Understanding task inter-dependence and co-ordination efforts in multi-sourcing: the suppliers’ perspective

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Metadata Record: [https://dspace.lboro.ac.uk/2134/23358](https://dspace.lboro.ac.uk/2134/23358)

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Understanding
Task Inter-dependence and
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Multi-sourcing: The Suppliers’
Perspective

by

Xiaowei Jin

A Doctoral Thesis
Submitted in Partial Fulfilment of the Requirements
for the Award of
Doctor of Philosophy of Loughborough University

14 October 2016

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ACKNOWLEDGEMENTS

I would like to express my appreciation to the many people who contributed to this thesis.

Profound gratitude goes to my supervisors: Professor Ilan Oshri and Professor Julia Kotlarsky. I would like to thank them for their tremendous academic and financial support. When I started my PhD journey at Warwick Business School, one of the main struggles was financial. Julia actively sought teaching opportunities and subsidies for me; not many PhD students have such luck. Similarly, I would also like to send my appreciation to Ilan, who granted me the PhD scholarship at Loughborough University. Furthermore, both of them supported and sponsored me to attend academic trainings (at LSE and Linköping University) and conferences (at Valencia, Linköping, Orlando and Beijing). Additionally, I was really lucky that they provided me with the opportunity to visit Pactera (Beijing) and TCS (London) and to conduct my empirical research there; assessing companies is a real challenge for most PhD students. Regarding the thesis writing process, I am particularly indebted to Ilan and Julia for their encouragement and for pointing out my research weaknesses. Their criticisms and suggestions were rigorous but constructive.

Special mention goes to the members of the Centre for Global Sourcing & Services at Loughborough University as well as the Information Systems & Management Group at Warwick Business School; their suggestions on my research were invaluable. I am also appreciative of the PhD support staff at the above two universities, and I thank them for answering my enquiries and for dealing with administrative issues.

Thanks also go to my fellow PhD students. It was great that I could discuss, work and chat with them. We travelled together on our doctoral journeys and they encouraged me to strive towards my goal. I have wonderful memories of our time together.

Finally, but by no means least, I would like to thank my parents and my beloved girlfriend for their patience and understanding. They are the most important people in my world and I dedicate this thesis to them.
ABSTRACT

The last decade has witnessed a significant growth in the outsourcing of information technologies and business processes. Of a particular trend within the outsourcing industry is the shift from the client firm contracting a single supplier to utilizing multiple suppliers, which is also known as multi-sourcing. Multi-sourcing may potentially offer numerous advantages to client firms, however, it might present some challenges to suppliers. In particular, multi-sourcing could create coordination challenges, as there are inter-dependencies between the outsourced tasks to numerous suppliers. While the current outsourcing literature acknowledges the existence of inter-dependencies, little is known about the efforts required for coordinating the work between suppliers and how these coordination efforts are made to manage task inter-dependence. Three case studies at Pactera (case one) and TCS (cases two and three) serve as the empirical base to investigate the inter-dependence between outsourced tasks and suppliers’ coordination efforts. This research offers theoretical contributions to both coordination studies and the outsourcing body of knowledge.

KEYWORDS: Multi-sourcing, Outsourcing, Task Inter-dependence, Inter-supplier Coordination, Coordination Efforts, Supplier Perspective
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CHAPTER 1 – INTRODUCTION

1.1 Background: Multi-sourcing Trend and its Challenges

Outsourcing implies contracting with a third party not directly controlled by the client organization to accomplish some work for a specified length of time, cost and level of service (Carmel & Tjia, 2005; Lewin & Peeters, 2006). The outsourcing of IT and business services has received considerable attention since the early 1990s, and now represents a global market of over $450 billion in annual revenues (Oshri, Kotlarsky, & Willcocks, 2015). It is noticeable that the outsourcing arena is undergoing a big transformation recently: the big outsourcing deal with a single supplier is being replaced by several selective contracts with a set of best-of-breed suppliers (Bapna, Barua, Mani, & Mehra, 2010). Multi-sourcing, which blends inter-dependent IT and business services from a set of internal and external suppliers to achieve optimal business goals (Oshri et al., 2015) is becoming a preferred sourcing model. A recent Tata Consultancy Services (TCS) report also indicates that ‘more than 90% of all outsourcing landscapes are multi-supplier’ (Sharma, 2011).

Although multi-sourcing is a rapidly growing trend in outsourcing practice, it does not come easily for client firms to adopt this sourcing model. However, expectation and reality are not always the same. Actually, 55% of companies using multi-sourcing are not able to achieve expected business objectives1. This is because various managerial challenges, such as governance complexity, task inter-dependence and workflow integration, are amplified in multi-sourcing settings. Royal Dutch Shell’s multi-sourcing contract with AT&T, T-Systems and EDS in 2008 illustrates the challenges in multi-sourcing. In this contract, there are inter-dependencies between telecommunication networks (delivered by AT&T), application storage systems (provided by T-Systems) and infrastructure (supplied by EDS) that required suppliers to maintain high level of interactions and mitigate risks deriving from interdependencies between the outsourced services. Saran (2008) comments on the complexity in Shell’s multi-sourcing contract:

‘How does EDS exercise control over AT&T and T-Systems, especially given that certain desktop support functions, such as a roll-out of Windows Vista, is predicated on AT&T’s network service? Similarly, how does EDS exercise control over decision support desktop software, which needs to take a data feed from the SAP system, managed by T-Systems. The other dilemma for Shell is how it can trust EDS to deliver the outsourced service if EDS faces a default by one of the other parties?’

As is shown in the above case, Shell’s multi-sourcing deal creates inter-dependence between multiple suppliers. Bapna et al. (2010) refers to this unique characteristic of multi-sourcing as task inter-dependence. The inter-dependence among multi-sourced tasks/functions/services means clients must coordinate (and properly incentivize) the actions of multiple suppliers, many of whose tasks are performed across firm interfaces. In addition, it may be difficult to write formal contracts based on project outcomes, which are often unverifiable. Both client and supplier firms must therefore resort to incentive mechanisms based on objectively measurable metrics such as the predefined agreements among multiple suppliers, including operating level agreements (OLAs) and service level agreements (SLAs). Even though multi-sourcing brings many challenges for client firms, it is still a promising avenue and having multiple suppliers and can bring its benefits. However, achieving these benefits in multi-sourcing requires all stakeholders to spend coordination and control efforts, in an attempt to deliver the multi-sourcing project successfully and efficiently.

