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Collaboration in multi-sourcing: critical to supplier success?

Niehot, M.

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Abstract

Previous scholarly research in the IT outsourcing domain has mainly focussed on dyadic sourcing relationships and usually taking the client firm perspective. This research synthesizes IT outsourcing literature with state of the art in multi sourcing to propose a framework of success factors that suppliers should focus on when engaging into multi-sourcing. An explanatory, case-study is used to specifically study the criticality of collaboration for an infrastructure supplier engaged in a global IT multi-sourcing arrangement. The results indicate that collaboration is indeed an important success factor but may not influence all components of success. To successfully collaborate, management attention should be given to relational governance complementing formal control mechanisms. Suppliers require an adaptive capability and the governing role of the client should be clearly documented. This research contributes to IS literature by providing a framework of CSF for suppliers in global IT multi-sourcing engagements, with emphasis on mechanisms that support collaboration.

Key terms

multi-sourcing, outsourcing, collaboration, critical success factor, supplier perspective, information technology

Summary

Since 2004 large scale multi-sourcing contracts have jumped sharply in number following its promotion by industry analysts like Gartner for the many advantages in delivering greater cost reductions and mitigating strategic and operational risk. Under multi sourcing client firms bring together a set of best of breed suppliers into an eco-system with the expectation that IT services will be delivered effortless and seamlessly to their end users. In such a highly complex environment suppliers require certain capabilities to be successful. Over the past few years companies have been revising their initial multi-sourcing contracts and discontinued one or more relationships. This makes us wonder why one supplier fails to get a new contract, while others remain successful within the client ecosystem. Against this backdrop we conducted a structured literature review to build a theoretical base towards answering our initial research question: *"What are the critical success factors (CSF) for a supplier in IT multi-sourcing?".*

No previous research has been found that already provided a framework of CSF for suppliers in ITM, and so guidance was taken from two important IT Outsourcing (ITO) review articles covering significant determinants of ITO success which were then synthesized with the state-of-the-art in ITM. This resulted in a framework with a total of nineteen success factors.

Due to the time constraint associated to this study it was decided to focus on empirical validation of just one success factor. Collaboration is considered an important differentiator between dyadic ITO engagements and multi-vendor sourcing and has been the subject of few previous research papers. As such the initial research question has been refined to: *"How critical is a collaborative capability for a supplier to be successful in IT multi-sourcing and how does collaboration contribute to this success?"*

A case study methodology was chosen using a multi method data collection approach to answer this explanatory question. Our unique and holistic case concerns an IT infrastructure supplier that has successfully remained contracted in a billion-dollar multi sourcing eco system since 2008. The unit of observation is an IT infrastructure supplier in a multi-sourcing deal and the unit of analysis is collaboration.

To establish an initial view of the applicability of previously gained insights from literature in this new context an online questionnaire was constructed using closed questions with a 5-point Likert scale. The survey was sent to 166 respondents based on non-probability purposive sampling. Fifty-three full responses were received and subjected to descriptive statistical analysis using SPSS. Subsequently, semi-structured interviews were conducted with four director level participants who oversee various disciplines of the outsourcing account to gain a deeper understanding of why collaboration is critical to success and how collaboration takes place.

Based on the analysis of both quantitative and qualitative results we can conclude that a collaborative capability is considered a critical factor for an IT infrastructure supplier to be successful in a multi-sourcing environment.

Firstly, research results reconfirm that IT services have become highly integrated and this creates dependencies between the component services, each delivered by the best of breed suppliers as part of a client's multi sourcing eco system. These interdependencies and the demarcations created by suppliers that leave gaps between these component services require collaboration to bridge these and enable suppliers to deliver seamless integrated IT services to their client.

A lack of collaboration will negatively influence the attainment of key success components such as meeting SLAs and high levels of customer satisfaction which are considered table stakes that build a

supplier's reputation. Sustained high reputation will increase the chances of the client to extend existing contracts, contract more services, and even new prospects. This will generate more revenue and may increase economies of scope and scale. In line with CSF theory, the importance of collaboration also receives a level of support based on the control that the supplier's leadership exerts over this particular area in order to achieve abovementioned goals: internally through mechanisms that promote collaborative working, as well as leveraging relational governance across the eco system, despite being ad-hoc or escalation driven.

Although inter-supplier agreements were implemented and supported collaboration, a lack of proactive governance failed to provide the repeated interactions that are necessary to build trust between suppliers, especially when new partners are onboarded into the eco system. When collaboration issues arise between suppliers, this is where the governing role of the client becomes important and should be clearly understood. Secondly, adaptation of organization, processes and systems supported or improved the ability to collaborate. Remarkably, social exchange of knowledge and information in particular is expected to support a collaborative environment, however quantitative and qualitative results contradict each other and do not match the frequency of eco system interaction. This may be caused by a misinterpretation of "social exchange" by the respondent pool. Although reciprocity or "quid pro quo" exchange supported a collaborative environment occasionally, there is no support for the influence of the two other social exchange mechanisms common culture and the use of social sanctions, as earlier research suggested. Finally, competition between eco system suppliers negatively impacted collaboration, as suppliers tend to put their own interest before any collective interest.

In fact, some of the research data suggests that the eco system did not feel particularly collaborative. To further understand this observation a high-level review of the peer reviewed work of Thomson et al. (2007) was conducted which suggests there is a level of mutuality in the eco system and adaptation may have partly supported the administrative dimension of collaboration. However, the lack of more proactive relational governance across suppliers to create "jointness" may partly explain the lack of a truly collaborative environment, and it requires a certain level of trust for reciprocity-based exchange to evolve into longer term commitments between suppliers. Unfortunately, the research did not collect all of the required data to assess all five dimensions of collaboration.

Although support is provided for the criticality of collaboration the substantiation should have been more detailed. The scope of research was too large, which limited the ability to cover all aspects with the required detail in the scheduled time. Lastly, the omission to further explore the concept of collaboration adds to the limited internal and external validity of the research.

Therefore, the recommendation for future research is to consider the five key dimensions of collaboration while utilizing an embedded case study covering few suppliers as part of a single ITM eco system and capture differences in supplier perspectives on how collaboration contributes to success such to understand its relation to and variations in the success of any of the suppliers.

Practical application can be found when IT suppliers who engage in a multi-sourcing deal are encouraged to ensure management attention is focused on building trust through more proactive relational governance, complementary to documented inter-supplier agreements. Suppliers should build an adaptive capability and ensure from their end that the client's governing role and associated responsibilities are clearly documented.

Contents

1. Introduction

1.1. Background

In the last decade IT multi-sourcing has been promoted by industry analysts like Gartner for its many advantages in delivering greater cost reductions and mitigating strategic and operational risk. It has subsequently been picked up by companies as the next strategy for exploiting those advantages (N. Levina & Su, 2008). However, there is also a recognition of drawbacks to this strategy. Whereas supplier management has been found as one of the key determinants of IT outsourcing outcome (Lacity et al., 2017), in multi-sourcing however, it is not just the client-supplier relationship that needs to be managed. Due to the inherent task interdependence there is a need to ensure that suppliers will cooperate, as well as the coordination between vendors[1] needs to be governed effectively (Bapna et al., 2010; N. Levina & Su, 2008).

Over the past few years companies have been revising their initial multi-sourcing contracts, which may be in their second or third generation. Some companies opted to continue with their incumbent vendors while others have changed their portfolio. Consequently, new contract negotiations create the opportunity for both clients and suppliers to review and adapt their contractual and relational governance. The discontinuity of a client-supplier relationship makes us wonder why one supplier fails to get a new contract, while others remain successful within the client ecosystem.

1.2. Problem statement

Under multi sourcing client firms bring together a set of best of breed suppliers into an eco-system with the expectation that IT services will be delivered to them end-to-end in an integrated way. Suppliers will need to build new relationships with other companies and settle into this eco system. Each of the suppliers have their own specific goals to be successful, at the same time they will need to be successful collectively. Clients expect suppliers to closely cooperate and make IT work seamlessly towards the end user. Problems need to be resolved as efficient and transparent as possible, with least intervention. In practice however, the cooperation between suppliers does not always work this smoothly. This requires mechanisms to bring and keep all parties together such that eco system suppliers will cooperate in an environment that also offers opportunity for competition.

ITM distinguishes itself from ITO due to the interdependency of tasks between the multiple vendors driving the need for collaboration towards delivery of integrated services (Bapna et al., 2010). In addition, the overlap in vendor service areas determines the level of competition (Wiener & Saunders, 2014). This highly complex environment requires certain capabilities of the suppliers to be successful. Against this backdrop we are interested to understand what the relevant critical factors are for suppliers to focus on such to increase the chances of being successful in a multi-sourcing engagement.

1.3. Research objective and questions

The initial goal of the research is to explore and understand what the most important factors are for a supplier to be successful in a multi-sourcing engagement. Our research question is:

What are the critical success factors for an IT infrastructure supplier in a multi-sourcing relationship?

[1] The terms supplier, provider and vendor are used interchangeably in this research

The questions that should support us in answering the main question are:

- *What is IT multi-sourcing and what are its main challenges?*
- *Which critical success factors are relevant from a supplier perspective in ITM?*

The answers to these questions together should provide a comprehensive insight into the context and challenges according to the established body of knowledge, as well as deliver a framework of potential Critical Success Factors which will need to be validated through empirical research. Later, you will find that this research question has been refined to accommodate the time constraint associated to this research by focusing on a single factor.

1.4. Motivation/relevance

Extent research has been carried out in single sourcing, however scholarly literature on IT multi-sourcing is still scarce. Increasing the ITO supplier portfolio introduces new characteristics such as task interdependence which creates its own set of challenges. A lot of the ITO research has been taken from a client perspective, however the supplier's position in multi-sourcing has not been given attention yet. Therefore, this research extends previous work by providing an initial view of which factors are considered important for suppliers to be successful in ITM, and in particular the contribution of collaboration.

From a practical perspective, suppliers can use the framework of success factors as a high-level guideline to understand which capabilities are required and specifically which factors and mechanisms influence the ability to collaborate when engaging into multi-sourcing.

1.5. Main lines of approach

This paper is organized as follows. Section 2 describes the theoretical framework as a result of a structured literature review. Section 3 contains the methodology followed for data collection and analysis. The research execution and results of the analysis are presented in chapter 4, followed by the conclusions, discussion and recommendations for practice and future research in chapter 5. The report concludes with a reflection in chapter 6.

2. Theoretical framework

The building of a theoretical framework through structured literature review started with a primary focus on the domain of Information Systems (IS). Progressively we found that previous research has used the domain of operations management in manufacturing to derive knowledge from and integrate it with the IS domain. Researchers have looked at various theories including resource dependency theory, coordination theory, and social exchange theory. The unit of analysis for this research is critical success factor, and the unit of observation is an IT supplier in a multi-sourcing arrangement. The key concepts for our research are critical success factor and IT multi-sourcing.

Critical Success Factors

Amberg et al. (2005) provide a review on critical success factors literature mostly based on work from Rockart (1979), Ramaprasad and Williams (1998) and Esteves (2004).

Critical success factors are defined as "*the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization*". These relevant areas of activity should be constantly and carefully managed by a company. This definition is based on the notion of management control being "*the process of ensuring that resources are obtained and used effectively toward the attainment of corporate goals*" (Amberg et al., 2005).

Identification of potentially relevant CSFs can be done through various research methods, including case studies, literature review, structured interviews, as well as questionnaires have been mentioned. The actual relevance or criticality of each identified CSF is mostly determined using case studies as well as surveys based on interviews. Typically, the relevance is determined using a scale indicating low, normal or high relevance. Lastly, we need to consider that throughout the lifecycle in our case for each phase of an outsourcing deal the criticality of a CSF may change.

In view of this research those determinants of ITO success and decisions that have been scientifically substantiated and found significantly relevant will be considered for inclusion into the framework of CSFs for ITM. Also considered are those challenges that have been identified by scholarly work to play an important role in IT multi-sourcing, and which need to be addressed such to increase the performance of the supplier, collective of suppliers or client-supplier relationship in the ITM engagement.

Information Technology Multi-sourcing

Herz et al. (2010) conducted a literature review on multi-sourcing covering the time frame from 1985 to 2009. Their research provides an overview of the relevant implicit and explicit definitions of multi-sourcing retrieved from scholarly literature in the domains of Information Systems (IS), Strategic Management, and Operations Management (OM) as well as from scholarly recognized practitioner work, see table 1 below.

This overview is expanded with additional results from this literature review and displayed in table 2. Generally, precedence appears to be set by N. Levina and Su (2008) with the definition from Cohen and Young (2006) being referred to most. From these definitions we can conclude that IT multi-sourcing is not just about taking services from several suppliers. It is a much more complex arrangement that requires client and supplier capabilities to support global thinking, inter-organizational working, with a need for integration and collaboration between client and suppliers and involves a certain level of vendor competitiveness complicating things further.

