabilities. These final models, while significant, only explain a small percentage of the variance with the dependent variable cost savings. As previously discussed there are two main causes that may have impacted the findings. Missing values and sample size may potentially have a great impact on the conducted analysis. The series mean replacement performed for missing values, may have obscured some of the significant findings, and the sample size being relative small ($n = 153$) increase the likelihood of finding significant relationships. This is based on the insensitivity to sample size - the smaller the sample size, the higher the probability that extremes may dominate responses.

In the case of the findings of this thesis, firstly, the relative competence level between the client and vendor does not appear to influence project performance in terms of time, cost, and quality. Secondly, knowledge-sharing between client and vendor will, at best, negatively influence performance. Finally, relational governance, or at least the attributes of the relationship if present, negatively influence performance while capabilities of a relationship seemingly has no greater impact on the overall performance.

7 Conclusion

In spite of the substantial amount of effort put into research within IT outsourcing, as documented by several researchers (Dibbern et al., 2004; Fjermestad and Saitta, 2005; Mahnke et al., 2005; Gonzalez et al., 2006; Lacity et al., 2009), there still exist gaps in the literature in specific contexts, such as performance of ICT outsourcing. This thesis set out to determine how prior researchers had investigated performance measurement in IT outsourcing, and through a quantitative study examine whether client-vendor relation-specific factors had a role in influencing the subsequent performance of outsourced ICT projects. The goal was thus two-folded, but interdependent since the empirical study relied on the findings from the literature review and content-analysis.

With regards to uncovering how prior research had investigated performance measurement within the context of IT outsourcing, a content-analysis was first conducted. The analysis consisted of a thorough database search through 15 different journals spanning several years (2005-2010). The search yielded a total of 39 relevant articles, upon which the content-analysis was based. The content-analysis revealed a severe fragmentation of adopted dependent and independent variables. While the independent variables were slightly more clustered, the variations in definitions of variables contributed to significant difficulties in deriving relevant constructs useful for ensuring optimal reliability of measurements. Having established the state of the relevant literature for the article, the main contributions were discussed and grouped into their relevant area: performance in software development, performance in strategic outsourcing, and performance in client-vendor relationships. The resulting summary thus provided a condensed summary of relevant findings of previous research. A total of four hypotheses were then proposed (and aligned with the dataset provided by Mavo Consulting A/S), based on the content-analysis and literature review, and thus proposed to measure project performance in terms of cost, time, and quality (Gardiner and Stewart, 2000) positively influenced by value-drivers (knowledge-sharing and relative competences) and relational governance.

The second half of the thesis was based on an analysis of empirical data provided by Mavo Consulting A/S. The main goal was to uncover whether the stipulated hypotheses could be supported or rejected. The questionnaire was based on 27 variables, whereof six were control variables and the rest based on Likert scale questions. Project performance was based on three questions, knowledge-sharing on six, relative competences on three, and relational governance on the remaining nine. The data collection resulted in a total of 153 responses. Missing values caused considerable considerations into strategies on avoiding a reduction in sample size. In the end, missing data was replaced by the series mean, and the subsequent analysis was based on the entire sample size of 153. The resulting analysis of the collected data revealed reliability problems of several constructs. Knowledge-sharing and relative competences could not reach the determined lower limit of the Cronbach's alpha of 0.6. Final analysis was therefore based on the subcomponents of both. Relational governance was divided into two sub constructs called relational attributes and relational capabilities. Both achieved an alpha above the 0.6 limit. The following correlation study showed seven correlations between the independent variables and the dependent variables. The correlations were contrary to most expectations all negative, such that an increase in any of the IV's would negatively affect the

project performance measures.

Following the correlations a simple linear regression showed the relationships significant at the 0.01 level (2-tailed) for knowledge-sharing (VC) HRM capabilities and relational attributes with quality improvements and time compliance respectively. Knowledge-sharing (CV) methodological capabilities, relational attributes, and knowledge-sharing (VC) technical capabilities was found significant at slightly lower level, 0.05 (2-tailed) for cost savings for the first two and time compliance for the last. The strongest relationship was found between knowledge-sharing (VC) HRM and cost savings at the 0.001 level (2-tailed). For all the regressions the R^2 was lower than 0.10 which is considered relatively low. This shows that at best the findings only account for close to 10% of the variance found with the dependent variables. Finally, a mediation-analysis was conducted which showed two relationships: one between relational attributes (X) and cost savings (Y) was partially mediated by knowledge-sharing (VC) HRM capabilities (M) and one where (X) is replaced with knowledge-sharing (CV) methodological capabilities. Both models fulfilled the requirements for mediation.