1.2 Motivation: Research Gaps in Literature

Multi-sourcing is a predominant outsourcing trend in practice; however, there are insufficient theoretical insights for understanding this sourcing strategy. Several scholars have investigated issues in multi-sourcing from the client’s side. Among these studies, the strategic rationale behind multi-sourcing has been well studied. For instance, multi-sourcing has been perceived to leverage the skills and value propositions of each supplier, and improve efficiency and flexibility (Cohen & Young, 2006; Report, 2008). Levina and Su (2008) also identify the competitive regime among suppliers on price and quality during the contract, and the potential to benefit from innovation when pursuing a multi-sourcing strategy, e.g., mitigating both operational risk (i.e., each provider becomes less dominant)
and strategy risk (i.e., lower switching cost). From an operational perspective, Su and Levina (2011) develop four archetypes of relationship-specific investment and their impacts on multi-sourcing outcomes. In particular, their work suggests that multi-sourcing arrangements can be characterized by the different breadth and depth of supply relationships that constitute a supply base of a client firm, where the breadth of the supply base reflects the number of suppliers the focal firm uses for a given business function, and the depth of a supply relationship is characterized by the client’s level of investment in a particular supply relationship for a given function. However, Bapna et al. (2010) point out that less accountability and the task inter-dependence make the multi-sourcing arrangement a difficult endeavour, in terms of its coordination, cooperation and governance efforts (Bapna et al., 2010; Gallivan & Oh, 1999; Klotz & Chatterjee, 1995).

The above studies on multi-sourcing provide insights on the unique features of multi-sourcing and the associated management issues. Multi-sourcing brings challenges in coordinating (and properly incentivizing) the actions of multiple suppliers, and the difficulty in assessing supplier performance (Bhattacharya, Gupta, & Hasija, 2012). Therefore, multi-sourcing can result in substantial costs for client firms, such as coordination costs (Gallivan & Oh, 1999; Klotz & Chatterjee, 1995), contracting costs (Levina & Su, 2008), and monitoring costs (Bapna et al., 2010). The focus of such studies is dominantly from the client’s perspective.

However, the suppliers’ perspective is often ignored in existing studies on multi-sourcing. Outsourcing performance depends not only on the client’s efforts but also on the suppliers’ (Mao, Lee, & Deng, 2008). As client and supplier firms have diverse perceptions (Sabherwal, 2003), it is essential to provide a nuanced understanding of multi-sourcing from the suppliers’ perspective. More specifically, this research has identified four research gaps as below.

1.2.1 Suppliers’ Perspective of Multi-Sourcing

Existing studies on multi-sourcing provide insights on the unique features of multi-sourcing and the associated management issues. Indeed, some of the insightful case work on
multi-sourcing engagements has studied this aspect in some detail (Levina & Su, 2008; Wiener & Saunders, 2014). However, the focus of these studies is predominantly from the client’s perspective, and the suppliers’ perspective is often ignored. From the suppliers’ perspective, the key concern is how to provide solutions in a timely and efficient manner such that their payoff is protected (Gopal, Espinosa, Gosain, & Darcy, 2011).

1.2.2 Task Inter-Dependence in Multi-Sourcing Settings

Different types of task inter-dependence imply varying inter-firm interactions and relationships, resulting in different implications for coordination modes between suppliers. However, prior research on task inter-dependence is less adequate for understanding inter-dependencies in modern environments. Indeed, companies are exposed to the context of globally distributed, high complex, knowledge-intensive work, instead of the collocated, simple, physical production work pattern (Kumar, van Fenema, & von Glinow, 2009; Wong, DeSanctis, & Staudenmayer, 2007). In light of this, it is necessary to re-examine the classical typology of inter-dependence and its implications for coordination; namely, to extend the understanding of the interactions and communication requirements between different suppliers.

1.2.3 A Process View of Inter-supplier Coordination

Multi-sourcing studies indicate that managerial challenges of multi-sourcing (such as task inter-dependence and organizational boundaries) can trigger substantial coordination costs (Gallivan & Oh, 1999; Klotz & Chatterjee, 1995). Although plenty of coordination mechanisms have been studied in prior literature, how these mechanisms are designed and executed in multi-sourcing contexts are yet to be studied, resulting in another research gap in the processes of coordination between suppliers.

1.3 Research Questions and Objects

In order to address the above research gaps, this research intends to develop a comprehensive understanding of the efforts that suppliers invest to coordinate with each
other in a multi-sourcing engagement. In particular, this study seeks to answer the following research questions:

1) **What** are the challenges when suppliers manage task inter-dependencies in a multi-sourcing engagement?

2) **How do** suppliers coordinate inter-dependent tasks with each other?

3) **What** coordination efforts occur, and how, when suppliers coordinate with each other?

In order to address above research questions, the following objects are set:

1) **Developing a Research Framework**

In order to understand suppliers’ coordination processes and their implications for coordination efforts in multi-sourcing and investigate how the suppliers’ coordination efforts may influence project performance, an initial theoretical framework will be developed. Drawing from a review of relevant literature, a tentative framework will be developed and presented before fieldwork. This framework serves as a theoretical lens for the following empirical studies.

2) **Exploring Coordination Efforts**

Qualitative data will be collected from multiple suppliers across different multi-sourcing projects in China and the United Kingdom. Based on the analysis of empirical work, the theoretical framework will be modified, and a revised theoretical framework will be proposed, coupled with several propositions. In addition, managerial implications that describe how supplier firms work with other suppliers in a multi-supplier setting will be suggested.

**1.4 Research Focus**

The description of the research focus is based on the following four dimensions:
Firstly, in terms of the **research context**, this study focuses on a multi-sourcing arrangement. Multi-sourcing implies the situations where inter-dependent services are performed by multiple suppliers, which entails different suppliers ‘*to work together to deliver end-to-end services to a client*’ (Bapna et al., 2010 p. 785). The supplier teams must collaborate with others when delivering services. Therefore, apart from client-supplier interactions, multi-sourcing usually involves the interactions or information exchange among multiple suppliers. It is worth noticing that **selective sourcing** is not the focus in this research. Although selective sourcing also implies multiple suppliers, the suppliers actually work on independent tasks, which is similar to single-sourcing.