Year	Author(s)	Definition	Literature domain	Publication type
2009	Janischowsky and Schonenbach (2009)	*[…] optimizing business, information technology and infrastructure services across external suppliers and internal departments / companies […]*	N/A	Practitioner literature
2006	Cohen and Young (2006)	*[…] the disciplined provisioning and blending of business and IT services from the optimal set of internal and external providers in the pursuit of business goals […]*	N/A	Practitioner literature
2005	Cullen, Seddon and Willcocks (2005)	*[…] several suppliers are contracted under one contract without a lead supplier […]*	IS	Journal article
2002	Carmel and Agarwal (2002)	*[…] longer-term, deeper relationships with a small number of vendors […]*	IS	Journal article
1999	Gallivan and Oh (1999)	*[…] a one-to-many relationship indicates that one client uses multiple outsourcing vendors to achieve its objectives […]*	IS	Conference proceeding
1998	Currie (1998)	*[…] a company signs outsourcing contracts with more than one IT supplier […]*	IS	Journal article
1998	Willcocks and Lacity (1998)	*[…] one outsourcing contract but multiple suppliers of services […]*	IS	Textbook
1995	Cross (1995)	*[…] buy IT services from multiple suppliers and have the pieces delivered as if they came from a single supplier […]*	Mgmt.	Journal article
1988	Treleven and Schweikhart (1988)	*[…] multiple sourcing refers to a vendee purchasing an identical part from two or more vendors […]*	OM	Journal article
1985	Porter (1985)	*A firm should:* • *[…] select those suppliers which are most efficient or those that offer the least costly product […]* • *[…] keep the number of sources sufficient to ensure competition […]*	Mgmt.	Textbook

Table 1: Overview of selected multi-sourcing definitions

Year	Authors	Definition
2014	Wiener and Saunders	refer to N. Levina and Su (2008) and Bapna et al. (2010), and choose to refine to *"the situation where a client firm delegates IT projects and services to multiple external vendors who must, at least partly, work cooperatively to achieve the client's business objectives".*
2013	Herz et al.	Refer to N. Levina and Su (2008) and further describe as: *[…] combining service process/product elements (SPEs) from multiple providers […]*
2012	Herz et al.	Refer to N. Levina and Su (2008)
2011	Su and Levina	Refer to N. Levina and Su (2008)
2010	Bapna et al.	*[…] to the delegation of IT and IT-enabled services to multiple vendors, who must work collaboratively to deliver services to a client organization […]* *[…] the practice of stitching together best-of-breed IT services from multiple, geographically dispersed service provide […]*
2008	N. Levina and Su	Adopt the definition of multi-sourcing as it appears in practitioner literature of Cohen and Young (2006)

Table 2: IT multi-sourcing definitions post 2007

2.1. Research approach

The goal of the literature review is to explore the research area of IT multi-sourcing, understand its key concepts and definitions, the most important theories used and their researchers, as well as used methods and techniques (Saunders et al., 2016). This should allow us to derive a state-of-the-art framework of the critical success factors for an IT infrastructure supplier in a multi-sourcing engagement by finding answers to the following questions:

- *What is IT multi-sourcing and what are its main challenges?*
- *Which critical success factors are relevant from a supplier perspective in relation to these challenges?*

This framework can be validated against an existing practical case that complies with the context of this research, such that it can add to the existing body of knowledge.

The methodology described by Saunders et al. (2016) has been used to complete this review. The following steps were taken:

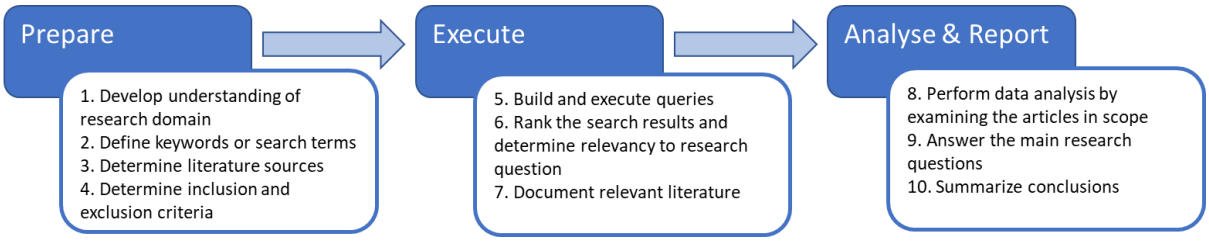

Figure 1: Methodology literature review

Domain understanding: Two recent ITO review articles have been used to get a common understanding of the state of the art of ITO. These articles also refer to multi-sourcing:

1. Liang et al. (2016). *IT outsourcing research from 1992 to 2013: A literature review based on main path analysis.* INFORMATION & MANAGEMENT, Volume 53, Issue 2, Pag 227-251.
2. Lacity et al. (2017). *Review of 23 Years of Empirical Research on Information Technology Outsourcing Decisions and Outcomes*. Paper presented at the Proceedings of the 50th Hawaii International Conference on System Sciences.

Keywords: Based on the research question an initial set of keywords were used to perform the database queries. These keywords were subsequently refined by scanning articles from the search result (Table 3).

Concept	Keyword
Multi-sourcing	"multisourcing" or "multi sourcing" (which will include "multi-sourcing") Alternatively, we used combinations of "multi" or "multiple" with "vendor", "supplier" and "provider", and with "sourcing", "outsourcing" and "offshoring", e.g. "multi vendor sourcing", "multiple provider outsourcing", etc.
Critical success factors	"success" and "success factor" (which will cover plural as well)
Vendor perspective	Combinations of "vendor", "supplier" and "provider" with "perspective" and "view", e.g. "vendor perspective", "supplier view", etc.

Table 3: Concepts and keywords

Databases: Searches have been placed in the Open University Library (http://bibliotheek.ou.nl/) which covers many well-known databases, such as Ebscohost, JSTOR, Web of Science, etc.

Inclusion and exclusion criteria: The following generic limitations as part of the standard search capabilities of the OU library have been put on each database search via the web user interface:

- Include journal articles
- Include conference proceedings
- Exclude book reviews
- Exclude newspaper articles
- Scholarly and peer reviewed
- English only
- Only articles with full text online

Queries: Because the actual database queries that have been used are quite lengthy it was decided to keep them in Appendix B of the full literature study (see Appendix B of this thesis report).

2.2. Implementation

By running the queries on the mentioned databases, we explored the availability of articles in each separate area.

IT multi-sourcing

The initial result of the search for “multi sourcing” – in any database field – generated a lot of false positives. Subsequently the database search was restricted to look for multi sourcing related articles by only considering the title, abstract or subject terms, and the research domains of information technology, information services or information systems. The final query generated a set of twenty-four (24) results. Four (4) potentially interesting articles were added as these were part of the “multi sourcing” branch mentioned in Liang et al. (2016). Next, forward searches were placed based on the expanded main set of articles and progressively articles were added while reading through their predecessors. These actions resulted in twelve (12) additional articles, arriving at forty (40) articles.

Vendor perspective

To understand whether “vendor perspective” would be the correct keyword to use a plain search without further keyword-based limitations was placed on the database and this yielded just over 2,200 results. Usage of keyword combinations including "vendor perspective", "vendor view" etc. shows sufficient results to conclude these are good candidate keywords for further searching.

Combinations

To understand to what extent current research has discussed IT/IS multi sourcing and success factors from the vendor perspective a search was performed on the databases again for each combination appearing in either title, abstract, or subject terms. We created two separate searches pertaining to the key concept “multi-sourcing” based on different combinations of keywords, see Table 4:

Search A	“multi sourcing” OR “multisourcing”	AND	• Success • Perspective/view
Search B	“multi” or “multiple” combined with “vendor” or “supplier” or “provider”		

Table 4: Combination queries

Both database searches A and B returned a maximum of two (2) articles, with one (1) common article, namely “*IT outsourcing research from 1992 to 2013: A literature review based on main path analysis”* by Liang et al. (2016). This article covers the umbrella domain of ITO.

Final result set

The initial result set of forty (40) articles was scanned by reviewing title, abstract, introduction and conclusions (in this order) to determine final inclusion or exclusion based on the relevance to the research question. Due to the time constraint associated with this study a subset of articles have been excluded. Refer to appendix C of the full literature review, where the last column of each table will provide an exclusion reason where applicable. The final list of eleven (11) ITM related articles used in this literature review can be found in Appendix C of this report.

2.3. Results and conclusions

The current body of knowledge on ITM does not provide a comprehensive overview of the critical success factors specifically for vendors. Therefore, this literature review resorts to the umbrella domain of ITO to understand what is already known about supplier success factors. We refer to two main articles, which can be seen as complements of each other.

The first article is *IT outsourcing research from 1992 to 2013: A literature review based on main path analysis", by Liang et al., 2016.* The researchers inform us that the vendor perspective in generic ITO finds its main root in the article by Natalia Levina and Ross (2003). Secondly, multi-sourcing as a separate research area within the IS research domain pertaining to ITO finds its main root in the article by N. Levina and Su (2008).

Our second reference article is "*Review of 23 Years of Empirical Research on Information Technology Outsourcing Decisions and Outcomes, Proceedings of the 50th Hawaii International Conference on System Sciences",* Lacity et al. (2017). The authors of this review are considered authorities in the research domain of ITO displayed by the multiple references in Liang et al. (2016). Next, we will outline the most important observations and recommendations originating from and based on these two articles.

2.3.1. Vendor perspective

The study by Natalia Levina and Ross (2003) shows that suppliers can add value by:

1. developing a set of core competencies that address market needs and constraints, namely IT Personnel Career Development, Methodology Development and Dissemination, and Client Relationship Management.
2. increasing the value of each competency through patterns of mutual reinforcement.
3. capitalizing on control over relevant decision rights on a growing number and variety of projects to develop competencies and to reduce the marginal costs of service delivery through economies of scale and scope.

The researchers also argue that simultaneous investment in several complementary activities increases performance more, than just increasing the level of only some of these activities. These capabilities and their complementarities are what constitute the core of a supplier's value proposition in ITO.

Lastly, Natalia Levina and Ross (2003) argue that contractual- and reputation-based incentives encourage vendors to share advantages with clients which improves client satisfaction and builds the supplier's reputation, which could lead to an increase of revenue by the number of services that the client is willing to contract with the same supplier.

2.3.2. ITO success factors

Lacity et al. (2017) present two updated models that capture the significant relationships between the dependent variable "ITO outcomes" and its determinants. When we consider these as focus areas in line with the adopted definition for "Critical Success Factor" i.e. exerting management control on these areas should allow a company to influence ITO outcome, then these determinants can be considered potential CSFs and as such should be included in the CSF framework. Secondly, hypothetically a vendor could still be successful while the client has not met its outsourcing goals. Therefore, even though ITO outcome has been studied mostly from a client perspective those

determinants that directly relate to the supplier or client-supplier relationship are still considered to be in scope of our research.

This results in an initial framework of critical success factors for suppliers, which will be synthesized with findings from ITM literature. The final and full overview is provided as part of the conclusions, see table 5.

2.3.3. IT multi-sourcing

Bapna et al. (2010) state: "*The most important differentiating characteristic of a multi-sourcing environment is the interdependence between the tasks performed by multiple vendors. <…> multi-sourcing necessitates individual and collaborative effort of multiple vendors at the back end to come together to create a seamless, integrated service at the front end for the client*". In addition, what characterizes IT multi-sourcing is:

- Sourcing of knowledge intensive services.
- Obtaining best-of-breed services, i.e. obtain the service from the best representative in each respective IT application or infrastructure area providing access to specialized expertise and capabilities.
- Establishing the optimal number of suppliers, i.e. supply base breadth (Su & Levina, 2011).
- Relationship-specific investments i.e. supply base depth (Su & Levina, 2011).
- Vendor area overlap and a directed or mediated client-supplier relationship determining the level of forced cooperation and competition (Wiener & Saunders, 2014).

Furthermore, we can conclude that the review findings from Herz et al. (2010) still hold true. Research on the topic still mostly discusses banking and insurance as an industry, as well as offshoring and near-shoring, and usually case studies are performed to gain further insights, with a few mathematical approaches added. Additionally, we can also conclude that a vendor perspective has not been considered in ITM specifically, and generally the IS function of IT applications development and management is explored more often than IT infrastructure.

To understand what drives vendor success in a multi-sourcing engagement the aforementioned key characteristics have been synthesized with existing ITO research with a focus on the main differentiators between single-sourcing and multi-sourcing. This research adds propositions P*i* while discussing four main topics will be discussed: *Influence of ITM on ITO outcome, Influence of ITM on ITO relationships, ITM models and forced coopetition, and lastly collaboration.*

Influence on ITO outcome

Scholars have investigated the influence of a multi-sourcing strategy on the anticipated outcome of IT outsourcing as well as its influence on the client-supplier relationships.

P1: Due to the mediating influence of the supplier's generic capabilities on ITM success (Su & Levina, 2011) these factors are considered a critical to supplier success. The suppliers' generic capabilities relate to the technical and methodological, human resource management and client management capabilities (Lacity et al., 2017; Natalia Levina & Ross, 2003).

P2: Due to the mediating influence of the supplier's client-specific capabilities on ITM success (Su & Levina, 2011), this is considered a critical success factor. The client-specific capabilities relate to the suppliers understanding of the client's domain (Lacity et al., 2017).

P3: CSFs related to competitive advantage may not be relevant for IT infrastructure suppliers as they may be less subject to competition. Su and Levina (2011) claim that sourcing of infrastructural systems relies more on economies of scale and as such argue that decreasing the number of suppliers in the customer's supply base may be useful. With less suppliers there is arguably less competition in a multi-sourcing engagement.

P4: An adaptive capability will give a supplier competitive and strategic advantage and is therefore considered a CSF. The flexibility of a client to adapt to changing market conditions drives the need for supplier adaptability. The supplier will need to respond to operational delivery needs, handle changes required in domain expertise and show the willingness and ability to manage organizational change. The adaptive capability is further enabled by effective management of the suppliers' relationship with the client, in which commitment, cooperation and satisfaction are essential. Ultimately, the ability to adapt will allow a supplier to influence client strategic decision-making in IT supplier selection (Plugge & Janssen, 2009).

P5: Supplier service quality as a generic capability is a strong determinant of ITO success and therefore considered a CSF in ITM too. The service quality delivered by the client's IS function through outsourcing is directly related to the delivery of service quality by the supplier and is ranked highly on the list of ITO success determinants (Su & Levina, 2011). Service quality of the IS function can be improved through the suppliers' advanced maturity and knowledge, as well as expertise and skills of their staff (T. P. Herz et al., 2012).

*P6: A supplier can gain competitive advantage by leveraging Information Technology to raise switching cost for their clients, therefore the supplier's own IT capability is considered a CSF***.** The goal of IT multi-sourcing pursued by client firms is to reduce the strategic risk of being locked in due to the dependency on a single supplier (Bhattacharya et al., 2012). Su and Levina (2011) point out that switching cost for a client mediates this effect. A supplier can gain competitive advantage by using Information Technology to raise the switching costs and make it harder for a customer to switch to a competing supplier (Applegate et al., 2006).

Influence on ITO relationships

P7: The willingness to make relationship-specific knowledge investments improves the supplier's competitive position and is therefore considered a CSF. Increasing the number of suppliers will decrease the level of client–supplier commitment and dependency. The willingness to obtain valuable business knowledge from clients in specific industries allows suppliers to negate this effect by building "vertical" market capabilities, which they can then use to differentiate themselves, improving their competitive positioning (N. Levina & Su, 2008).