The main findings of the data analysis has shown that all but one of the initially proposed hypotheses could be supported partially. However, many factors may have influenced the final results. In light of the work undertaken with the thesis, two methodological corrections should have been resolved immediately. A thorough investigation of proper constructs and questions should have been derived from consulting prior literature. The failure of achieving the desired Cronbach's alpha of at least 0.6 is evidence of the apparent lack of reliability. When performing positivistic research that follows the hypothetico-deductive model, it is imperative that models, findings, and tests are performed on a easily and explicitly comparable level. Corroboration cannot be determined if the measurement models are lacking in terms of reliability or validity. The second failure in data collection is attributed to the sample size and missing values. Missing values were replaced by the series mean, given single or multiple imputation was unavailable, however, the fact of the matter is that missing values may have a significant impact on results, especially when the sample size is low. This resulted in a two-part vicious circle. Resolving the missing values by listwise or pairwise deletion would result in a substantial reduction in sample size, while relying on series mean replacement would ensure a larger sample size, but higher probability of having results obscured. These fundamental methodological findings impair the generalizability and limits the usefulness of the findings. Therefore, caution should be exercised when interpreting the results. However, the findings enable further research to be conducted with a new lens for understanding performance, and how it is influenced. For these reasons additional research would be required in order to corroborate the validity of the main model derived from the analysis.

References

- C. Abecassis-Moedas and S. B. Mahmoud-Jouini. Absorptive Capacity and Source-Recipient Complementarity in Designing New Products: An Empirically Derived Framework. *Journal of Product Innovation Management*, 25:473–490, 2008.
- M. Alsudairi and Y. K. Dwivedi. A Multi-disciplinary Profile of IS/IT Outsourcing Research. *Journal of Enterprise Information Management*, 23, No. 2:215–258, 2010.
- C. Argyris and D. A. Schon. *Organizational Learning: A Theory of Action Perspective*. Addison-Wesley, 1978.
- G. Barczak, E. J. Hultink, and F. Sultan. Antecedents and Consequences of Information Technology Usage in NPD: A comparison of Dutch and U.S. Companies. *Journal of Product Innovation Management*, 25:620–631, 2008.
- I. Bardhan, J. Whitaker, and S. Mithas. Information Technology, Production Process Outsourcing, and Manufacturing Plant Performance. *Journal of Management Information Systems*, 23 No. 2:13–40, 2006.
- J. Barney. Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17, No. 1:99–120, 1991.
- J. Barthelemy. The Hidden Costs of IT Outsourcing. *MIT Sloan Management Review*, 2001.
- B. Berg and A. C. Stylianou. Factors considered when outsourcing an IS system: an empirical examination of the impacts of organizational size, strategy and the object of a decision. *European Journal of Information Systems*, 18:235–248, 2009.
- S. S. Bharadwaj, K. B. C. Saxena, and M. D. Halemane. Building a successful relationship in business process outsourcing: an exploratory study. *European Information Systems*, 19: 168–180, 2010.
- G. Burrell and G. Morgan. *Sociological Paradigms and Organizational Analysis*. Ashgate Publishing, London, Exeter, 1979.
- O. F. Bustinza, D. Arias-Aranda, and L. Gutierrez-Gutierrez. Outsourcing, competitive capabilities and performance: an empirical study in service firms. *Int. J. Production Economics*, 126:276–288, 2010.
- D. Dey, M. Fan, and C. Zhang. Design and Analysis of Contracts for Software Outsourcing. *Information Systems Research*, 21 No. 1:93–114, 2010.
- J. Dibbern, T. Goles, R. Hirschheim, and B. Jayatilaka. Information Systems Outsourcing: A Survey and Analysis of the Literature. *The DATABASE for Advances in Information Systems*, 35, No. 4, 2004.
- C. Duan, V. Grover, and N. Balakrishnan. Business Process Outsourcing: an event study on the nature of processes and firm valuation. *European Journal of Information Systems*, 18: 442–457, 2009.
- J. H. Dyer and H. Singh. The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. *Academy of Management Review*, 23 No. 4:660–679, 1998.
- P. Fingar and J. Bellini. *The Real-Time Enterprise : Competing on Time with the Revolutionary Business S-Ex Machine*. Meghan Kiffer Pr, 2005.
- J. Fjermestad and J. Saitta. A Strategic Management Framework for IT Outsourcing: A review of the literature and the development of a success factors model. *Journal of Information Technology and Case and Application Research*, 7, No. 3:42–60, 2005.
- P. D. Gardiner and K. Stewart. Revisiting the golden triangle of cost, time and quality: the role of NPV in project control, success and failure. *International Journal of Project Management*, 18:251–256, 2000.