Secondly, in terms of the **industry focus**, this research concentrates on IT outsourcing (ITO) and business process outsourcing (BPO) rather than manufacturing and retail outsourcing. ITO consists of a wide array of services from Infrastructure Management Services (IMS), Application Development (AD), Application Maintenance (AM) to IT consulting, R&D (Beulen et al., 2005). BPO includes a number of services, such as back-end data processing, HR, Finance and call centre operations, as well as design and product development.

Finally, the **primary perspective** of this research is the suppliers’ viewpoint of multi-sourcing. In particular, this study takes into account what efforts suppliers should invest when they coordinate inter-dependent tasks with others, namely, coordination efforts. In order to investigate suppliers’ coordination efforts, this paper analyses task inter-dependence in multi-sourcing arrangements and its influence on inter-supplier coordination.

### 1.5 Thesis Structure

Chapter 2 is a review of relevant literature, which draws upon four related research streams. Then, a research framework is developed in Chapter 2. The research framework suggests potential factors contributing to suppliers’ efforts in multi-sourcing, and it serves as a theoretical lens for subsequent empirical investigation. Chapter 3 discusses the qualitative case study method adopted in this research, as well as the case selection criteria. In addition,
Chapter 3 also describes the process of data collection and analysis, as well as the specific data collection and analysis techniques. After Chapter 3, three cases are presented and analysed in Chapters 4, 5, and 6. Chapter 7 is a cross-case analysis which provides a comparison across three cases. A discussion on the similarities and differences among the three cases is also provided in Chapter 7. Drawing upon the above analysis, Chapter 8 interprets the evidence by developing an integrated framework. Chapter 9 concludes the thesis by identifying theoretical and practical contributions, indicating limitations as well as suggesting future research directions. The structure of this thesis is presented in Figure 1.
CHAPTER 2 – LITERATURE REVIEW

2.1 Introduction

This chapter aims to review relevant literature which draws upon four research streams: 1) Multi-sourcing, which covers its key definitions, primary characteristics, benefits and the managerial challenges involved in such arrangement; 2) Task inter-dependence, which covers the classical typology, the revised typology and different variations of inter-dependence; 3) Coordination, which examines how inter-dependence may be managed through coordination mechanisms; 4) Extra costs in outsourcing, which discusses the relevant concepts, determinant factors and cost classifications. In the final section, this chapter develops and presents a research framework for the empirical investigation.

To identify relevant literature, I have performed a keyword-based full-text search in a wide range of data bases, including IEEE Explorer, ACM Digital Library, Google Scholar, Science Direct, Wiley Inter Science Journal Finder and Springer Links. I checked these search engines frequently so as to avoid any important publication missing. In terms of the keywords, I have chosen synonyms and alternative words so that this research can cover large number of articles. Apart from that, I have also requested some relevant literature from my supervisors.

Although nearly one hundred articles were found in total, only few of which were relevant to our research. Based on a literature selection criteria (i.e. 3* and 4* journals in the ABS2), I selected several leading academic papers talking about task inter-dependence, multi-sourcing, coordination and outsourcing costs. To broaden the scope, I also included practitioner’s articles discussing the multi-sourcing challenges and management. Finally, more than 10 papers and articles were selected as the core references. Through searching the references of these papers, I selected additional papers based on the same criteria.

2 https://charteredabs.org/academic-journal-guide-2015/
2.2 Studies on Multi-sourcing

In outsourcing literature, multi-sourcing has been perceived to mitigate the risk of failure in outsourcing (Report, 2008) and, therefore, allows client firms to benefit from best-of-breed suppliers (Cohen & Young, 2006). Levina and Su (2008) also identify the competitive regime among suppliers on price and quality during the contract, and the potential to benefit from innovation when pursuing a multi-sourcing strategy, e.g., mitigating operational risk (each provider becomes less dominant). However, multi-sourcing requires setting high prerequisites for managerial capabilities in facing additional challenges (Bapna et al., 2010), such as inter-firm inter-dependence among multiple suppliers, the formal incentive structure and the alignment of metrics (in the contracts that govern these multi-sourcing relationships) with the client’s overall objectives (Bhattacharya et al., 2012). In contrast to the dyadic client-supplier relationships in single-sourcing, the interfaces in multi-sourcing are more complex. The sections below review and summarize prior studies on multi-sourcing.

2.2.1 Concept Evolution and Definition

The term *multi-sourcing* has been used in strategic management (Porter, 1985), operations management (Treleven & Schweikhart, 1988) and lately in an information systems (IS) research domain (Willcocks & Lacity, 1998). The first author who implicitly defines multi-sourcing idea is Porter, who emphasizes choosing the most efficient but least costly suppliers, and keeping a sufficient number of suppliers to foster competition (Porter, 1985). Cross (1995) also recommends buying IT services from multiple suppliers: Even though firms might have to rely on one particular supplier, the outsourcing task should be delivered by different functions. In operations management literature, multi-sourcing has been described explicitly; for instance, Treleven and Schweikhart (1988) describe multiple sourcing as a client that bought a similar part from no less than two suppliers. In IS literature, multi-sourcing has been prevalently understood as a client firm that signed contracts with two or more IT suppliers without a leader supplier to achieve its objectives (Carmel & Agarwal, 2002; Cullen, Seddon, & Willcocks, 2005; Currie, 1998; Lacity &

The recent perspective of multi-sourcing has combined both IT and business services. Cohen and Young (2006) give a new definition of multi-sourcing, claiming it blended IT and business services from a number of internal and external providers to achieve business objectives, and their research gained great attention recently (see Bapna et al., 2010; Herz, Hamel, Uebernickel, & Brenner, 2011; Su & Levina, 2011). Oshri et al. (2015) define multi-sourcing as ‘integrating inter-dependent IT and business services from those selective internal and external suppliers to seek optimal business goals’ (p. 130). Table 1 shows an overview the definitions of multi-sourcing.