ITM models and forced coopetition

P8: The client-provider interface design and the supplier's client management capability are both considered a CSF, because they allow a supplier to influence the relationship with the client such to improve their reputation (partnership view) and competitive position. The client-provider interface design as a relational governance mechanism, is a determinant of ITO outcome that "mattered"[2], and a providers' client management capability has a positive relationship with ITO outcome (Lacity et al., 2017). T. P. Herz et al. (2012) found that due to the existence of a group structure with the client there

[2] From Lacity et al. (2017): The code "M" was used to indicate a relationship that "mattered" and was needed because some significant relationships were categorical (i.e., not ordinal, interval, or continuous), but a relationship clearly mattered between the independent and dependent variable.

was difficulty of getting local business entities (BE) to buy-in to a multi-sourcing strategy and even refusing to collaborate with centrally selected suppliers. Suppliers could leverage a direct client-vendor relationship to enhance their reputations and ultimately improve their competitive positions in future bidding processes (Wiener & Saunders, 2014).

Collaboration

The need for collaboration due to task interdependence as a key characteristic of IT multi-sourcing described by Bapna et al. (2010) has found support through various subsequent research work. A supplier's collaborative capability is supported through various mechanisms.

The high level of interdependence between the multi-sourcing partners requires a strong cooperative relationship that will benefit from mutually sharing strategy and future plans (Plugge & Janssen, 2014), sharing knowledge, facilities and processes, and providing out-of-original-scope services (Feng et al., 2011), as well as sharing capabilities and resources between them when performing closely related tasks (Wiener & Saunders, 2014). Plugge and Bouwman (2015) elaborate on the importance of social exchange of information and knowledge on an organizational level as this contributes to building trust fostering collaboration in support of the collective interest. On an individual level sharing a common culture with common values and beliefs encourages actors to exchange information and services. Client firms can support their vendors towards this behavior when they emphasize on an intended long-term partnership as this promotes social exchange as well as capability and technology transfers among the suppliers (Wiener & Saunders, 2014).

P11[3]: Suppliers should engage in social exchange such as sharing of service, knowledge and information, as this fosters collaboration positively influencing service delivery to the client. Social exchange is therefore considered a CSF.

Social exchange should be supported by development and implementation of clear governance structures and mechanisms to successfully coordinate the delivery of IT services. Contractual governance mechanisms, such as the definition of clear roles, responsibilities, and coordination of activities should be complemented by relational governance mechanisms, such as regular meetings and conflict resolution (Plugge & Janssen, 2014). The multi-sourcing contract should specifically address the interdependencies between vendors. In addition, vendors should consider setting up Operational Level Agreements (OLAs) between them as opposed to working (solely) based on informal relationships and compensation behaviour (Plugge & Janssen, 2014).

P9: Contractual governance should ensure adequate contract detail, including clear definitions of the IT services boundaries, with roles and responsibilities defined for suppliers, as this positively influences vendor collaboration. Contractual governance is therefore considered a CSF.

P10: Relational governance mechanisms between suppliers such as Operational Level Agreements (OLA) support collaboration and therefore contribute to improvement of the end-to-end service performance. As such these are considered a CSF.

Lastly, operational adjustments to e.g. processes need to be made by both client firms as well as their suppliers to be able to collaborate. Client and suppliers need to adhere to defined processes and methods such to ensure integrated service delivery (T. P. Herz et al., 2012). This is in line with the need for an adaptive capability (see P4).

[3] The numbering of propositions has been maintained from the literature review, hence the order in which they appear is different in the final thesis document.

2.3.4. Conclusion

Our findings show that there is no existing list of CSFs for providers in multi-sourcing. As such, it may be premature to talk about critical success factors, rather consider these as success contributors. Nevertheless, research to date in ITM provides support that shows the relevance of most of the previously identified determinants of ITO success. We have also added five new success factors to the existing list of fourteen supplier related determinants of ITO success, resulting in a total of nineteen success factors, see Table 5. For a full table with definitions and associated substantiation see Appendix D.

IV Category	Definitions from (Lacity et al., 2010; Lacity et al., 2017)	Relationship to ITO outcome	Relationship to ITM outcome
Relational governance	Knowledge sharing	Pos	Pos
	Communication	Pos	Pos
	Trust	Pos	Pos
	Relationship quality	Pos	Pos
	Cultural distance	Neg	Neg
	Partnership view	Pos	Pos
	Relational governance	Pos	Pos
	Client-provider interface design	M	M
	Commitment	Pos	Pos
Contractual governance	Contract detail	Pos	Pos
Provider firm capabilities	Technical and methodological capability - provider	Pos	Pos
	Human resource management capability – provider	Pos	Pos
	Domain understanding	Pos	Pos
	Client management capability	Pos	Pos
	Adaptive capability*		Pos
	Collaborative capability*		Pos
	Internal IT capability*		Pos
	Service Quality*		Pos
	Utilization of Economies of Scale*		Pos

Table 5: Updated table of ITM critical success factors. * = newly added

Relational governance, contractual governance and the provider's capabilities are the main areas of focus in ensuring supplier success. Adaptive capabilities will allow a supplier to adjust its organizational design and technology mode to accommodate client flexibility. Particularly important in multi-sourcing, a supplier will need to be able to adjust its processes and tooling such to enable integration of services across the multi-sourcing eco system (Goldberg et al., 2016; Goldberg et al., 2015).

A second important finding pertaining to IT multi-sourcing is that suppliers require collaborative capabilities supported by exchange of knowledge, information and resources leading to increased trust and commitment, and serving the suppliers' mutual benefit. Finally, the set of complementary capabilities of a supplier will need to embrace adaptability and collaboration.

2.4. Objective of the follow-up research

Due to the time constraint associated to this study it was decided to focus on empirical validation of one single success factor. Collaboration is considered an important differentiator between dyadic ITO engagements and multi-vendor sourcing and has been the subject of few previous research papers (Bapna et al., 2010; Feng et al., 2011; T. P. Herz et al., 2012; Plugge & Janssen, 2009, 2014). As opposed to attempting to validate the importance of all CSFs that have been found from the literature review,

the original research question has been adjusted such that the empirical research will only focus on collaboration as a potential CSF:

> *How critical is a collaborative capability for a supplier to be successful in IT multi-sourcing and how does collaboration contribute to this success?*

The sub questions to address are:

1. *What does the supplier consider to be success in a multi-sourcing deal?*
2. *To what extent can supplier success be attributed to the supplier's collaborative effort?*
3. *How did collaboration with the client and with the other suppliers take place?*
4. *Which contextual factors influenced collaboration?*

The next chapter will outline the methodology used to complete the empirical research.

3. Methodology

The goal of the empirical part of the research is to validate the criticality of collaboration and its influence on supplier success. We want to understand in more detail why this factor is indeed relevant and critical, and if not, why not. The concepts are known, and their relation is subject to deeper investigation. As such, this research is of explanatory nature.

Considering this goal, a deductive as well as inductive strategy are applicable. A deductive approach caters for clear definition of key concepts and validate the relevance and importance of this factor empirically. Induction allows for gathering and analysis of additional in-depth data to understand the underlying motivation. The unit of analysis is collaboration and the unit of observation is the specific ITM engagement.

3.1. Research method

This research will utilize a case study strategy as it supports more in-depth explanatory research and has the ability to generate answers to 'why?', 'what?' and 'how?' questions delivering a rich and detailed description of a contemporary phenomenon in a real context. As opposed to the survey method, a qualitative case study methodology can be a valuable way to prove an existing theory or model, as well as uncover previously unidentified variables such to build new hypotheses (Saunders et al., 2016). Table 13 in Appendix E outlines the reasons for not choosing any of the other research methods.

This case study concerns a unique and holistic case (Saunders et al., 2016) of a single IT infrastructure supplier that is part of a 1.5B USD client multi sourcing deal. The initial contract has been extended or renewed at least three times with a cumulative length of more than ten years. The overall ITM environment has three main IT infrastructure suppliers, various application suppliers, and a large and complex retained organisation on the client side. Our case study organization holds a decade of historical knowledge and has the potential to deliver rich data to further confirm and deepen are understanding of collaboration between suppliers in ITM deals of such a size.

3.2. Time horizon

A cross-sectional research is chosen because the research will build upon the extensive experience and memory of individuals, meaning all relevant data should already be available. Secondly, there is a time limitation to complete this empirical research as part of the study, which dismisses the option of observing changes over time as they happen.

3.3. Data collection

A case study methodology is generally supported by qualitative data collection methods. Quantitative methods, however, can be used in conjunction (Saunders, 2016, p84). For this case study there is value in combining both methods.

The quantitative data collection will use a questionnaire to access a selected pool of respondents who have the relevant experience gained over an extensive length of time. Firstly, by asking the same structured questions the characteristics, opinions and/or behaviour of a population can be described based on numbers. Secondly, this is a more objective method of data collection, where there is less influence of the observer. Lastly, due to a restriction in time for this research and thus the number of people that can be interviewed, the questionnaire method allows for data collection from a larger pool of respondents in a shorter timeframe (Saunders et al., 2016).

This would be the most efficient and effective way to build an initial view and establish if previously gained insights from literature are also applicable in this new context. An important drawback, though, is that it is restricted to what the researcher anticipates and does not leave room for capturing other potentially important data (Saunders et al., 2016).

To put more emphasis on the how and why of the relationships under research people's knowledge and experience are required to understand the relevance of collaborative behaviour to business success. Participating observation is not a relevant method, because it specifically aims to describe behavioural changes (as these happen). To that extent semi-structured interviews have been chosen, which can be used in support of both exploratory research and explanatory research (Saunders et al., 2016). Firstly, this data collection method allows for open and complex questions and offers flexibility to change the interview as required. Secondly and most importantly, it allows the researcher to dive deeper into the answers asking for further explanation such to further understand the relationships between variables (Saunders et al., 2016, p. 224).

3.3.1. Structured questionnaires

The use of online questionnaires appears most suitable for our case to collect the quantitative data. This limits the cost and time and allows for collecting the data from a global respondent pool (Saunders et al., 2016, pp. 179, 180). An email invitation as introductory letter (with URL to the survey) clearly explaining the goal of the survey will be sent to the respondents (Saunders et al., 2016, p. 199).

The design of the questionnaires influences the response percentages, reliability and validity of the data. In order to guarantee - as much as possible - that the essential data will be collected:

1. A data requirements table will be created (Saunders et al., 2016, p. 183). The main variables will be defined based on existing literature.
2. The survey will use closed questions mostly using a 5-point Likert rating scale. Each section of questions will have introductory text guiding the readier through the list.
3. The checklist referred to by Saunders et al. (2016, p. 194) will be used to verify the wording of the questions.
4. Questions will be coded (re)using readily available schemes.

Reliability - In order to increase reliability of the survey the internal consistency of constructs will be checked through correlation of data using Cronbach alpha, and through comparison of answers to similar/alternative form questions (check questions). Unfortunately, there will be no room in this research to actually perform a test-re-test validation (Saunders et al., 2016, pp. 185-186).

Internal validity - To increase validity as well as reliability (Saunders et al., 2016, pp. 185, 200) the questionnaire will introduce the respondent with the research subject and provide a clear definition of the relevant constructs from existing literature. Secondly, the survey will be sent to few test respondents, who have significant experience regarding the research subject and will be asked to review the questionnaire using a list of probes as presented by Saunders et al. (2016, p. 201).

Generalizability - To be able to generalize the survey results the sample size should adequately represent the population. Non-probability purposive sampling will be used to create a list of potential respondents who have extensive experience on the customer account which should allow them to accurately respond to the questionnaire (Saunders et al., 2016, p. 163). The company's internal global address list will be used to gather potential respondents. With roughly 500 people working on the

customer account full responses of 215 respondents will need to be obtained in order to achieve a 5% maximum fault ratio.

3.3.2. Semi-structured interviews

For semi structured interviews it is important to precisely document the choices that have been made using this method, how the data was captured and how the researchers drew their conclusions (Saunders et al., 2016, p. 233).

Reliability - To ensure reliability of qualitative data the process of data collection will be standardized through a thoroughly described and applied interview protocol. As the interview process and participation are time-consuming the nature of the respondent may affect the willingness to take part, and consequently affect respondent bias. The research will also need to consider the sensitivity of the information that is sought for. To minimize interviewer bias it is important to obtain the participant's trust by proving the researcher's credibility (Saunders et al., 2016, p. 227). The full list of measures can be found in Appendix J.

To further safeguard the quality of the data the semi-structured interviews will be audio recorded (upon consent) and transcribed as soon as possible afterwards. Notes will be taken during the interviews to capture non-verbal behaviour. Each interview transcription will use the same consistent format and will be stored as a separate data file with a filename that maintains confidentiality and preserves anonymity. The completed transcription will be sent to the respondents for a member check.

Internal validity - Content validity will be verified by referring to clear definitions from existing literature, and secondly by checking the relevance of each question through a subset of experts (Saunders et al., 2016, p. 185). During the interviews the researcher will look for mutual clarification of questions and responses as much as possible (Saunders et al., 2016, p. 228).

Generalizability - The empirical part of this research will build upon the literature study, and look for confirmation, otherwise falsification of propositions made. By demonstrating the applicability of existing theory to the specific case or relate the case findings back to existing theory we aim to support the external validity of the research (Saunders et al., 2016, p. 233).

Sampling - For the interviews non-probability purposive sampling will be used to create a very limited list of potential respondents who have extensive experience on the customer account which should allow them to accurately respond to the interview questions (Saunders et al., 2016, p. 163).

3.4. Ethical considerations

Prior to inviting people to participate in the interviews a meeting will be held with a legal representative such to ensure anonymising respondents and company names will be sufficient to complete the empirical research and reporting. Subsequently, respondents will be informed by email about this research, the objective of the interview and its protocol. It will be pointed out that participation is entirely voluntary and that they can withdraw at any time. Respondents will be asked for their consent and to confirm back over email. The list of respondents with their actual names and positions along with their consent will be stored separately from the anonymised data collection and analysis.