- D. Gefen, S. Wyss, and Y. Lichtenstein. Business Familiarity as Risk Mitigation in Software Development Outsourcing Contracts. *MIS Quarterly*, 32 No. 3:531–551, 2008.
- K. M. Gilley and A. Rasheed. Making More by Doing Less: An Analysis of Outsourcing and its Effects on Firm Performance. *Journal of Management*, 26 No. 4:763–790, 2000.
- R. Gonzalez, J. Gasco, and J. Llopis. Information Systems Outsourcing: A literature analysis. *Information & Management*, 43, No. 7:821–834, 2006.
- J. Goo, R. Kishore, and H. R. Rao. The Role of Service Level Agreements in Relational Management of Information Technology Outsourcing: An Empirical Study. *MIS Quarterly*, 33 No. 1:119–145, 2009.
- A. Gopal and B. Koka. The Role of Contracts on Quality and Returns to Quality in Offshore Software Development Outsourcing. *Decision Sciences Journal*, 41 No. 3:491–516, 2010.
- R. M. Grant. Toward a Knowledge-Based Theory of the Firm. *Strategic Management Journal*, 17:109–122, 1996.
- K. L. Gwebu, J. Wang, and L. Wang. Does IT outsourcing deliver economic value to firms? *Journal of Strategic Information Systems*, 19:109–123, 2010.
- J. A. Hall and S. L. Liedtka. Financial Performance, CEO Compensation, and Large-Scale Information Technology. *Journal of Management Information Systems*, 22 No. a:193–221, 2005.
- D. G. Hoopes and S. Postrel. Shared Knowledge, “Glitches,” and Product Development Performance. *Strategic Management Journal*, 20:837–865, 1999.
- G. Iyer, S. Ravindran, and P. M. J. Reckers. Procurement of IT Consulting Services and Firm-Specific Characteristics. *Journal of the Association for Information Systems*, 7 No. 4: 207–240, 2006.
- T. A. Jenkin and Y. E. Chan. IS project alignment - a process perspective. *Journal of Information Technology*, 25:35–55, 2010.
- B. Jiang, G. V. Frazier, and E. L. Prater. Outsourcing effects on firms’ operational performance An empirical study. *International Journal of Operations & Production Management*, 26 No. 12:1280–1300, 2006.
- M. Keil, G. Paul, and Mhring M. Reporting bad news on software projects: the effects of culturally constituted views of face-saving. *Information Systems Journal*, 17:59–87, 2007.
- N. Khan and G. Fitzgerald. Dimensions of Offshore Outsourcing Business Models. *Journal of Information Technology Cases and Applications*, 2004.
- R. Klepper. The management of partnering development in I/S outsourcing. *Journal of Information Technology*, 10, No. 4:248, 1995.
- B. Kogut and U. Zander. Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. *Organization Science*, 3, No. 3, 1992.
- M. C. Lacity, S. A. Khan, and L. P. Willcocks. A review of IT outsourcing literature: Insights for practice. *Journal of Strategic Information Systems*, 18:130–146, 2009.
- M. C. Lacity, S. Khan, A Yan, and L. P. Willcocks. A review of the IT outsourcing empirical literature and future research directions. *Journal of Information Technology*, 25:395–433, 2010.
- M. Lansiti and R. Levien. Strategy as Ecology. *Harvard Business Review*, 2004.
- M. A. le Dain, R. Calvi, and S. Cheriti. Measuring supplier performance in collaborative design: Proposition of a framework, 2009.
- J. N. Lee and Y. G. Kim. Effects of Partnership Quality on IS Outsourcing Success: Conceptual Framework and Empirical Validation. *Journal of Management Information Systems*, 15, No. 4:29–61, 1999.