<table>
<thead>
<tr>
<th>Source</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Oshri, Kotlarsky and Willcocks (2015)</td>
<td>‘Combining inter-dependent IT and business services from a set of internal and external providers to achieve optimal outcome.’ (p. 130)</td>
</tr>
<tr>
<td>Bapna, Barua, Mani and Mehra (2010)</td>
<td>‘The delegation of IT and IT-enabled services to multiple vendors, who must work collaboratively to deliver services to a client organization.’ (p.786)</td>
</tr>
<tr>
<td>Janischowsky and Schonenbach (2009)</td>
<td>‘Optimizing business, information technology and infrastructure services across external suppliers and internal departments/companies.’ (p.78)</td>
</tr>
<tr>
<td>Levina and Su (2008)</td>
<td>‘Select and combine information technology (IT) and business services from multiple providers.’ (p. 541)</td>
</tr>
<tr>
<td>Cohen and Young (2006)</td>
<td>‘The disciplined provisioning and blending of business and IT services from the optimal set of internal and external suppliers in the pursuit of business goals.’ (p. 1)</td>
</tr>
<tr>
<td>Cullen, Seddon and Willcocks (2005)</td>
<td>‘Several suppliers are contracted under one contract without a lead supplier.’ (p.368)</td>
</tr>
<tr>
<td>Carmel and Agarwal (2002)</td>
<td>‘Longer-term, deeper relationships with a small number of suppliers.’ (p.69)</td>
</tr>
<tr>
<td>Currie (1998)</td>
<td>‘A company signs outsourcing contracts with more than one IT supplier.’ (p.171)</td>
</tr>
<tr>
<td>Currie and Willcocks (1998)</td>
<td>‘A strategy that intends to create an alliance of suppliers who compete with each other.’ (p.126)</td>
</tr>
<tr>
<td>Cross, 1995</td>
<td>‘Buy IT services from multiple suppliers and have the pieces delivered as if they came from a single supplier.’</td>
</tr>
<tr>
<td>Treleven and Schweikhart, 1988</td>
<td>‘Multiple sourcing refers to a vendee purchasing an identical part from two or more suppliers.’ (p.96)</td>
</tr>
</tbody>
</table>

Compared to the previous articles of multiple suppliers focusing on goods and stressing the economies of scale (Herz, Hamel, Uebernickel, & Brenner, 2010), the current understanding of multi-sourcing emphasizes business and IT services instead of solely goods, which is
mainly concerned with relationship and knowledge (Levina & Su, 2008). In this research, the exhaustive definition proposed by Oshri et al. (2011) is adopted because it is very well in line with other definitions.

2.2.2 Benefits of Multi-sourcing

There are numerous benefits for client firms when they pursue a multi-sourcing approach. Multi-sourcing gives the advantages of a choice from ‘best-of-breed’ suppliers, lower costs resulting from supplier competition, and improved agility and adaptability to dynamic environments (Cohen & Young, 2006). Drawing on previous outsourcing literature, the benefits of outsourcing are classified into five categories: cost, flexibility, supplier innovation, service quality and delivery speed (Dibbern, Goles, Hirschheim, & Jayatilaka, 2004; Lacity & Willcocks, 1998). In the case of numerous suppliers, there are additional benefits such as decrease dependency on a single supplier. According to Levina and Su (2008), a multi-sourcing strategy can increase competition among suppliers and reduce both operational and strategic risks. The research by Rottman and Lacity (2012) argues in a similar vein about the benefits associated with supplier competition and the decrease in risk. However, they underline the significance of involving a relatively small number of suppliers, rather than contracting with many. On the other hand, Lacity and Willcocks (1998) suggest that the employment of multiple providers offers even greater flexibility and control. Supplier specialization and access to best-of-breed technical expertise are indicated as two enabling forces for the adoption of a multi-supplier approach (Gallivan & Oh, 1999). Moreover, other studies also conclude that, ‘An expanded supplier portfolio increases the ability to find the best-fit capabilities including quality, responsiveness, innovation and production cost advantage’ (Levina and Su, 2008 p. 545).

Usually, a single supplier may not have the expertise and skills to handle all the operations. Therefore, client organizations are limited to the technological capability of their suppliers, and therefore, could diminish over the life of a contract (Willcocks & Lacity 1999). However, multi-sourcing addresses this issue by recognizing that each supplier are specialists in a particular field. Therefore, one benefit multi-sourcing brings is that clients can potentially
utilize suppliers with best-of-breed capabilities, including technical skill, process competency, and client management ability (Su & Levina, 2011). These capabilities are developed over time through the suppliers’ exposure to multiple clients (Levina & Ross 2003; Ethiraj, Kale, Krishnan, & Singh 2005). Client organizations can therefore draw on the capabilities of these specialist vendors by adding them to their outsourcing portfolios (McLellan, Marcolin, & Beamish 1995).

### 2.2.3 Challenges of Multi-sourcing

Although the advantages of multi-sourcing are valuable to client firms, there are certain challenges to be considered, as a result of the task/service inter-dependencies associated with multi-sourcing (Bapna et al., 2010). In particular, the client firm needs to manage multiple suppliers, in order to ensure that services provided by individual suppliers are integrated and fit the client’s business needs. This results in increased management overheads as managers need to contract with several suppliers, coordinate various tasks and collaborate with multiple parties (Levina & Su, 2008).

Compared to a single-sourcing model, the contracts in a multi-sourcing setting may be too small to attract and maintain the interest of suppliers, resulting in the decrease of client-supplier dependency and commitment. Therefore, it may reduce the ‘incentive for suppliers to make customer-specific investments’ (Levina & Su 2008, p. 546), with regard to relationship-building, knowledge, technology and physical assets and dedication of resource and process optimization. Also, the client’s investments on supplier-specific relationships may affect the quality or cost of service (Deming, 1986) whereby this underinvestment can have an overall negative impact on the relationship or partnership (Burke, Carrillo, & Vakharia, 2007). Given that outsourcing success is positively associated with the quality of the client-supplier relationship (Barboza, Myers, & Gardner, 2011), the potential absence of partnership quality is a critical issue that client firm should consider in a multi-sourcing environment (Barboza et al., 2011).

From an operational perspective, the management of outsourcing includes the governance of suppliers and the monitoring of their performance (Davis, Ein-Dor, King, & Torkzadeh,
2006). In multi-sourcing environments, it is likely that a client firm will confront ‘finger pointing’ problems, as it may be difficult for a client firm to identify which supplier is shirking its responsibility (Bapna et al., 2010). The limited observability and verifiability\(^3\) of task output in a multi-sourcing setting means that supplier firms ‘sometimes blamed each other for loss of operational performance’ (Currie, 1998 p. 179). Therefore, the governance of multi-sourcing relationships becomes a challenging issue for client firms (Bapna et al., 2010).