3.5. Triangulation

Triangulation refers to the use of different data collection techniques within one study in order to ensure that the data are telling you what you think they are telling you. In this research it is covered to some extent by the fact that a qualitative data method was used in conjunction with semi-structured interviews. Per Saunders et al. (2016, pp. 84, 85) this may be a valuable way of triangulating the collected data. Access to organizational documentation also allows for triangulation of the data provided, however that method will not be utilized.

3.6. Data analysis

Because two different methods of data collection have been chosen there will also be two different methods of data analysis.

3.6.1. Quantitative analysis

The aim of the quantitative data collection is to describe the population and understand the central tendency of variables based on concepts learnt from literature related to the research question. The required data will be captured mostly by using rating or scale questions, for example how strongly the respondent agrees with a statement. Although these would be ordinal data, some researchers argue that they can be analysed as if they were numerical interval data. Therefor the mathematical average, mode and median values will be calculated and used to describe the central tendency of the data using SPSS (Saunders et al., 2016, p. 278). Cronbach's alpha (α) and the inter-item correlation coefficient (r) will be used to complete the analysis (Saunders et al., 2016, p. 186).

Cronbach's Alpha (α) is most commonly used to assess the internal consistency of a questionnaire (or survey) that is made up of multiple Likert-type type scales and items. For classification of α we use the table 6 below as retrieved from https://en.wikipedia.org/wiki/Cronbach%27s_alpha.

Inter-item correlation (r) provides an indication of how each item correlates to all of the other items used to construct the main variable. When r>0.2 this means there is sufficient correlation between the items. Secondly, we can look at how well the individual items correlate to the total by checking the "corrected item-total correlation" in SPSS output.

The data requirements table lists all the items to be measured and analyzed for constructing the variables. A five-class scale will be created accordingly to be able to position the mean and mode/median of constructed variables. Appendix L outlines the scales that will be used for each N-items construct.

Cronbach's alpha	Internal consistency
$0.9 \leq \alpha$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Table 6: Classification of Cronbach's Alpha (α)

3.6.2. Qualitative data analysis

Qualitative data is non-numeric data or non-quantified data and is characterised by its richness and fullness. This type of data will need to be condensed, categorised, and or re-structured as a narrative in order to make a meaningful analysis (Saunders et al., 2016, p. 311).

For each of the interview transcriptions each question or group of questions will be summarized. Pre-defined categories have been created based on concepts found while building the theoretical framework. Associated labels will be used to assign portions of summarized data to each category. Ideally these should be very much aligned to the variables used in the questionnaire. Next, the data assigned to each category will be combined and subsequently re-structured as a kind of narrative with clear references to the individual transcripts and the line items therein. While going through these iterations, attention will be paid to uncover potential new categories. Contextual data like the setting of the interviews, circumstances and respondents' behaviour during the interviews will be taken into account as much as possible.

Finally, both qualitative and quantitative data will be analysed and reviewed together per category (or construct) to understand if these data support each other and then come to a conclusion how this answers the research question.

4. Results

Getting overall commitment and support from the case study organization to conduct the survey and interviews was not a problem. Their legal department was very helpful to ensure it would be no problem to complete the thesis work. A few challenges which deserve some attention are mentioned below.

Based on the advice of the OU supervisor the methodology was adapted to include a survey. This is where likely some confusion was introduced on the students end as to whether the survey would replace or complement the interviews. Only during the survey data analysis, the realization came that the data would not support an explanatory research, because the questions had not been set up that way. Rather, the results provided an initial view on the research topic based on a larger respondent pool and serves as a basis to offset interview data against.

Quantitative data analysis took considerable time as researcher had to refresh knowledge of the SPSS application. Secondly, despite considered rather basic statistical measures, the interpretation of these was sometimes not straightforward.

The interviews were anticipated to last for one hour but generally overran and some took two sessions to complete. Getting all interviews completed was quite laborious due to leave, last minute other priorities, and the number of chasings of participants throughout the process, despite these were kept limited to avoid putting too much pressure. Lastly, the audio transcriptions took considerable time, by choice of the researcher to perform the activity by himself.

Table 7 outlines the overall progress of the execution.

Time frame	Actions
Mid-November 2018	Interview questions and protocol setup. Started survey set up.
February 2019	Survey reviewed
Mid-March	Pre-announcement and final invitation to survey sent out
End of March	Reminder sent to respondents to complete survey
7 April	Survey submission closed
End of May	Data analysis was completed
Mid-June	Interview protocol and questions reviewed
End of June - mid-July	Interviews conducted
Mid-July – September	Audio transcriptions and summarization completed
September 2019	Data analysis completed

Table 7: Time line of methodology execution

Table 8 provides the references to the most important deliverables and documents during the execution of the methodology.

Document name	Reference
Data requirements tables	Appendix F
Survey pre-announcement and final invitation	Appendix G
Final version of the questionnaire	Appendix H
Interview protocol + script	Appendix I
Raw survey results + the SPSS syntax file	Available on request
Quantitative analysis & results	Appendix K
Summarized interview transcripts with labelling.	Appendix N
Qualitative analysis & results	Appendix O
Raw transcript	Available on request
Interview consent forms	Available on request

Table 8: References to data collection and analysis deliverables and documents

4.1. Quantitative Results

This chapter provides the results of the questionnaire that was sent out to the sampled population. The target population counted 503 cases, of which 166 (33%) were chosen as respondents to send the survey to. Fifty-three (53) completed the survey, as such the response rate is 32%. Some descriptive data of the respondents:

- 51 from 53 respondents are working for more than 5 years on or for the customer account in the supplier organization
- Twenty-two (22) individual contributors, twenty-three (23) managers and eight (8) directors (or above) completed the survey.
- Most respondents are from the Projects & Programs organization (17 ; 32%), and from Service Management & Operations organization (20 ; 38%).

Table 9 presents the qualified results of the survey. A detailed description of the analysis and the actual quantitative results can be found in Appendix K.

Item	Quantitative Results
Partner Dependency	The supplier has an above average dependency on eco system partners. Dependency on the customer appears higher than dependency on the other ISPs.
Need for Collaboration	Overall there is a need for collaboration. It is felt that ecosystem partners tend to share a collective interest, though respondents are not convinced that ecosystem partners are out to improve their own and each other's performance.
ITM model/Client Relationship	The influence of the type of relationship a supplier has with the client – direct or indirect via guardian vendor - on collaboration shows as positive. A direct relationship influences collaboration positively, though the influence by a mediated relationship is considered neutral.
Competition	Most respondents (86%) state that there is competition. 54% of this group believes it negatively influences collaboration.
Sourcing Success	Respondents agree to strongly agree that sourcing success is reflected by Reputation increase, Customer satisfaction, Meeting SLAs, Meeting financial targets, and Economies of scope/scale.
Criticality of collaboration to supplier success	Respondents strongly confirm the influence of collaboration on supplier success. Both individual items consistently confirm that collaboration impacts success both ways: negatively when the supplier refrains from collaborating, and positively when the supplier does collaborate. Collaboration has the tendency to frequently be a critical element for being successful. Respondents feel that overall management control over inter-organizational (between eco system partners) collaboration is between neutral and strong with a tendency to strong.
Adaptation	Respondents indicate that the organization has adapted itself frequently to support the sourcing deal. Respondents agree that adaptation by the organization positively influences eco system collaboration.
Governance	Lack of contractual governance tends to impact collaboration sometimes. Respondents agree that relational governance positively influences collaboration between the company and the other eco system partners (client and suppliers)
Social exchange	Social exchange appears to happen rarely. Knowledge/information is shared most though sometimes. Strategy and plans are shared rarely. Social exchange is neither unimportant nor important to achieve organizational goals. Only 28% of respondents think it is important and less than 10% find social exchange critical*.
Generalized reciprocity	Generalized reciprocity is observed rarely to sometimes with tendency to sometimes. The positive contribution to collaboration of generalized reciprocity is rated between neutral and agree with a tendency to agree - based on 42/53 respondents who observed quid pro quo behavior between rarely and very frequently
Social sanctions	Social sanctions are being used almost never to rarely with a tendency to almost never. The positive contribution to collaboration of Social sanctions is rated between disagree and neutral with a tendency to being neutral - based on 30/53 respondents who observed social sanctions being used between rarely and very frequently
Common culture	Respondents feel mainly neutral about whether their organization shares a common culture with the other infrastructure suppliers. The positive contribution to collaboration of a common culture between suppliers is rated between neutral and agree with a tendency to agree - based on 15/53 respondents who (strongly) agree that the organization shares a common culture with the other suppliers.

Table 9: Summary of quantitative results

4.2. Qualitative Results

The supplier is dependent on the client for providing information to be able to deliver services, as well as providing governance across the eco system. There is also a dependency on the other suppliers for delivering component services because IT services have become highly integrated due to convergence of various technologies. In certain areas supplier dependencies may only be "touch points", a simple hand off of tasks. In projects delivery other suppliers appear to be dependent on the case study organization.

There is a need for collaboration in order to provide a seamless integrated service to the customer. However, the suppliers do not seem to share a collective interest and focus on their own benefit first due to a competitive environment. Interestingly, in projects delivery, suppliers do look to share benefit and improve joint performance.

Competition between eco system suppliers exists as there is overlap in portfolio, which requires them to balance competition with collaboration. This interaction is described as *"a relationship with the hand-break on".* Suppliers cannot refrain from collaboration, also in order to sustain reputation, though caution is taken while sharing sensitive information as that may prevent having a competitive advantage. Competition on a reputational basis happens when suppliers are rated for their partnership and innovation capabilities, but also when they make themselves guilty of point fingers and place blame on each other.

The client evolved from a mediated to a direct model by insourcing the operational integrator role previously delivered by a guardian vendor. Although certain questionable behaviour has been observed with the guardian vendor, and interaction within the eco system changed post the insourcing, only one respondent explicitly confirms that the rather negative behaviour never really impacted collaboration.

Sourcing Success

Meeting SLAs, customer satisfaction, reputation increase, meeting financial targets, and obtaining economies of scope/scale are confirmed to be components of success. In addition, partnership innovation, and personal (career) growth have been mentioned. The cumulative length of contract periods is considered a success, however not all components of success have been a contributing factor; financial targets and economies of scope and scale have not been (fully) met.

Criticality of collaboration to supplier success

Collaboration is at least very important, if not, critical to success. The main reason for this is the fact that suppliers and client collectively need to deliver highly integrated services, which are built based on various components, delivered through different suppliers, and with no single party having full control nor the expertise to do this alone. Suppliers will need to create a demarcation point to ensure their service is profitable. The gaps between those demarcations need to be bridged through collaboration such to achieve the best result for the end customer.

Without collaboration, suppliers will be unable to resolve issues between them, meet their contractual obligations and SLAs, with a direct impact to end user experience for the client, which will reflect on the suppliers' customer satisfaction score card, and their reputation.

While respondents state collaboration is important to achieve goals, only one respondent explicitly states the eco system did not particularly feel as a collaborative group, as per the following quote:

"The beauty of this deal is there is always something to fight over… when fighting, no collaboration takes place. Each ISPs would happily make the other responsible for issues. In a truly collaborative environment, you would not have these discussions."

Management attention to collaboration is mainly given on an escalation basis, either ad hoc or via regular governance calls to manage those escalations. More proactive types of governance mechanisms have been dismissed after inter-supplier agreements had been formalized. Only one respondent feels that insufficient attention, on both management and operational level, is given to collaboration. This is said to be particularly evident when there are changes made in the eco system landscape with new suppliers being onboarded. Although no regular proactive governance meetings take place across the eco system, the supplier's management does provide some internal focus on collaboration depending on the occasion.

Governance

Overall relational governance appears to be more ad hoc and of an escalation-driven nature, when there's a situation with high customer impact or when there are sales opportunities where the supplier's senior management would need to be involved. Day to day governance is provided by the client's operational integrator organization. There are also governance forums related to the client's individual business units.

The client has an important – and underestimated – role to play for providing governance such to close the gaps between the service demarcations by fostering collaboration and to avoid trust related conflicts due to competition. Under certain circumstances the client is said to consciously decide not to provide any governance because of a particular self-interest such as improved service levels or reduced cost.

Where one respondent feels that the lack or discontinuation of a regular (quarterly) governance meeting is not considered to negatively influence the deal, other respondents have mentioned that this does create challenges for example when new suppliers enter the eco system, and escalations are the only way to try to move forward.

There have been issues between eco system partners related to details in the contract. Few, more serious issues indeed caused collaboration issues, minor disputes were actually resolved through collaboration.

Adaptation

Adaptation of organizational structure, processes and applications was required multiple times to accommodate changes introduced by the client. These adaptations supported or improved the ability to collaborate, though at the same time collaboration was required to implement the changes.

Social exchange

Social exchange of various items takes place:

- Sharing knowledge and information is more or less a continuous process and is supporting various goals and processes, like innovation and integration activities.
- Resources are also shared, contracted out, or transferred which directly and indirectly supports collaboration.
- Office space may be shared between eco system partners to support collaboration between operational teams, or on project bases.

- Corporate strategy and plans are being shared, though is considered sensitive information which requires a level of trust that will need be built when two parties engage into a partnership with the aim to bring mutual benefits.
- No evidence was provided for sharing processes and technology & capabilities, this does not seem to happen.

Social Exchange Mechanisms

Generalized reciprocity supports collaboration through various ways of leveraging a positive existing as well as newly built relationships with other people. There is no consensus whether there was or was not a common culture in the eco system. Two respondents state that collaboration is driven more from a contractual perspective, revenue growth/share holder targets, or the amount of business any supplier may have with the customer. Lastly, social sanctions have not been observed.

Trust

Trust is an important factor in building and maintaining relationships, which takes considerable effort because trust isn't always naturally present. Trust can be built through repeated interactions during governance meetings, but also on a personal level. On management level trust is built through fact-based exchange of information.

The right level of trust can enable collaboration and consequently increase joint performance. It allows for creation of advocates in the peer organization such to improve reputation. Trust is required to maximize mutual benefits, which may require the exchange of sensitive information such as corporate strategy and plans. A lack of trust in the relationship, either damaged or still to be built, can cause collaboration to be hampered or even stop until parties sort out their fundamental differences.