- N. Levina and J. W. Ross. From The Vendor's Perspective: Exploring the Value Proposition in Information Technology Outsourcing. *MIS Quarterly*, 27, No. 3:331–364, 2003.
- L. Liu and P. Yetton. Sponsorship and IT vendor management of projects. *Journal of Information Technology*, 24:46–54, 2009.
- V. Mahnke, M. L. Overby, and J. Vang. Strategic Outsourcing of IT Services: Theoretical Stocktaking and Empirical Challenges. *Industry and Innovation*, 12 No. 2:205–253, 2005.
- D. Mani, A. Barua, and A. Whinston. An Empirical Analysis of the Impact of Information Capabilities Design on Business Process Outsourcing Performance. *MIS Quarterly*, 34 No. 1:39–62, 2010.
- K. J. Mayer and R. M. Salomon. Capabilities, Contractual Hazards, and Governance: Integrating Resource-Based and Transaction Cost Perspectives. *Academy of Management Journal*, 49 No. 5:942–959, 2006.
- S. Nadkarni and P. Herrmann. CEO Personality, Strategic Flexibility, and Firm Performance: The Case of the Indian Business Process Outsourcing Industry. *Academy of Management Journal*, 53 No. 5:1050–1073, 2010.
- W. L. Neuman. *Social research methods: qualitative and quantitative approaches*. Allyn & Bacon, Boston, Massachusetts, 2006.
- S. Novak and S. Stern. How Does Outsourcing Affect Performance Dynamics? Evidence from the Automobile Industry. *Management Science*, 54 No. 12:1963–1979, 2008.
- B. J. Oates. *Research Information Systems and Computing*. Sage Publications Ltd, 2006.
- W. Oh, M. J. Gallivan, and J. W. Kim. The Market's Perception of the Transactional Risks of Information Technology Outsourcing Announcements. *Journal of Management Information Systems*, 22 No. 4:271–303, 2006.
- M. S. Olson, D. van Bever, and S. Verry. When Growth Stalls. *Harvard Business Review*, 2008.
- W. Orlikowski and J. J. Baroudi. Studying Information Technology Organizations: Research Approaches and Assumptions. Working Paper Series: STERN IS-90-4, 1991.
- J. H. Park, J. K. Lee, and J. S. Yoo. A framework for designing the balanced supply chain scorecard. *European Journal of Information Systems*, 14:335–346, 2005.
- K. Peca. Positivism in Education: Philosophical, Research, and Organizational Assumptions. *Opinion Papers (120)*, 2000.
- M. A. Peteraf. The Cornerstone of Competitive Advantage: A Resource-Based View. *Strategic Management Journal*, 14, No. 3:179–191, 1993.
- L. Poppo and T. Zenger. Do Formal Contracts and Relational Governance Function as Substitutes or Complements? *Strategic Management Journal*, 23:707–725, 2002.
- K. J. Preacher and A. F. Hayes. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36 No. 4:717–731, 2004.
- K. J. Preacher and A. F. Hayes. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40 No. 3:879–891, 2008.
- B. J. Quinn and F. G. Hilmer. Strategic Outsourcing. *Sloan Management Review*, 1994.
- A. Rai, L. M. Maruping, and V. Venkatesh. Offshore Information Systems Project Success: The Role of Social Embeddedness and Cultural Characteristics. *MIS Quarterly*, 33 No. 3: 617–641, 2009.
- V. Ramachandran and A. Gopal. Managers' Judgments of Performance in IT Services Outsourcing. *Journal of Management Information Systems*, 26 No. 4:181–218, 2010.