According to Willcocks, Cullen, and Craig (2010), the involvement of independent suppliers with inter-dependent activities increases the task complexity. This is mainly because multi-sourcing requires the management of multiple outsourcing lifecycles, complex relationships and processes, and multi-party interfaces. Therefore, coordination costs and contractual complexity are highlighted as two constraining forces of multi-sourcing (Gallivan & Oh, 1999); these issues will be discussed in subsequent sections.

\subsection*{2.2.4 Temporal Phases in the Multi-sourcing Engagement}

Previous literature suggests that there are several phases as a project proceeds (Hoegl & Weinkauf, 2005). In particular, scholars distinguish three to seven phases in outsourcing projects (Cullen et al., 2005; Dibbern et al., 2008; Oshri et al., 2015). Although there is not a consensus conclusion, a project normally involves \textit{Initiation}, \textit{Planning}, \textit{Execution} and \textit{Closure} phases. These four phases are supported by the data of this research; however, the concepts of these phases need to be adjusted when analysing the multi-sourcing project from the suppliers’ perspective. More specifically, in addition to contractual negotiations with the client, suppliers need to estimate and invest both financial and human resources for the multi-sourcing project during the \textit{Project Initiation} phase. Then, in the \textit{Project Planning} phase, scheduling and planning for specific tasks becomes the suppliers’ primary target, including scope management and risk management (Westland, 2007). Moving to the \textit{Project Execution} phase, the suppliers’ primary purpose is performing and completing the services or products assigned by the client. In addition to completing deliverables (i.e., internal

\footnote{Task output observability and verifiability are referred to as ‘the ability or feasibility to objectively measure supplier output or performance (Bapna et al., 2010 p. 789)
development), suppliers spend time and effort in coordinating inter-dependent tasks (i.e., coordination practices). For instance, task-related information (such as specifications, feedback and requirements) needs to be acquired from other supplier firms. In terms of the final phase, Project Closing phase, the suppliers’ efforts focus on handing over the services to the client, finalizing all project practices and releasing employees to work on other assignments. As the coordination and communication practices between suppliers mainly occur within the Planning and Execution phases, this research seeks to analyse suppliers’ efforts during these two phases.

The Planning and Execution phases are distinguished by the different nature of task characteristic (Adams & Barnd, 2008). Specifically, the Planning phase is characterized by negotiating and establishing each supplier’s actions and plans to attain a coordination objective, while the Execution phase is characterized by coordinating information, process and resources among multiple suppliers to perform each supplier’s own tasks.

2.3 Concept of Inter-dependence

Task inter-dependence is the core of multi-sourcing arrangements; therefore, the primary purpose of this section is to review the literature on inter-dependence. There are different perspectives of inter-dependence in the current literature, and these will be discussed in this section.

2.3.1 Classical Classification

In the articles that discuss task inter-dependence, the work of Thompson (1967) is widely accepted and built on. He describes internal inter-dependence as ‘the extent to which a task requires organizational units to engage in workflow exchanges of products, information and/or resources and where actions in one unit affect the actions and work outcomes in another unit’ (p. 53). According to Thompson (1967), the nature of the workflow (form or logical structure) determines the degree of the inter-dependence. Within this view, three types of inter-dependence are distinguished by Thompson (1967): pooled, sequential and reciprocal
inter-dependences.

1) **Pooled inter-dependence** is the lowest form of task inter-dependence. It exists when no work flows between units. The units contribute to the company, and the company supports the units. In the example of regional offices of a bank, these offices are working autonomously, and there is no workflow between the offices.

2) **Sequential inter-dependence** is a higher form of task inter-dependence. The work between units flows in one direction only. The output of one unit becomes the input of the next unit. This type of inter-dependence is very common in an assembly line. Sequential inter-dependence implies a one-way flow of materials. Therefore, extensive planning and scheduling work are needed.

3) **Reciprocal inter-dependence** is the highest form of task inter-dependence in the typology of Thompson (1967). The output of a unit is the input of another unit. And the output of the second unit is the input of the first unit. Examples can be seen in the case of new product development, where separate units perform tasks that are input to other units, but where the output of the other unit can be input to the first.

Drawing on Thompson’s work, subsequent scholars gradually replace Thompson’s term ‘*internal inter-dependence*’ with a more general label: task inter-dependence. Although the terminology is changed, subsequent studies make few modifications to Thompson’s basic conceptual idea. For instance, **workflow inter-dependence** is defined as ‘*the extent to which individuals are dependent on other personnel in the performance of their individual jobs*’ (Van de Ven et al., 1976 p. 324). In particular, Van de Ven, Delbecq, and Koenig Jr (1976) extend Thompson’s three types of inter-dependence by adding a fourth, which is called **inter-dependence in a team arrangement** or **team inter-dependence**.

4) **Team inter-dependence** refers to situations where ‘*the work is undertaken jointly by unit personnel who diagnose, problem-solve and collaborate in order to complete the work. In team workflow, there is no measurable temporal lapse in the flow of work between unit members*’ (Van de Ven et al., 1976 p. 325). This distinguishes it from sequential and reciprocal inter-dependence. The work is carried out by personnel simultaneously. Examples of team work
inter-dependence in organizational units include a group of people designing a research. Figure 2 depicts four types of task inter-dependence.

![Figure 2: Classification of Task Inter-dependence](image)

According to Thompson (1967), the features of work are inherent to the technology; however, Shea and Guzzo (1987) point out that tasks can be designed to be performed at varying levels of inter-dependence, not limited by technology. Acknowledging these two viewpoints, Shea and Guzzo (1987) suggest an integrated definition of inter-dependence: Task inter-dependence is ‘a structural feature of work, but tasks can be designed to be performed at varying levels of inter-dependence’ (p. 146-147). The features (or technologies) of defining a task create a level of inter-dependence that, in turn, may influence members’ interaction when they execute the task (Hackman, 1969). Thompson (1967) assumes that all members of groups are equally inter-dependent. However, Wageman (1995) and Wageman and Baker (1997) point out that the degree of inter-dependence among members in groups may differ. Therefore, Wageman (1995) examines the separate and joint effects of different levels of task inter-dependence (low, hybrid and high) on group effectiveness.