5. Conclusions

This research attempts to find an answer to the main question:

How critical is a collaborative capability for a supplier to be successful in IT multi-sourcing and how does collaboration contribute to this success?

The conclusions are presented here for each of the supporting sub questions.

What does the supplier consider to be success in a multi-sourcing deal?

Remaining contracted for more than 10 years is one thing but does not quite tell the whole story. This research confirms that various components collectively contribute to this success. Meeting SLAs and improving customer satisfaction are considered table stakes. Consistent performance in these areas allow for reputation build, which increases the opportunity to contract more services that support revenue growth. This allows for further exploitation of economies of scope and scale and meeting financial targets. In addition, partnership innovation as well as employee (career) growth have been mentioned. This conforms largely to the vendor's value proposition in outsourcing (Natalia Levina & Ross, 2003).

To what extent can supplier success be attributed to the supplier's collaborative effort?

Research results confirm that collaboration is very important to supplier success. IT services have become highly integrated and this creates dependencies between the component services delivered by different suppliers. These interdependencies - in line with previous findings of Bapna et al. (2010) – and the demarcations created by suppliers between these component services leave gaps which require collaboration to bridge these. A lack of collaboration will have an adverse effect on most of the supplier's goals confirmed earlier. The importance of collaboration is also confirmed by the frequent and sufficient focus that supplier's leadership exercises internally through various mechanisms, as well as leveraging relational governance mechanisms across the eco system despite being ad-hoc or escalated driven. Nevertheless, this is in line with previous literature on CSF by Amberg et al. (2005).

How did collaboration with the client and with the other suppliers take place?

This study provides various levels of support for previously identified mechanisms that foster or support collaboration with eco system partners, including social exchange, an adaptive capability and governance mechanisms.

Social exchange

Social exchange of various items such as resources, facilities, corporate strategy takes place though not regularly. Most interesting observation is the contradiction between qualitative results stating that knowledge and information are being shared as a continuous process, whereas the survey results show that these are shared only sometimes.

According to the survey results social exchange does not have a positive nor a negative influence on achieving organizational goals: only 28% of respondents think it is important and less than 10% find social exchange critical. When we consider social exchange as a mechanism that fosters collaboration these results are rather remarkable, and only provide limited support to Feng et al. (2011) Plugge and Janssen (2009) Plugge and Bouwman (2015) and the derived proposition **P11:**

"Suppliers should engage in social exchange such as sharing of service, knowledge and information, as this fosters collaboration positively influencing service delivery to the client. Social exchange is therefore considered a CSF."

There is no obvious reason why the survey presents these results. It would seem logical that information and knowledge are regularly shared, for example during joint troubleshooting activities that basically happen each and every day in the customer's extensive IT infrastructure. Considering that survey responses indicate interaction with the customer tends to happen daily, and with the other ISPs weekly, it seems odd if social relationships are not being built and subsequently information and knowledge are not being exchanged regularly through these repeated interactions. Perhaps respondents misinterpreted social exchange to be something that only happens verbally at the coffee machine.

Generalized reciprocity has been confirmed to support collaboration, though quantitative results show that the mechanism does not appear to be used that often. These results provide a level of support for earlier findings by Plugge and Bouwman (2015). Despite that a definition and explanation have been given in the questionnaire respondents may still have found this a difficult concept, and have interpreted this each in their own way, as was also observed during the interviews.

There is no consensus across results whether there was or was not a common culture in the eco system, and that it positively supported collaboration. Overall these results only provide limited support for earlier findings by Plugge and Bouwman (2015). The reason for not getting consensus may be a lack of a meaningful and clear definition and consequently a difference in interpretation of the intended meaning of "culture".

There is minor empirical support for the use of social sanctions and no support for a positive effect on collaboration, and therefore earlier findings by Plugge and Bouwman (2015) cannot be confirmed. Especially as none of the interviewees confirmed this factor without further substantiation it is hard to understand what the reasons could be for survey results to spread across "almost never" to "sometimes".

Adaptation

The supplier had to adapt their organizational structure, processes and applications multiple times to accommodate changes introduced by the client. Adaptations supported or improved the ability to collaborate, though at the same time collaboration was required to implement the changes. These findings support the earlier work of Thomas Ph Herz et al. (2012), Plugge and Janssen (2009), Goldberg et al. (2015) and Goldberg et al. (2016).

Governance

This research also confirms that suppliers are dependent on the customer for providing governance across the eco system to ensure collaboration takes place to close the gaps between suppliers' areas of expertise and accountability. Although the customer provides day to day governance (at operational level), the supplier feels that the client role is indeed important, though still underestimated, and sometimes even intentionally dismissed. This provides support to the earlier findings of T. P. Herz et al. (2012), and Plugge and Janssen (2014, p. 93) about the governing role of the client: "*Finally, firms that engage in a multivendor outsourcing arrangement can benefit from implementing clear governance agreements such as roles, responsibilities, and meeting structures. <…>. Governing a multivendor outsourcing arrangement is a continuous process that requires regular management attention".*

Although proactive mechanisms between suppliers have been replaced with documented inter-supplier agreements (ISA) and statements of work, issues may still arise with collaboration due to their absence. The eco system then defaults back to an escalation type of governance. Both mechanisms (ISA and ad-hoc relational governance) have been confirmed to foster collaboration and seem to complement each other. This confirms that forms of relational governance are being used to foster collaboration and these findings provide a level of support to proposition **P10** based on Plugge and Janssen (2014)**:**

"Behavioural control mechanisms between suppliers such as Operational Level Agreements (OLA) support collaboration and therefore contribute to improvement of the end-to-end service performance. As such these are considered a CSF."

Despite the ad-hoc, escalation-based nature, the importance of relational governance also receives a level of support by the fact that results confirm that management focus is specifically provided on this mechanism.

Minor contractual issues did not seem to cause any real collaboration issues, in fact they were resolved through collaboration. However, larger issues in collaboration due to the missing details in the contract do sometimes happen, and therefor this case provides a level of support to proposition **P9** based on Plugge and Janssen (2014):

"Contractual governance should ensure adequate contract detail, including clear definitions of the IT services boundaries, with roles and responsibilities defined for suppliers, as this positively influences vendor collaboration. Contractual governance is therefore considered a CSF."

Which contextual factors influenced collaboration?

Research results suggest that collaboration is influenced mostly by the level of competition and trust. A direct relationship with the customer allows for improved collaboration, because this eliminates the opportunity for guardian vendors to abuse their position towards the client to the detriment of other suppliers.

There appears to be a level of awareness across the eco system suppliers regarding a collective interest to achieve mutual goals. Unfortunately, there does not seem to be an actual drive to mutually improve each other's performance. Competition due to overlap in portfolios causes suppliers to focus on their own benefit first, which consequently negatively influences collaboration. The supplier needs to balance competition and collaboration, also referred to as *"a relationship with the hand-break on", by R2.* The mediating effect of competition on collaboration has been referred to by Wiener and Saunders (2014) in their work on forced coopetition.

The interviews also emphasized the importance of trust in a multi sourcing collaboration. Governance mechanisms are required to ensure repeated interactions take place that enable building of trust. Once a certain level of trust is in place exchange of more sensitive information and knowledge will occur which will, in turn, foster collaboration. The fact that the importance of trust is being reiterated in this research is not surprising; it has been eluded to in the work of N. Levina and Su (2008), Plugge and Janssen (2014), Plugge and Bouwman (2015), and Lacity et al. (2017).

6. Discussion and reflection

Based on the research results one important question arises. It was mentioned that the eco system did not particularly feel collaborative, therefore, based on theory, can we expect a collaborative environment or speak of collaboration in this case study?

The three main IT infrastructure suppliers to which the client awarded the initial multi sourcing contract did not have contractually overlapping areas of expertise or service offerings. As per Wiener and Saunders (2014): *"…. as soon as the client has assigned the tasks to its multiple vendors, each vendor focuses on fulfilling its tasks and cooperates with the other vendors if needed for task fulfillment."* this suggests there is no reason for collaboration. Research results show the respondents are not convinced about a collective interest, and for sure suppliers are not out to improve each other's performance. Would it not be a shared interest of all suppliers to foster a collaborative work environment to ensure that each remains contracted?

Considering the initial omission of more detailed literature on collaboration we will briefly, and high level discuss the results from this case study in view of the earlier peer reviewed work by Thomson et al. (2007) who confirm collaboration is based on five key dimensions: 1. Governance, 2. Administration, 3. Organizational autonomy, 4. Mutuality, and 5. Norms (see Appendix P for more detailed explanations).

Governance - Despite the implementation of inter-supplier agreements and the governing role of the client being more a referee type of role at times of escalation, a lack of proactive relational governance across suppliers to create "jointness" as well as a lack of shared responsibility, and consequently a dysfunctional equilibrium (Thomson et al., 2007, p. 26), may partly explain the lack of a truly collaborative environment, as observed by R2.

Administration - Adaptation may have partly supported the establishment of an operational system by routinalizing and standardizing organization, processes and systems for communication and coordination. However, it would still require social coordination through a central position (Thomson et al., 2007, p. 26). This cannot be deducted from the research data.

Organizational autonomy - Despite a level of awareness with the supplier regarding a collective interest to achieve mutual goals, suppliers tend to focus on self-interest first due to the existence of competition. This creates tension with a potential collective interest (Thomson et al., 2007, p. 26). Unfortunately, there is no supporting research data whether fully empowered individuals represented their parent organization to make judgments about collaborative commitments.

Mutuality - In our case all vendors have unique skills and expertise (being best of breed) while supporting the different technologies they have been contracted for, and which other vendors can benefit from as it enables them to collectively deliver an integrated and seamless IT service end-to-end (complementarity). Two important factors regarding shared interest that also apply to this case study organization are 1. the same commitment to deliver integrated IT services while meeting SLAs and CSAT targets (similar mission) and 2. sharing the same customer (similar target populations) (Thomson et al., 2007, pp. 27,28).

Norms - Reciprocity has been observed though not used that often. Given that a. governance is mainly ad-hoc and escalation based, and b. there's a level of competition we can argue whether a sufficient level of trust exits such that the limited reciprocity evolves into longer term commitments between suppliers (Thomson et al., 2007, p. 28).

Based on this short review the preliminary view is that there is for sure room for mutuality. However, it would require improved proactive relational governance mechanisms to allow for better building of trust between suppliers which then subsequently raises the chances of expressing longer term commitment. With only partial and limited data it would require a more specific study to understand the maturity level of these key dimensions to understand if there is fruitful ground for true collaboration towards a collective goal in this case study context.

One observation from the literature study is that some researchers talk about cooperation (Bapna et al., 2010) and others about collaboration (Plugge & Bouwman, 2015), though none of them clearly elaborate on any specific difference between the two concepts in their work. One could argue that there is a difference between collaboration and cooperation, where in this case study cooperation has likely taken place through fulfillment of tasks at the interfaces of vendor areas and may have occasionally taken the shape of collaboration in e.g. in project delivery – driven by a collective interest through selling connectivity services and grow revenue, and in turn deliver improved helpdesk services with higher customer satisfaction rates.

6.1. Reflection

The next section will discuss to what extent the case study organization matches the ITM context, as well as the extent with which reliability, validity and generalizability have been ensured.

The case study organization matches the ITM context. The client is operating an outsourcing model for IT infrastructure services which has been split into three main towers: networking, hosting, end user computing. Each supplier is delivering best-of-breed services to the client as part of this outsourcing deal. These are knowledge intensive services as opposed to just supplying goods. There are clear dependencies between the eco system suppliers while delivering a seamless integrated service to the client. Although the suppliers have been sourced based on a specific service area, there is still overlap in vendor portfolio which generates opportunity to compete when the client is issuing a new RfP. The client appears to evolve through various ITM models, starting with a mediated model, moving to a direct model and more recently taking some initial steps into direct overlapping engagements.

6.1.1. Structured questionnaires

Overall reliability of the questionnaire was measured, using a short survey at the end, as “strong” (mean of 28.4 within range of 23.8-29.4), with $\alpha >= 0.7$ showing good internal consistency (see Appendix M). To counter this, respondents may have not been out to offend the researcher by submitting a bad result.

Reliability – moderate. The internal consistency of about half of the constructs appears acceptable and better ($\alpha >= 0.7$). For some of the constructs with $\alpha < 0.7$ (questionable or worse) it was decided to use the statistical outcome of the individual questions. As the survey was used for descriptive results this is not considered a real problem. Reliability of the survey could have been improved if additional questions had been used per construct, including effective use of check questions.

Internal validity – moderate. Despite using a data requirements table some of the following difficulties were encountered:

1. Framing questions in a clear and precise way.
2. Using measurement scales (standardization, consistency, labelling of values)

3. Lack of further clarification: what does “sharing of processes and technology” mean, knowledge vs information, etc?

The survey was revised based on feedback from two English native / two non-native speaking test respondents, however this does not meet the minimum of ten reviewers (Saunders, 2016, p201). In addition, lack of time and experience using survey tool ThesisTools may have also affected the internal validity. The implementation of routing and conditional presentation of questions has caused some data not to be collected where it would still have been prudent.

Generalizability – limited. Only 53 from 166 respondents completed the questionnaire. Saunders refers to a minimum of 30 respondents to be able to generalize, though it required full responses of 215 respondents to be able to achieve 95% reliability across the total population of 503 (Saunders et al., 2016, p. 154). Most likely reasons for the limited response are: only two weeks given to complete the survey, scope of research too extensive resulting in a fairly long questionnaire, and lastly, researcher bias due to preliminary exclusion of potential respondents.

6.1.2. Semi-structured interviews

The full list of reliability measures (Appendix J) has been followed, while taking into account the ethical considerations. A few notes as per below that likely affect the reliability of the data.

Reliability – moderate. Observer bias is considered low. Gaining access to the respondents was not a problem and there were no obvious trustworthiness and credibility concerns as information appeared to be shared freely. Although being familiar with the case study organization researcher did not consciously impose a frame of reference and left it to the respondents to choose their own examples. The existing researcher-participant relationship allowed for positive informal behaviour at various moments, though may have injected some bias on both ends.

Participants’ bias was attempted to be minimized by allowing them to choose when and where to conduct the interview. Few occasions affected the interview as background noise made it a less comfortable meeting, and questions had to be re-iterated to allow the interview to progress.