- N. Ramasubbu, S. Mithas, M. S. Krishnan, and C. F. Kemerer. Work Dispersion, Process-Based Learning, and Offshore Software Development Performance. *MIS Quarterly*, 32 No. 2, 2008.
- F. T. Rothaermel, M. A. Hitt, and L. A. Jobe. Balancing Vertical Integration and Strategic Outsourcing: Effects on Product Portfolio, Product Success, and Firm Performance. *Strategic Management Journal*, 27:1033–1056, 2006.
- R. Sankaranarayanan and Sundararajan A. Electronic Markets, Search Costs, and Firm Boundaries. *Information Systems Research*, 21 No. 1:154–169, 2010.
- P. B. Seddon, S. Cullen, and L. P. Willcocks. Does Domberger’s theory of ‘The Contracting Organization’ explain why organizations outsource IT and the level of satisfaction achieved? *European Journal of Information Systems*, 16:237–253, 2007.
- F. Sen and M. Shiel. From business process outsourcing (BPO) to knowledge process outsourcing (KPO): Some issues. *Human Systems Management*, 25:145–155, 2006.
- M. A. Stanko and R. J. Calantone. Controversy in Innovation Outsourcing Research: Review, Synthesis and Future Directions. *Submitted to the R&D Management special issue on “Outsourcing R&D for efficient innovation”*, 2009.
- D. J. Teece, G. Pisano, and A. Shuen. Dynamic Capabilities and Strategic Management. *Strategic Management Journal*, 18 No. 7:509–533, 1997.
- M. F. Thouin, J. J. Hoffman, and E. W. Ford. IT outsourcing and firm-level performance: A transaction cost perspective. *Information & Management*, 46:463–469, 2009.
- A. Tiwana and A. A. Bush. A Comparison of Transaction Cost, Agency, and Knowledge-Based Predictors of IT Outsourcing Decisions: A U.S.-Japan Cross-Cultural Field Study. *Journal of Management Information Systems*, 24 No. 1:259–300, 2007.
- K. Tsai and J. Wang. External technology sourcing and innovation performance in LMT sectors: An analysis based on the Taiwanese Technological Innovation Survey. *Research Policy*, 38:518–526, 2009.
- A. Tversky and D. Kahneman. Judgment under Uncertainty: Heuristics and Biases. *Science*, 184, No. 4157:1124–1131, 1974.
- P. W. L. Vlaar, P. C. van Fenema, and V. Tiwari. Cocreating Understanding and Value in Distributed Work: How Members of Onsite and Offshore Vendor Teams Give, Make, Demand, and Break Sense. *MIS Quarterly*, 32 No. 2:227–255, 2008.
- T. F. Wallace and M. H. Kremzar. *ERP: Making It Happen: The Implementers’ Guide to Success with Enterprise Resource Planning*. John Wiley & Sons, Inc., Canada, 2001.
- C. Weigelt. The Impact of Outsourcing New Technologies on Integrative Capabilities and Performance. *Strategic Management Journal*, 30:595–616, 2009.
- O. E. Williamson. *Markets and Hierarchies*. The Free Press, New York, 1975.

Appendix

Short list of the 39 articles analyzed for the literature review

Abecassis-Moedas and Mahmoud-Jouini (2008)
Barczak, Hultink, and Sultan (2008)
Bardhan, Whitaker, and Mithas (2006)
Berg and Stylianou (2009)
Bharadwaj, Saxena, and Halemane (2010)
Bustanza, Arias-Aranda, and Gutierrez-Gutierrez (2010)
Dey, Fan, and Zhang (2010)
Duan, Grover, and Balakrishnan (2009)
Gefen, Wyss, and Lichtenstein (2008)
Gilley and Rasheed (2000)
Goo, Kishore, and Rao (2009)
Gwebu, Wang, and Wang (2010)
Hall and Liedtka (2005)
Hoopes and Postrel (1999)
Iyer, Ravindran, and Reckers (2006)
Jenkin and Chan (2010)
Jiang, Frazier, and Prater (2006)
Keil, Paul, and M. (2007)
Lacity, Khan, and Willcocks (2009)
le Dain, Calvi, and Cheriti (2009)
Liu and Yetton (2009)
Mani, Barua, and Whinston (2010)
Mayer and Salomon (2006)
Nadkarni and Herrmann (2010)
Novak and Stern (2008)
Oh, Gallivan, and Kim (2006)
Park, Lee, and Yoo (2005)
Rai, Maruping, and Venkatesh (2009)
Ramachandran and Gopal (2010)
Ramasubbu, Mithas, Krishnan, and Kemerer (2008)
Rothaermel, Hitt, and Jobe (2006)
Sankaranarayanan and A. (2010)
Seddon, Cullen, and Willcocks (2007)
Stanko and Calantone (2009)
Thouin, Hoffman, and Ford (2009)
Tiwana and Bush (2007)
Tsai and Wang (2009)
Vlaar, van Fenema, and Tiwari (2008)
Weigelt (2009)

Word count

<i>Item</i>	<i>#</i>	<i>Characters</i>	<i>Pages</i>
Characters with spaces		158.371	69.1
Figures	34	23.800	10.5
Total characters:		180.494	≈ 79.6 pages