In addition to task inter-dependence, a range of similar concepts are proposed in subsequent literature, for instance, informational inter-dependence (Vaughan, 1990), subsystem
inter-dependence (Allen, 1984), product component inter-dependence (Pimmler & Eppinger, 1994), and transactional inter-dependence (McCann & Ferry, 1979). Although adopting different terminologies, these studies closely follow Thompson (1967)'s idea of inter-dependence, namely, viewing inter-dependence as a contingent relationship among internal activities within a group or team.

The object of inter-dependence can also go beyond tasks. Malone and Crowston (1994) and Crowston (1997) extend the concept of internal inter-dependence and suggest two ontology of inter-dependence: task (goals and activities to be accomplished) and resource used or created by tasks (including the efforts of the actors). According to Malone and Crowston (1994), whenever multiple activities share some limited resource (e.g., money or storage space), a resource allocation process is needed to manage the subsequent inter-dependencies. In particular, they propose three types of inter-dependence: task-task dependence, task-resource dependence, and resource-resource dependence. The task-task inter-dependence occurs when 1) tasks share common output, 2) tasks share common input and/or 3) output of one task is input to others. Resource-related dependence is an attribute of a relationship within a specific context, instead of a task. Task-task dependence has received detailed discussion while the others have not (Crowston, 1997).

2.3.2 Revised Classification

The traditional typology of inter-dependence was developed in the 1960s and 1970s. However, it is inadequate for understanding and managing inter-dependencies in modern environments. Companies are now exposed to the context of globally distributed, high complex, knowledge-intensive work, instead of the collocated, simple, physical production work pattern (Kumar et al., 2009; Wong et al., 2007). In light of this, Kumar et al. (2009) re-examine classical typology of inter-dependence and extend the understanding of the interactions and communication requirements between locations. In particular, integration inter-dependence is proposed as an additional type to the four classical types of inter-dependence. Instead of proposing an explicit definition, Kumar et al. (2009) describe integration inter-dependence by saying: ‘Independent parallel activities are actually highly
interdependent, as actors in each sub-activity need to be mindful that the outcome of their activity will need to be integrated with the outcomes of other activities, involving a fitting activity’ (p. 651).

Kumar et al. (2009) also use the term ‘work hand-offs’ to express the idea of ‘technically separate interface’, and indicate that both sequential and reciprocal inter-dependences include explicit hand-offs between activities. Based on Von Hippel (1994)’s definition of stickiness, Kumar et al. (2009) propose ‘non-sticky’ versus ‘sticky’ inter-dependence. These two concepts are introduced to distinguish physical collocated work from knowledge-intensive global distributed work. However, one limitation of this research is the lack of ordinal scale; further empirical work needs to be done to define precisely integration inter-dependence and its scale.

2.3.3 External Inter-dependence

In addition to internal inter-dependence, Thompson (1976) also mentions organizational environment inter-dependence without an in-depth description. Gresov (1990) points out that the bulk of research on inter-dependence focuses on an internal task-design perspective, resulting in an ignorance of other important context factors. One that is prominent among these is external dependence. Gresov (1990) defines external dependence or work-unit dependence as ‘when task performance is related to (and thus dependent on) the actions and outcomes occurring outside the unit’ (p. 508), and operationalized as the degree to which resources or information from outside sources are deemed necessary inputs to a work process (Gresov, 1989). According to Gresov (1989; 1990), work unit inter-dependence generally arises in connection with a unit’s position in the organizational workflow, whereas task inter-dependence arises from the content of the workflow in a particular focal unit (Gresov, 1989). Quite a number of empirical studies substantiate this claim (Adler, 1995; Ito & Peterson, 1986; Tushman, 1979; Van de Ven & Ferry, 1980).

Another group of scholars analyse inter-team task inter-dependence. For instance, Kazanjian, Drazin, and Glynn (2000) and Hoegl, Weinkauf, and Gemuenden (2004) study inter-dependence in multi-team R&D projects. Regarding their analysis level, the inductive research of Kazanjian et al. (2000) propose task inter-dependence on three different levels of
a multi-team project: within team inter-dependence, across team inter-dependence, and system level inter-dependence. The article induces theory from large development projects with ambiguous outcomes, like that of aircrafts, cars or computers. They propose that multiple levels of inter-dependence affect creativity. This is because coordination requirements are increased in complex projects and there is less time for creative solutions. They also find that, even with the best attempts at developing an organizational architecture to handle such complexity, the outcomes are never perfect. This is because crises always arise during the design process, and these crises can be significant events at a point where creativity occurs and new technical knowledge is generated. Whilst there is no empirical testing of their propositions, multi-level inter-dependence looks promising for future research. Hoegl et al. (2004) also cover multi-team projects for the development of highly complex products. Given that previous research focuses on the team’s internal processes, Hoegl et al. (2004) study the collaborative processes between teams in large-scale projects, and point out that task inter-dependence is closely related to inter-team coordination. Specifically, they focus on task inter-dependence and changes occurring during the development process, and the increase in requirements of inter-team coordination (Hoegl et al., 2004). Similarly, other articles discuss task inter-dependence in cross-functional settings. For instance, the inter-dependence between R&D and Marketing (Gupta, Raj, & Wilemon, 1986) and the inter-dependence between R&D and Manufacturing (Adler, 1995).

2.3.4 Outcome Inter-dependence

Since Thompson (1976) studied inter-dependence, subsequent studies have sought to develop and extend its scope. For instance, Pennings (1975) proposes four distinct forms of interconnectedness, namely, task inter-dependence, role or positional inter-dependence, knowledge or skill inter-dependence, and social (goal or need) inter-dependence. In the same vein, some scholars distinguish two aspects of inter-dependence (i.e., task and outcome). Although the terms of task inter-dependence and outcome inter-dependence are used synonymously, they are conceptually and empirically different (Wageman, 1995). According to Wageman (1995), ‘task and outcome inter-dependence affected different aspects of
group functioning: Tasks influenced variables related to cooperation, while outcomes influenced variables related to effort' (p. 145). Therefore, outcome inter-dependence is described as ‘the degree to which the significant outcomes an individual receives depend on the performance of others’ (Wageman, 1995 p. 147). Outcome inter-dependence can exist without any inter-dependence in the means of accomplishing the work. An illustration used is a room full of telemarketers; they may be held accountable for a collective goal, but they complete independent tasks and vice versa (Mitchell & Silver, 1990). In particular, outcome inter-dependence can be further differentiated into goal inter-dependence and reward inter-dependence; these two types of outcome inter-dependence are detailed as below.