The level of engagement and the way the questions were answered (verbal and non-verbal) varied between participants. Despite the standardization of the interview scripts, and progressively applying learnings, it was regularly difficult to obtain examples of critical events that would substantiate the more general confirmation of criticality of collaboration. The researcher had hoped for a few specific well-known examples which were not forthcoming. Misalignment or misinterpretation of concepts and questions sometimes required multiple attempts to steer the participant in the desired direction. Unfortunately, the researcher’s interview skills were not strong enough at that point to prevent that from happening.

These factors, in addition to the extensive research scope, put time pressure on the interviews such that researcher had to balance out whether to stress the process by attempting to gather data that was not forthcoming or allowing the participant to finish answering while carefully listening and taking notes and then proceeding with less information such to cover the full scope of the interview.

Lastly, the member checks of the interview transcriptions required multiple chasers. Consequently, some reviews may have been performed more thorough than others and therefor have a bearing on the reliability of data.

Internal validity – moderate. The interview protocol was reviewed by three people within the case study organization with extensive experience. Their feedback did not result in any major changes

though few improvements or clarifications on concepts have been applied. It should be noted here that the reviewers were not necessarily scientifically suited to pass judgment on the validity of the interview questions.

Despite sufficient attention was given to prepare the interviewees it can be argued whether they actual did do so. Unfortunately, the researcher still had to clarify or ask for clarification, solicited as well as unsolicited, to ensure the answer would target the context and scope of the research. Sometimes the answers were more confirmatory/negatory in nature rather than explanatory. Apparently, some questions could still be interpreted differently from what was anticipated.

Generalisability – limited. The theoretical framework that was built should allow the researcher to validate whether key concepts are also applicable in this case study. Considering the fact that the research eventually focussed on collaboration only, as opposed to the full list of critical success factors, and the imposed time constraint to complete the thesis work, there was no further literature research performed to understand collaboration and how to measure this concept in interorganizational relationships. Consequently, the concept may have been measured and evaluated on a more basic level, which decreased internal as well as external validity. To put this in perspective, the discussion contains a high-level review based on the work of Thomson et al. (2007).

Sampling – For this part of the research four respondents had been chosen who are experts in their respective areas on the client account, covering sales and commercial, project and programme management and operations. These individuals operate on mid management levels and have many years of related experience on the account, some even being part of the account since the start in 2008. Although we could argue that there is no heterogeneity in management level to ensure different perspectives are taken into account based on this characteristic, it does allow for creation of a more senior and holistic view across various operational areas of the case study organization.

Respondent Identifier	Role	Org position	Motivation for invitation to interview
R1	Service Level Management, Systems Integration	Director	Contract detail, SLA/OLA information
R2	Operations, Technical Service Management	Director	Inter-supplier operations
R3	Programme and project management	Director	Inter-supplier projects, Contract negotiations
R4	Sales, ex Operations, ex Lead Contract Negotiator	Director	Inter-supplier operations, Contract negotiations

Table 10: Respondents for semi structured interviews

6.1.3. Triangulation

Despite attempting to be consistent between survey and interviews using the same concepts and definitions the observation is that some variables are not being confirmed by both survey and interviews. Both methods provide contradicting information. For example, the questionnaire results show that sharing of information happens rarely to sometimes, whereas the interviews confirm this basically happens continuously. This also indicates a weakness of the internal validity of this research.

7. Recommendations

Based on the conclusions, discussion and reflection this chapter provides some recommendations for both practice and future research.

7.1. Recommendations for practice

The importance of having a collaborative capability has found support through this research with the understanding that it impacts the ability to achieve organizational goals such as meeting SLAs and customer satisfaction targets, increasing supplier reputation, attaining economies of scope/scale, and ultimately increasing revenue.

To support the ability to collaborate in an ITM ecosystem IT suppliers should consider focussing mainly on building trust through repeated interactions. As trust and confidence are being built, reciprocity as a social exchange mechanism already fosters collaboration at a basic level. On an organizational level it requires relational governance, even if it is only covered at a bare minimum through ad-hoc and escalation driven practices. Though, ideally it should be supported through documented inter-supplier agreements and regular meetings, as a proactive approach such to enable integration of new suppliers for example. This would serve the mutual benefit such that it does not impact any of the supplier's table stakes, and ultimately ensures collective delivery of integrated services to the client. With a lot of pressure of client firms on the suppliers to deliver to their expectations, suppliers need to ensure from their end that the client's governing role and associated responsibilities are clearly documented too.

Furthermore, suppliers need to understand that being selected to participate in a client enforced ecosystem requires management and balancing of competing and cooperating relationships as new suppliers and even existing suppliers' own technology partners may be joined into the eco system by the customer. The capability of a supplier to adapt its organizational structures, processes and support systems enables integration into the ecosystem and consequently enables the ability to collaborate, but one should not forget that these endeavours also require collaboration to begin with. How well the supplier is able to adapt, and shape collaborative relationships determines for a good part how a supplier can remain successful.

7.2. Recommendations for future research

Firstly, this research contributes to existing IT outsourcing theory because the case study context differs considerably from the usual research context:

- Multi-sourcing vs single-sourcing
- Supplier perspective vs client perspective
- Global sourcing through IT suppliers with head office in Western countries, vs off-shoring.
- IT infrastructure delivery vs application development and management services.

Moreover, although the preceding literature study revealed that the interdependence of supplier tasks and consequently the need for cooperation is what distinguishes ITM from ITO, specifically in IT multi-sourcing there has not been any research done to understand which factors, including collaboration, are critical for an IT supplier to be successful operating within a client imposed and orchestrated ecosystem.

Based on this study we have a proposal for a framework of critical success factors for a supplier in IT multi-sourcing. Secondly, the results of the empirical part confirm that collaboration is considered critical to success and can be linked – on a high level – to several success components.

The first suggestion for future research would be to set up an embedded case study, where the unit of analysis is the eco system and the embedded cases are the different suppliers in the eco system. To address the sub-optimal internal validity of this research future work should take into account the five key dimensions of collaboration from the work of Thomson et al. (2007) such to provide a holistic view of collaboration within the single eco system and understand if the importance of collaboration and how it should be fostered is viewed the same by each of the suppliers, and when perspectives differ, does that explain differences in the success of any of the suppliers.

The organization has been successful in meeting SLAs, ensuring customer satisfaction and maintaining reputation, though some interview participants have hinted at the organization being less successful at increasing eco of scope and scale as well meeting financial targets. Some of the reasons for not meeting financial targets could be a suboptimal internal cost structure, or a high level of customization required by the customer which is not applicable to other clients and therefore no opportunity for increasing economies of scope and scale. Pricing based on strategy and future outlook may then become obsolete. And so, alternatively, future research can focus on the internal relationships between the components of success and finding substantiation that supports how collaboration exactly influences each mentioned component.

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Appendix B. Literature Study

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Appendix C. IT multi-sourcing articles

No	Article
1	Levina, N., & Su, N. (2008). Global multisourcing strategy: The emergence of a supplier portfolio in services offshoring. Decision Sciences, 39(3), 541-570.
2	Bapna, R., Barua, A., Mani, D., & Mehra, A. (2010). Cooperation, Coordination, and Governance in Multisourcing: An Agenda for Analytical and Empirical Research. Information Systems Research, 21(4), 785-795.
3	Su, N., & Levina, N. (2011). Global Multisourcing Strategy: Integrating Learning From Manufacturing Into IT Service Outsourcing. IEEE Transactions on Engineering Management, 58(4), 717-729.
4	Feng, B., Fan, Z.-P., & Li, Y. (2011). A decision method for supplier selection in multi-service outsourcing. International Journal of Production Economics, 132(2), 240-250.
5	Bhattacharya, S., Gupta, A., & Hasija, S. (2012). Single sourcing versus multisourcing: The role of effort interdependence, metric-outcome misalignment, and incentive design.
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7	Wiener, M., & Saunders, C. (2014). Forced coopetition in IT multi-sourcing. The Journal of Strategic Information Systems, 23(3), 210-225.
8	Koo, Y., Lee, J. N., Heng, C. S., & Park, J. (2017). Effect of multi-vendor outsourcing on organizational learning: A social relation perspective. INFORMATION & MANAGEMENT, 54(3), 396-413.
9	Plugge, A., & Janssen, M. (2009). Managing change in IT outsourcing arrangements: an offshore service provider perspective on adaptability. [PR]. Strategic Outsourcing: An International Journal, 2(3), 257-274.
10	Plugge, A., & Janssen, M. (2014). Governance of Multivendor Outsourcing Arrangements: A Coordination and Resource Dependency View. In J. Kotlarsky, I. Oshri, & L. P. Willcocks (Eds.), Governing Sourcing Relationships. A Collection of Studies at the Country, Sector and Firm Level: 8th Global Sourcing Workshop 2014, Val d'Isere, France, March 23-26, 2014, Revised Selected Papers (pp. 78-97). Cham: Springer International Publishing.
11	Plugge, A., & Bouwman, H. (2015). Understanding Collaboration in Multisourcing Arrangements: A Social Exchange Theory Perspective. Paper presented at the International Workshop on Global Sourcing of Information Technology and Business Processes.

Table 11: Final list of ITM articles used in this literature review

Appendix D. Critical Success Factors Framework

Critical Success Factor	Definitions from (Lacity et al., 2010; Lacity et al., 2017)	Relation to ITO outcome	Relevant in ITM	Comments
Relationship characteristics	Knowledge sharing: "the degree to which clients and providers share and transfer knowledge."	Pos	Pos	Social exchange supports collaboration and builds trust and commitment
	Communication: "the degree to which parties are willing to openly discuss their expectations, directions for the future, their capabilities, and/or their strengths and weaknesses."	Pos	Pos	Social exchange supports collaboration and builds trust and commitment
	Trust: "the confidence in the other party's benevolence."	Pos	Pos	Trust influences collaboration and the quality of the relationship
	Relationship quality: "the quality of the relationship between a client and provider."	Pos	Pos	Affects collaboration and ITO success Decreased trust, commitment and collaboration will affect the quality of the relationship
	Cultural distance: "the extent to which the members of two distinct groups differ on one or more cultural dimensions."	Neg	Neg	Can be addressed by creating a common culture in support of collaboration
	Partnership view: "a client organization's consideration of a provider as a trusted partner rather than as an opportunistic vendor."	Pos	Pos	Although the description suggests this is a one-way relationship (the client's view) it can be influenced by the supplier through the client-provider interface design and the supplier's client management capability
	Relational governance: "the unwritten, worker-based mechanisms designed to influence inter-organizational behavior."	Pos	Pos	Under collaboration, includes OLAs as behavioural mechanism between suppliers
	Client-provider interface design: "the planned structure on where, when, and how client and provider employees work, interact, and communicate."	M	Pos	May determine the level of influence on relationship by supplier such to build reputation and gain competitive advantage
	Commitment: "the degree to which partners pledge to continue the relationship."	Pos	Pos	Required to maintain long term knowledge intensive relationship and affects ITO outcome
Contractual governance	Contract detail: "the number or degree of detailed clauses in the outsourcing contract, such as clauses that specify prices, service levels, key process indicators, benchmarking, warranties, and penalties for non-performance."	Pos	Pos	Clear descriptions of the roles and responsibilities, supplier inter-dependencies avoid unclarity and decreased trust
Provider firm capabilities	Technical and methodological capability - provider: "a provider organization's level of maturity in terms of technical or process related and best practices."	Pos	Pos	Generic capability mediates the relationship between supply base breadth and ITO benefits and risks
	Human resource management capability - provider: "a provider organization's ability to identify, acquire, develop, retain, and deploy	Pos	Pos	Generic capability mediates the relationship between supply base breadth and ITO benefits and risks

	human resources to achieve both provider's and client's organizational objectives."			
	Domain understanding: "the extent to which a provider has prior experience and/or understanding of the client organization's business and technical contexts, processes, practices, and requirements."	Pos	Pos	Client specific capability, influences production and coordination cost
	Client management capability: "the extent to which a provider organization is able to effectively manage client relationships."	Pos	Pos	Generic capability, mediates the relationship between supply base breadth and ITO benefits and risks . Influences reputation level and competitive advantage
	Adaptive capability*: The ability to deal with new environmental conditions and to identify and capitalize emerging markets and technology opportunities (Plugge & Janssen, 2009)	-	Pos	Adaption of technology mode, and organizational design support the flexibility of the client to adjust to change environment. In addition, the ability to adapt processes and tools allows for collaboration and integration of services.
	Collaborative capability*: The supplier's capability of exchanging, information and knowledge with other suppliers and the client with a focus on improving individual and joint business performance and to create value. (Plugge & Bouwman, 2015)	-	Pos	Required due to task interdependency and to meet mutual goals. Related to social exchange, common culture, sharing resources, operational adjustment and governance
	Internal IT capability*: The supplier's capability to leverage Information (and communication) Technologies to strengthen their business model by raising switching cost of their clients	-	Pos	Provides the ability to build proprietary solutions and as such raises switching cost for the client
	Service Quality*: Intangible service quality refers to the difference between the service customer's expectations and perceptions. Service quality can be generally conceptualized along five dimensions: reliability, responsiveness, assurance, empathy, and visual appearance (Su & Levina, 2011)	-	Pos	As part of generic capabilities service quality of the supplier improves service quality of the client.
	Utilization of Economies of Scale*: The suppliers' decreasing unit production costs as a result of increasing transaction volumes (Su & Levina, 2011)	-	Pos	Has a negative relationship with production cost, and therefore positive effect on ITO outcome

Table 12: ITO success determinants updated with ITM findings. An (*) means these are newly added to the previous ITO research.

Appendix E. Methodology choices

Experiment	Method involves tightly controlled environment with at least two research groups: 1 for the experiment (subject to interventions) and 1 for validation.	This is not the aim, there is no requirement to put an intervention on a group to understand a causal relationship between variables.
Action research	Aims to build theory/model whilst solving issues with explicit emphasis on action through spiral of diagnosis, planning, actioning, evaluating, promoting/progressing change. Researcher active participant of the drive for change.	Our research is not aimed to solve a specific business problem and actively driving change.
Ethnographical research	Descriptive, explanatory method for research pertaining to social issues (like corporate culture)	Social issues are not the objective of our studies
Archival research	Exploratory, descriptive, explanatory method. Uses administrative data and documents and focused on historical data and changes over time.	Maybe a secondary research method for the purpose of triangulation
Grounded Theory	Explorative method. Starting with data collection, mainly used to develop new theory for explaining, predicting e.g. human behaviour in business.	This is not the objective of our studies to predict e.g. human behaviour

Table 13 - Methodologies considered

Appendix F. Data Requirements Tables

Part 1 of main research question: *How critical is a collaborative capability for a supplier to be successful in IT multi-sourcing?*

Associated sub questions:

1. *What does the supplier consider to be success in a multi-sourcing deal?*
2. *To what extent can supplier success be attributed to the supplier's collaborative effort?*

Sub question 1 . What does the supplier consider to be success in a multi-sourcing deal?			
Researching questions	Required variables	How is variable measured?	Included in questionnaire?
Which organizational goals define the success of this sourcing deal?	Opinion of expert whether the envisaged success of this sourcing deal for the supplier relates to any of the following: - reputation increase - customer satisfaction - meeting SLAs - profit/revenue increase (financial gain) - increase economies of scope and/or scale	Disagrees strongly – Agrees strongly for each of the proposed values	Src_Suc01 Src_Suc02 Src_Suc03 Src_Suc04 Src_Suc05

Sub question 2. To what extent can supplier success be attributed to the supplier's collaborative effort?			
Researching questions	Required variables	How is variable measured?	Included in questionnaire?
Is (lack of) collaboration a crucial/decisive factor in (failing to) attaining the goals as part of this ITM deal?	Opinion of expert regarding the criticality of collaboration	Very infrequently - Somewhat infrequently - Occasionally - Somewhat frequently - Very frequently	Ctrb_Suc01 Ctrb_Suc02
How often was (lack of) collaboration the main cause of (failure in) attaining the goals as part of this ITM deal?	Opinion of expert regarding the criticality of collaboration	Very infrequently - Somewhat infrequently - Occasionally - Somewhat frequently - Very frequently	Frq_Col01 Frq_Col02
To what extent did collaboration receive management attention such to ensure the success of the sourcing deal?	Opinion of expert regarding the management attention given or required to facilitate/foster collaboration	Disagrees strongly – Agrees strongly that management attention is given or required to facilitate/foster collaboration	Mgt_Ctl01 Mgt_Ctl02

Part 2 of main research question: *How does collaboration contribute to success?*

Associated sub questions:

1. *How did collaboration with the client and with the other suppliers in the ecosystem take place?*
2. *Which factors influence collaboration?*

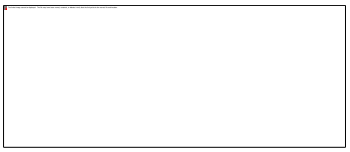
How did collaboration with the client and with the other suppliers in the ecosystem take place?				
Researching questions	**Required variables**	**How is variable measured?**	**Included in questionnaire?**	
Which mechanisms have been successfully utilized/implemented to support a collaborative ecosystem?	Expert opinion about the observation of mechanisms used to successfully foster collaboration: - Adaptive capability of supplier - Contractual governance - Relational governance - Sharing of knowledge - Social exchange mechanisms	Disagrees strongly – Agrees strongly for each of the presented mechanisms whether those have been observed as being implemented or utilized in the ITM eco system	Adpt01 Adpt02 Adpt03 Adpt_Col01 Adpt_Col02 Adpt_Col03 Gov_Ctr01 Gov_Ctr02 Gov_Ctr03 Gov_Rel01 Gov_Rel02 Gov_Rel03	Frq_Sox01 Frq_Sox02 Frq_Sox03 Frq_Sox04 Frq_Sox05 Frq_Sox06 Imp_Sox01 Imp_Sox02 Imp_Sox03 Imp_Sox04 Imp_Sox05 Imp_Sox06 Sox_Mch01 Sox_Mch02 Sox_Mch03 Sox_Inf01 Sox_Inf02 Sox_Inf03

Which factors influence collaboration?			
Researching questions	**Required variables**	**How is variable measured?**	**Included in questionnaire?**
Which contextual factors of this sourcing deal influenced the ability to collaborate?	Opinion of expert regarding the presence of an actual need for cross-supplier collaboration within this sourcing deal - Is there a collective interest to deliver mutual benefits between suppliers, and the intent of suppliers to improve individual as well as joint performance, in the sourcing deal? Expert opinion about the presence of following contextual factors that may influence collaboration: - The interdependence of activities (tasks) performed by different suppliers - a direct/indirect relationship with the customer - the level of competition between suppliers	Disagrees strongly – Agrees strongly that there is a collective interest across suppliers to deliver mutual benefits and to improve individual as well as joint performance Disagrees strongly – Agrees strongly for each of the presented factors whether those have been observed as present and influencing collaboration in the ITM eco system	NfC01 NfC02 Prtn_Dep01 Prtn_Dep02 Ext_Cmp01 Infl_Cmp01 Clt_Rel01 Clt_Rel02

Appendix G. Invitation to questionnaire

INTERNAL EMAIL TO RESPONDENT POOL – 21 March 2019

- Sent to: All respondents on Bcc
- Subject: Invitation to complete online questionnaire in support of MSc Study



The importance of collaboration in achieving success as part of a multi-sourcing engagement: a supplier perspective
Your experience working together with client and suppliers and the relation to sourcing success

The Hague, 21 March 2019

Dear respondent,

My goal for 2019 is to complete my Business Process Management & IT studies at the Open University Netherlands, as such to obtain my Master of Science degree. Currently I am working towards graduation for which I need to conduct an empirical research project. The main research question for this project is:

How critical is a collaborative capability for a supplier to be successful in IT multi-sourcing and how does collaboration contribute to this success?

Background

As you know, <CLIENT> is multi-sourcing its IT infrastructure services through various suppliers. <COMPANY> is part of <CLIENT>'s eco system and working together with the other infrastructure providers to deliver end-to-end services to their client. Since 2008, the company has been awarded contract extensions/renewals with a cumulative contract length of 15 years. The successful relationship between <CLIENT> and <COMPANY> and the extensive experience gained in a multi-sourcing environment creates an interesting opportunity for research. Hence, this engagement is my choice to serve as a case study.

Purpose

This email is my invitation to you to complete a questionnaire as part of my research project.

Your answers will be used as part of the main data set that should allow me to further analyze and understand the criticality of collaboration in IT multi-sourcing (ITM) environments. The scope of this questionnaire is the sourcing deal between <COMPANY> and <CLIENT>.

Process

This email is only sent internally such to keep the online questionnaire "clean" from company names, therefore please take note of the following:

A. When stating "this organization" or "the company" this refers to <COMPANY> as the telecommunications partner in the sourcing contract with its customer <CLIENT>.
B. <CLIENT> will be referred to as "the client" or "the customer".

C. Where "sourcing deal" or "engagement" is mentioned this means the total duration of contract renewals or extensions since service commencement date (SCD), 1 July 2008.

Carefully read the ethical considerations regarding this questionnaire upon which you'll be asked for your consent by check marking "I agree". Once checked you'll be taken to the first page of the survey.

Completing the questionnaire should take you about 20-30 minutes. I hope you will find it interesting.

Kindly submit your answers no later than 7 April to allow me to complete and submit my thesis before the deadline.

Closing

Thank you in advance. I truly appreciate your support.

If you have any questions or would like further information, please do not hesitate to reach me on Skype or email me.

START Questionnaire by clicking here

(PLEASE DO NOT SHARE OUTSIDE THE COMPANY, THIS IS SPECIFICALLY SENT TO YOU)

Best regards,

Martijn Niehot

Appendix H. Questionnaire (final version)

Questionnaire (Word version of ThesisTools

Appendix I. Interview protocol & script

Interview protocol v3.0.pdf

Appendix J. Interview Reliability Measures

1	This empirical research is based on a structured literature review and as such researcher is familiar with the research topic to the extent that was feasible as part of the Open University study.
2	Researcher will consult company's legal department to ensure the correct measures are taken to ensure confidentiality and anonymity of the company, the respondents and the client's name. This should address the main ethical barriers such to carry out the research.
3	Upon agreement, target respondents will be invited to the interviews. The invite will include the background of the research, the goal, the interview process and a request for consent.
4	Upon consent and prior to the interview, more information will be shared with the respondents regarding the concepts that will be discussed, the exact context and the interview protocol.
5	Researcher is a well-known and respected employee with the targeted respondents. The existing social relationship should provide an initial mitigation of credibility and trust issues.
6	Because researcher is employee of the case study company he will need to take care not to provoke bias, and stay neutral (in tone, behaviour and response) to the discussion.
7	The interviews will take place using Skype and seated within enclosed area as much as possible. Researcher does not have a direct influence on where the respondents will be located, which may allow for distraction/disruption of the interview.
8	Researcher will refrain from promoting own ideas, rather focus on listening to the respondent, and allow respondent to finish answering.
9	Apart from a member check of the transcription, researcher will summarize his understanding of the answer during the interview and ask for confirmation.
10	Respondents include non-native English speakers from Germany, and the Netherlands. Cultural differences will be restricted to Western society. Clarification will be asked in case of doubt, to avoid misinterpretation.

Appendix K. Quantitative data analysis & results

ItemID	Item Label	R	N	Mean	Mode/ Median*	r	α	α - classification	Analysis Remarks
Src_Suc	Sourcing Success	53	5	20.32	20*	>0.2	0.8	Good	The inter-item correlations show sufficiently high values (r>0.2). [ca] of 0.763 is slightly less than 0.800. We are able to increase [ca] to 0.800 by removing "meeting financial targets". However, because this item is an important measure, it is decided to keep it. Using the results of all 5 items the variable "Sourcing Success" (Src_Suc) is constructed. Mean = 20.32, median = 20 falls into class 'agree'.
Ctrb_Suc	Contribution of collaboration to supplier success	53	2	8.34	8.0	>0.2	0.6	Questionable	The inter-item correlation is sufficient, with r=0.447. Although [ca] is only 0.599 (< 0.8) it is decided to construct the variable Ctrb_Suc based on the two items. Mean of 8.34 and mode of 8 fall into class 'Strong' Note The second item – due to how the question is presented - may seem to be negatively oriented, however where respondents answered "disagree" or "disagree strongly" this confirms that no collaboration actually has no effect on success, i.e. there is no influence from collaboration. When respondents "agree" or "agree strongly" this would mean that not collaborating indeed does – although negatively – influence the success, which is a positive confirmation of a relation. As such this question is positively oriented and does not need to be recoded.
Frq_Col	Frequency of critical collaboration	53	2	6.96	7.0	>0.2	0.7	Acceptable	The inter-item correlation is sufficiently high at r=0.495. [ca] is 0.662 which shows low homogeneity. Nevertheless, we keep both items to compose variable Frq_Col – Frequency of critical collaboration. Mean of 6.96 and a mode of 7 fall into class 'Frequently'
Mgt_Ctl	Management control	53	2	6.34	8.0	>0.2	0.8	Good	The inter-item correlation is sufficient with r=0.726. [ca] is high enough at 0.840. Variable Mgt_Ctl can be composed from these two items. Mean of 6.34 falls into class 'Weak nor strong', but mode of 8 falls into 'Strong'
Adpt	Adaptability	53	3	11.25	11.0	>0.2	0.7	Acceptable	The inter-item correlations are sufficiently high (r>0.2). [ca] of 0.710 indicates homogeneity is slightly too low. [ca]can only be lifted to 0.790 through elimination of "adaptation of org structure" however would then still be considered (slightly) too low. Variable Adpt is created based on all items. Despite the fact that [ca] can be raised to 0.790, the item to be removed is considered too important, so it is kept. Adaptation mean of 11.25 and mode of 11 fall into class 'frequently'
Adpt_Col	Influence of Adaptability	53	3	10.32	12.0	>0.2	0.7	Acceptable	The inter-item correlations show r> 0.2. [ca] is 0.726, which means that the homogeneity across items is actually slightly too low to be able to create variable Adpt_Col. Removing any item will even decrease the [ca] value. However, due to importance we decide to keep all three items to create variable Adpt_Col.