Goal inter-dependence describes the way in which the goal accomplishment of an individual/organization is affected by the goal achievement of others (van Vijfeijken, Kleingeld, Tuijl, Algera, & Thierry, 2002). Johnson, Donohue, Atkin, and Johnson (2001) argue that positive goal inter-dependence happens when individuals/organizations perceive that their goals are achieved only when other individuals/organizations (that are working cooperatively) achieve their goals.

Reward inter-dependence, also known as joint reward, assumes that an individual's reward achievement is also influenced by others’ reward achievement (van Vijfeijken et al., 2002). This happens when the rewards are based on total, rather than individual, performance. Therefore, an individual only gains a reward if others are performing well and yield a return. Since the reward achievement of a group affects the reward achievement of individuals in the group, reward inter-dependence is said to be the function of a distribution of work outcomes (Wageman & Baker, 1997).

2.3.5 Critique

The sections above review different definitions and perspectives of inter-dependence. Most studies on inter-dependence primarily draw on the three types of task inter-dependence (Thompson, 1967), which are expanded by Van de Ven et al. (1976) into four: pooled, sequential, reciprocal, and team inter-dependencies. However, one problem of these inter-dependence research is studied in the intra-organizational contexts, their applicability
in inter-organizational settings is understudied. McCann and Ferry (1979) state that inter-dependence exists when actions taken by one referent system affect the actions/outcomes of another referent system. They define six criteria to assess the level of inter-dependence, creating an ordinal scale. Unfortunately, there is little theoretical evidence supporting their views. In line with McCann and Ferry (1979), Wageman (1995) also uses an ordinal scale, by examining the separate and joint effects on different levels of task inter-dependence (low, hybrid, and high) on the effectiveness of working groups in organizations. Unlike Thompson (1967), McCann and Ferry (1979) point out that the degree of inter-dependence among members in groups may differ greatly, thereby using a different level of analysis.

Additionally, the understanding of inter-dependence is actually quite limited if its objects only focus on task; therefore, some scholars extend the scope of inter-dependence and suggest that inter-dependence is not only simply a structured pattern of task relationships but also an attribute of a relationship within a context. Therefore, some scholars propose some additional concepts, such as external inter-dependence and outcome inter-dependence.

Earlier literature provides some fundamental insights on inter-dependence; however, these studies fail to consider the recent characteristics of work in organizations and are not able to reflect the complexity of work and work relationships in contemporary business contexts. In light of this, the classical typology of task inter-dependence is re-examined by Kumar et al. (2009), and is extended by adding a fifth type: integration inter-dependence. Kumar et al. (2009)'s work broadens our understanding of inter-dependence in the context of globally distributed work.

According to the above analysis, the concept of inter-dependence (task or outcome inter-dependence) has been well developed and revised within an organizational context; however, it is still not developed adequately in inter-organizational relationships, such as multi-sourcing arrangements. Therefore, this research seeks to refine the understanding of how and what tasks are inter-dependent in multi-sourcing settings.
2.3.6 Implications

In line with the definition of multi-sourcing, this research treats task inter-dependence as one characteristic of the multi-sourced tasks. Therefore, the level of analysis most suitable for this research is the inter-organizational level. Instead of internal task inter-dependence, this research focuses on the inter-dependence between various tasks that are provided by different suppliers. From a task inter-dependence perspective, the following paragraphs provide a nuanced understanding of inter-dependence in multi-sourcing.

First, the multi-sourcing task is subdivided into several smaller tasks allocated to multiple suppliers. They are working separately in parallel to deliver their primary task/services. The services outsourced to various suppliers are typically of different natures, requiring different work processes, skills, and capabilities from their performing actors, and produce different outcomes. For instance, Royal Dutch Shell outsourced its global infrastructure work to three suppliers; there are inter-dependencies between telecommunication networks (provided by AT&T), application storage systems (delivered by T-Systems), and end-user computing and cross-bundle service coordination (perform by EDS).

Second, ‘the outcomes of the parallel task segments do not have much value in themselves; they acquire value as part of the integrated whole’ (Kumar et al., 2009 p. 652). Take Shell’s multi-sourcing arrangement as an example: the telecommunication system, storage system, and infrastructure may have their own intrinsic value; however, none of them can independently provide a whole work infrastructure to the end-user. The three functions have to come together and need to be integrated as an end-to-end service to the client (i.e., Shell).

Third, ‘the integration of parallel streams of activities requires a fitting or integration process. The fit of activity is the value-creating activity: in contrast to pooled dependence, without this concluding process intermediate outputs do not have much value’ (Kumar et al., 2009 p. 652). In Shell’s multi-sourcing arrangement, the coordination of people, process, and tools/technology across various suppliers (service integration) plays a critical role in this context.

Fourth, ‘actors in each of the individual parallel activities need to be aware of the status of and
changes in other work activities, to the extent that the performance, status, and outcome of the other activities can impact either on their own work, or on the timing and work required to fit their outcomes’ (Kumar et al., 2009 p. 652). In the example of Shell, the speed and accuracy of application services (by EDS) depends on the performance of AT&T (i.e., telecommunication networks). Specifically, AT&T network’s operating characteristics (e.g., real-time loading patterns), and the APIs to access the myriad of network resources and services can be exploited by EDS for real-time load balancing, faster execution and potentially even localized and personalized services. Also in this case, if the AT&T adjusts its transport protocol, the previous functions delivered by EDS systems and/or T-system may not fit with the new protocol, requiring additional coordination and communication work between these suppliers.

Pee, Kankanhalli, and Kim (2010) highlight that inter-dependence may not influence behaviour if it is not believed or perceived. In addition, behaviour is determined by how the situation is perceived, not by an objective assessment (Johnson & Johnson, 2005). Therefore, instead of actual inter-dependence, this thesis focuses on perceived inter-dependence from suppliers’ perspective.