ItemID	Item Label	R	N	Mean	Mode/ Median*	r	α	α - classification	Analysis Remarks
									The influence of the supplier's adaptive capabilities on collaboration has a mean of 10.32 and a mode of 12, which fall into class 'Agree'.
Gov_Ctr	Contractual Governance	53	2	6.08	6.0	>0.2	0.8	Good	The inter-item correlations are negative and weak for Gov_Ctr03 towards Gov_Ctr01 and Gov_Ctr02. [ca] is 0.497, which indicates low homogeneity. When we take out Gov_Ctr03, we are able to increase [ca] to 0.836. As such variable Gov_Ctr can be created using Gov_Ctr01 and Gov_Ctr02 only. Mean of 6.08 and mode of 6 fall into class 'Sometimes' Note: The items Gov_Ctr01 and Gov_Ctr02 have been recoded before evaluating reliability, as these are negatively oriented. For ease of interpretation of the variable the original (non-recoded) values are used. Remark: Perhaps a better way to frame the question for item Gov_Ctr03 – consequently make it more relevant for inclusion in the variable calculation - is by changing it from: 1. Old - Kindly share your opinion on following statement: This organization negotiated operating level agreements (OLAs) with other suppliers to govern mutual dependencies to 2. New - Kindly share your opinion on following statement: OLAs between suppliers positively influenced collaboration as they prevented disputes/dependency issues between suppliers
Gov_Rel	Relational Governance	53	3	11.02	12.0	>0.2	0.7	Acceptable	'The inter-item correlations are well above 0.2. [ca] is slightly too low at 0.733. We could decide to remove Gov_Rel01 with the opportunity to increase [ca] to 0.874. However, we chose to keep Gov_Rel01 as it reflects the intended variable Gov_Rel - Influence of Relational Governance, and thus composed from all three items. Mean 12.06 and mode 12 fall into class 'Agree'
Frq_Sox	Frequency of social exchange	30	6	15.57	16*	>0.2	0.9	Excellent	'Inter-item correlations are all >0.2 except for one combination: resource vs. strategy/plans. As homogeneity is scored sufficiently high with [ca] at 0.862 it was decided to keep all items and create variable Frq_Sox – Frequency of social exchange. 86.7% of respondents score below 21 i.e. social exchange does not happen more often than sometimes. And so, only 13.3% of social exchange happens frequently/very frequently. Mean of 15.57 falls into class 'rarely'. Note: The composed variable is based on a subset of responses, only 30, because the option was given to respondents to select "Not applicable to my role" (entered by 23 respondents). As this option was originally coded as "1", all values were recoded according to following scheme: • 1=>6 • 2=>1 • 3=>2 • 4=>3 • 5=>4

ItemID	Item Label	R	N	Mean	Mode/ Median*	r	α	α - classification	Analysis Remarks
									• 6=>5 The recoded values of 6 are marked as MISSING in further analysis.
Imp_Sox	Importance of social exchange	41	6	18.28	20*	>0.2	0.9	Excellent	Inter-item correlations are all sufficient (r>0.2) except for two combinations: facilities - knowledge (0.178) and facilities - strategy and plans (0.089). As homogeneity is scored sufficiently high with [ca] at 0.868 it was decided to keep all items and create variable Imp_Sox – Importance of social exchange. Mean = 18.28 and median = 20 fall into class 'neutral' which can be translated to 'neither important nor unimportant'. Note: The composed variable is based on a subset of responses, only 32, because the option was given to respondents to select “Not applicable to my role” (entered by 21 respondents). As this option was originally coded as “1”, all values were recoded according to following scheme: • 1=>6 • 2=>1 • 3=>2 • 4=>3 • 5=>4 • 6=>5 The recoded values of 6 are marked as MISSING in further analysis. Social exchange is neither unimportant nor important (mean = 18.28 and median is 20). - 62.5% of respondents find social exchange not (so) important - 28.1% of respondents think it is important and less than - 10.1% of respondents actually find social exchange critical*.
Sox_Mch	Social Exchange Mechanisms	53	1	2.55	3.0	<0.2	0.5	Questionable	Inter item correlation and Cronbach Alpha not sufficient. Decided to consider the answers to the individual questions>
Sox_Inf	Social Exchange Influence	42	1	3.36	4.0	<0.2	0.2	Unacceptable	Inter item correlation and Cronbach Alpha not sufficient. Decided to consider the answers to the individual questions>
Clt_Rel	Influence of client relationship type	53	2	6.92	8.0	>0.2	0.6	Questionable	Inter item correlation and Cronbach Alpha changed resp from -0.478 to 0.478 and from -1.824 to 0.646 after recoding Q22_2. The influence of the type of relationship a supplier has with the client – direct or indirect via guardian vendor - shows as positive, meaning that it confirms there is influence. However, depending on the type of relationship, this would be a positive or more neutral oriented relationship. The inter-item correlation r=0.478. The homogeneity of items appears slightly low, [ca] = 0.646. Despite a lower [ca], it is believed that both items are important to provide an idea of whether the type of relationship has influence on collaboration. Therefore the newly created variable Ctl_Rel will use both items to depict this.

ItemID	Item Label	R	N	Mean	Mode/ Median*	r	α	α - classification	Analysis Remarks
Ext_Cmp01	'Q10 Existence Competition'	53	1	1.21	1.0	>0.2	N/A	N/A	
Infl_Cmp01	'Q19 Influence of Competition'	46	1	2.50	2.0	>0.2	N/A	N/A	
NfC	Need for Collaboration	53	2	6.85	6.0	>0.2	0.9	Excellent	The inter-item correlation is sufficient (r=0.755) and [ca] is 0.860, thus both items are relevant and kept such to construct the variable NfC. The mean of 7.21 and mode of 8 fall in class "Agree".
Prtn_Dep	Dependency on eco system partners	53	2	7.60	8.0	>0.2	0.3	Unacceptable	Inter-item correlation is just over 0.2 (r=0.211). The homogeneity of items appears very low [CA] = 0.318. As we only measure two items there is no way to increase [ca] to a higher value. Regardless, both items are important to measure eco system partner dependency. Mean =7.6 , mode =8 falls into 4th class, above average dependency, though not very dependent
Frq_Int	Frequency of eco system partner interaction	53	2	7.70	9.0	>0.2	0.6	Questionable	Inter-item correlation is 0.439. Despite Cronbach's Alpha being questionable at 0.610 it is decided to keep both items to construct the variable (Freq_Int). Mean = 7.7, falls into class 'Weekly' Mode = 9 falls into class 'Daily'

Table 14: Quantitative results - constructs

ItemID	Item Label	R	N	Mean	Mode/ Median*	Analysis Remarks
Sox_Mch01	'Q27 Social Exch. Mech.– Generalized Reciprocity'	53	1	2.55	3.0	Generalized reciprocity or quid pro quo behavior (a supplier supporting another supplier and consequently receiving support in return from the same or any of the other suppliers) has been observed rarely to sometimes (mean of 2.55) with a tendency to sometimes (mode of 3)
Sox_Mch02	'Q28 Social Exch. Mech.– Social Sanctions'	53	1	1.81	1.0	'Social sanctions are being used almost never to rarely (mean of 1.81) with a tendency to almost never (mode of 1)
Sox_Mch03	'Q29 Social Exch. Mech.– Common Culture'	53	1	2.92	3.0	'Respondents feel mainly neutral about whether their organization shares a common culture with the other infrastructure suppliers (mean of 2.92, mode of 3)
Sox_Inf01	'Q30 Social Exch. Influ. – Generalized Reciprocity'	42	1	3.36	4.0	Quid pro quo behavior positively contributes to collaboration is rated between neutral and agree (mean of 3.36) with a tendency to agree (mode of 4) - based on 42/53 respondents who observed qpq behaviour between rarely and very frequently
Sox_Inf02	'Q31 Social Exch. Influ. – Social Sanctions'	30	1	2.80	3.0	Social sanctions positively influencig collaboration is rated between disagree and neutral (mean of 2.80) with a tendency to being neutral (mode of 3) - based on 30/53 respondents who observed social sanctions being used between rarely and very frequently
Sox_Inf03	'Q32 Social Exch. Influ. – Common Culture'	15	1	3.93	4.0	A common culture between suppliers positively contributes to collaboration is rated between neutral and agree (mean of 3.93) with a tendency to agree (mode of 4) - based on 15/53 respondents who (strongly) agree that the organization shares a common culture with the other suppliers.

Table 15: Quantitative results - single variables

Appendix L. Likert/Measurement scales

ItemID	5 class measurement scale				
Src_Suc	5.0-9.0 'Disagree strongly'	9.0-13.0 'Disagree'	13.0-17.0 'Neutral'	17.0-21.0 'Agree'	21.0-25.0 'Agree strongly'
NfC	2.0-3.6 'Disagree strongly'	3.6-5.2 'Disagree'	5.2-6.8 'Neutral'	6.8-8.4 'Agree'	8.4-10.0 'Agree strongly'
Prtn_Dep	2.0-3.6 'Not dependent'	3.6-5.2 ''	5.2-6.8 ''	6.8-8.4 ''	8.4-10.0 'Very dependent'
Clt_Rel	2.0-3.6 'Very negatively'	3.6-5.2 'Negatively'	5.2-6.8 'Neutral'	6.8-8.4 'Positively'	8.4-10.0 'Very Positively'
Frq_Int	2.0-3.6 'Annually'	3.6-5.2 'Quarterly'	5.2-6.8 'Monthly'	6.8-8.4 'Weekly'	8.4-10.0 'Daily'
Ctrb_Suc	2.0-3.6 'Very weak'	3.6-5.2 'Weak'	5.2-6.8 'Neither weak nor strong'	6.8-8.4 'Strong'	8.4-10.0 'Very strong'
Mgt_Ctl	2.0-3.6 'Very weak'	3.6-5.2 'Weak'	5.2-6.8 'Neither weak nor strong'	6.8-8.4 'Strong'	8.4-10.0 'Very strong'
Frq_Col	2.0-3.6 '(Almost) never'	3.6-5.2 'Rarely'	5.2-6.8 'Sometimes'	6.8-8.4 'Frequently'	8.4-10.0 'Very frequently'
Adpt	3.0-5.4 '(Almost) never'	5.4-7.8 'Rarely'	7.8-10.2 'Sometimes'	10.2-12.6 'Frequently'	12.6-15.0 'Very frequently'
Adpt_Col	3.0-5.4 'Disagree strongly'	5.4-7.8 'Disagree'	7.8-10.2 'Neutral'	10.2-12.6 'Agree'	12.6-15.0 'Agree strongly'
Gov_Ctr	2.0-3.6 '(Almost) never'	3.6-5.2 'Rarely'	5.2-6.8 'Sometimes'	6.8-8.4 'Frequently'	8.4-10.0 'Very frequently'
Gov_Rel	3.0-5.4 'Disagree strongly'	5.4-7.8 'Disagree'	7.8-10.2 'Neutral'	10.2-12.6 'Agree'	12.6-15.0 'Agree strongly'
Frq_Sox	6.0-10.8 '(Almost) Never'	10.8-15.6 'Rarely'	15.6-20.4 'Sometimes'	20.4-25.2 'Frequently'	25.2-30.0 'Very frequently'
Imp_Sox	6.0-10.8 'Not important'	10.8-15.6 'Desirable'	15.6-20.4 'Neutral'	20.4-25.2 'Important'	25.2-30.0 'Critical'

Table 16: Scales constructed for constructs bsaed on number of variables included

ItemID	Original Likert/Numeric scale				
Sox_Mch01	1 '(Almost) Never'	2 'Rarely'	3 'Sometimes'	4 'Frequently'	5 'Very frequently'
Sox_Mch02	1 '(Almost)_Never'	2 'Rarely'	3 'Sometimes'	4 'Frequently'	5 'Very frequently'
Sox_Mch03	1 'Disagree strongly'	2 'Disagree'	3 'Neutral'	4 'Agree'	5 'Agree strongly'
Sox_Inf01	1 'Disagree strongly'	2 'Disagree'	3 'Neutral'	4 'Agree'	5 'Agree strongly'
Sox_Inf02	1 'Disagree strongly'	2 'Disagree'	3 'Neutral'	4 'Agree'	5 'Agree strongly'
Sox_Inf03	1 'Disagree strongly'	2 'Disagree'	3 'Neutral'	4 'Agree'	5 'Agree strongly'
Col_Intr01	1 'Disagree strongly'	2 'Disagree'	3 'Neutral'	4 'Agree'	5 'Agree strongly'
Col_Intr02	1 'Disagree strongly'	2 'Disagree'	3 'Neutral'	4 'Agree'	5 'Agree strongly'
Infl_Cmp01	1 'Very negatively'	2 'Negatively'	3 'Neutral'	4 'Positively'	5 'Very Positively'

Table 17: Original scales for single variables

Appendix M. Survey reliability

ItemID	Item Label	Number of responses	Mean	Mode *Median	StdDev	Cronbach Alpha	Inter-Item Correlation
Rel_Val	Reliability of questionnaire	50	28.54	28*	3.309	0.889	>0.2
Rel_Val01	Clear Scope	50	4.14	4	0.452	0.889	>0.2
Rel_Val02	Clear Topics	50	4.16	4	0.468	0.889	>0.2
Rel_Val03	Logical Flow	50	3.94	4	0.620	0.889	>0.2
Rel_Val04	Clear and Unambigious	50	3.86	4	0.756	0.889	>0.2
Rel_Val05	Unbiased	50	4.06	4	0.652	0.889	>0.2
Rel_Val06	Sensitivity	50	4.18	4	0.661	0.889	>0.2
Rel_Val07	Effort	50	4.20	4	0.606	0.889	>0.2

Table 18: Survey reliability

ItemID	Measurement Scale
Rel_Val	7-12.6 ‘very weak’, 12.6-18.2 ‘weak’, 18.2-23.8 ‘weak nor strong’, 23.8-29.4 ‘strong’, 29.4-35 ‘very strong’
Rel_Val01-07	1 'Disagree strongly' 2 'Disagree' 3 'Neutral' 4 'Agree' 5 'Agree strongly' .

Table 19: Survey reliability scales

Appendix N. Interview transcripts


Transcription Summary R4 - v1.1 - I


Transcription Summary R3 - v1.1 - I


Transcription Summary R2 - v1.1 - I


Transcription Summary R1 - v1.1 - I

Appendix O. Qualitative analysis and results

Qualitative Analysis v0.5.pdf

Appendix P. Five key dimensions of collaboration

Dimension	Explanation
Governance	Creating structures that allow participants to make choices about how to solve the collective action problems. Participants must understand how to jointly make decisions about rules that will govern their behaviour and relationships, negotiate an equilibrium, while having shared responsibility.
Administration	Doing what it takes to achieving the goal which requires an administrative structure to move from governance to implementation (like joint decision making). Participation by (semi) autonomous parties is voluntary and requires social coordination. Traditional coordination mechanisms such as hierarchy, standardization, and routinization are less feasible in situations where actors are autonomous or semiautonomous. One of the principal administrative dilemmas affecting the ability to get things done in a collaboration is managing the inherent tension between self and collective interests.
Organizational autonomy	Collaborating partners share a dual identity: they maintain their own distinct identities and organizational authority separate from a collaborative identity. Own and collective identity create tension between self-interest and collective interest. As no formal authority hierarchies exist between collaborating partners, this consequently requires fully empowered individuals who represent their parent organization to make judgments about collaborative commitments. Participating organizations can find the potential dynamism implicit in this tension between individual and collective interests by maximizing latent synergies among individual differences. These latent synergies are captured by the fourth dimension, mutuality.
Mutuality	Organizations that collaborate must experience mutually beneficial interdependencies based either on differing interests (complementarities) or on shared interests. Doing what needs to be done - even at own expense- to continue the collaboration requires norms of reciprocity and trust.
Norms	Collective action depends upon the three key core relationships: trust, reciprocity, and reputation. Through repeated interactions partners can build reputation for trustworthy behavior, only then reciprocity may evolve into longer term commitments.

Table 20: Five key dimensions of collaboration per Thomson et al (2007)