2.4 Coordination and Coordination Mechanisms

This section provides a review of current literature on coordination. It focuses on (1) the various understandings of coordination within and across organizations, (2) the types of coordination mechanisms proposed in coordination literature and (3) the implications of these mechanisms in a multi-sourcing context.

2.4.1 Coordination: Historical and Recent Understandings

Coordination – the management of inter-dependent organizational tasks – has been studied by organization theorists. The concept of coordination has emerged since the eighteenth century and has evolved considerably over time. In particular, the focus of classical coordination studies has shifted away from formal structures and organizational design to
informal and emergent behaviours (Okhuysen & Betchky, 2009).

Since the nineteenth century, the emergence of large-scale manufacturing has engendered the research of coordination (Scott & Davis, 2007). As Okhuysen and Betchky (2009) point out, early coordination studies aim at increasing efficiency through improved work coordination (Chandler, 1962) and mainly focus on the design of work — analysing how coordination can be better performed through specialization and resource utilization. These early coordination studies reveal an increasing demand for communication, organization and integration activities that would allow for the integration of specialized tasks (Okhuysen & Betchky, 2009).

Moreover, some researchers focus on the design of management systems or organizational design. For instance, Fayol (1949)'s work is based on the principles of centralization, administration and subordination of individual interests. Other scholars (Andres & Zmud, 2002; Tushman, 1977) focus on overcoming uncertainty and complexity, and state that increased information exchange is essential to overcome task complexity (Perrow, 1967), task inter-dependence (Thompson, 1967) and workflow integration (Hickson et al., 1969).

Another stream of earlier coordination studies focuses on the need to balance differentiation among organizational units, aiming at achieving integration through coordination mechanisms (Milliken, 1987). Therefore, these studies are heavily reliant on organizational design. However, early coordination literature cannot meet the challenges faced in modern business environments, especially when the nature of work becomes less tangible and more difficult to define (Davis, 2003). In addition, the formalized, designed and planned solutions suggested in early coordination literature cannot deal with ‘unplanned contingencies’ (Okhuysen & Betchky, 2009 p. 468). The limitations of earlier coordination literature are recognized and pointed out by recent studies.

Recently, a range of disciplines investigate the topic of coordination, including economics, organizational theory, computer science and artificial intelligence (Malone & Crowston, 1994). The multi-disciplines of coordination research result in a range of research concerns. For instance, Malone and Crowston’s work (e.g., Crowston, 1997; Malone & Crowston, 1990;
Malone & Crowston, 1994) regards coordination as an approach to manage inter-dependencies. The inter-dependence mainly involves managing shared resources (including task assignments), managing producer/consumer relationships (including prerequisites and usability constraints), managing simultaneity constraints, and managing task/subtask relationships. Thus, the focus of these studies is elaborating various coordination mechanisms that can be used to facilitate information exchange and require or create resources. In addition, other scholars present different conceptualizations of coordination, focusing on human interactions and relational coordination. According to these studies, collaborative work can be coordinated through cooperation (Pinto, Pinto, & Prescott, 1993), communication (Ballard & Seibold, 2003), knowledge sharing (Bechky, 2003a; Carlile, 2002), interaction (Heath, Hindmarsh, & Luff, 1999) and alignment of activities (Heath & Staudenmayer, 2000). Put simply, recent coordination literature is concerned with the emergent and contextualized coordination process, instead of optimizing structures for a given situation (Okhuysen & Betchky, 2009). Therefore, informal and emergent coordination practices are highlighted and explored in recent coordination literature.

More recently, the concept of coordination is extended beyond administrative coordination (e.g., task assignment, resource allocation, and input integration) into expertise coordination (Faraj & Xiao, 2006). Coordination of knowledge or expertise brings unique challenges in dynamic and time-constrained environments (Faraj et al., 2000). Faraj and Sproull (2000) who wrote one of the earlier studies on expertise coordination reveal the need for expertise integration and management to perform a task in groups. Their research also shows that expertise coordination contributes to team performance above and beyond traditional factors (e.g., administrative coordination). Knowledge or expertise is usually embedded in localized work practices and difficult to decontextualize (Faraj & Xiao, 2006); therefore, coordination at the boundary requires knowledge translation (Carlile, 2004) and transformation (Bechky, 2003). However, because of the differences in perspectives and interests, it becomes necessary to coordinate knowledge across boundaries.

Carlile (2004)'s typology of knowledge boundaries suggests that knowledge coordination involves dealing with conflicting knowledge-based interests and that there will be an
inevitable need for stakeholders to change and transform their knowledge. Drawing on Carlile (2004)’s framework of knowledge boundaries, Majchrzak, More, and Faraj (2012) examine the spanning of pragmatic boundaries. Majchrzak et al. (2012) argue that traversing knowledge boundaries involves ‘deep’ levels of dialogue, which requires developing a shared understanding of each other’s perspective through communicating and sharing deeply-held values and knowledge in a language that is understandable to others. Such processes are not only typically time-consuming but also risky to engage in. Therefore, they propose several transcending coordination practices to avoid the time-consuming deep dialogues (Majchrzak et al., 2012). The understanding of expertise knowledge is further advanced in the context of offshore outsourcing. For instance, Kotlarsky, Scarbrough, and Oshri (2014) examine the dynamic nature of codification and show multiple roles of codification in coordinating distributed knowledge over time. Additionally, the codification of ‘the knower’ emerges as an important mechanism for expertise coordination, and its complementary role for the codification of knowledge in the context of offshore outsourcing is also highlighted Kotlarsky et al. (2014).

In brief, a variety of scholars propose multiple definitions of coordination (see Table 2). In spite of this, there are still some common characteristics among these various definitions, namely, 1) coordination focuses on the management of inter-dependence among tasks and resources, 2) coordination aims at achieving expected goals and, 3) coordination can be achieved through a series of management practices.

<table>
<thead>
<tr>
<th>Source</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulati (2012)</td>
<td>‘The deliberate and orderly alignment or adjustment of partners’ actions to achieve jointly determined goals.’ (p. 537)</td>
</tr>
<tr>
<td>Faraj and Xiao (2006)</td>
<td>‘At its core, coordination is about the integration of organizational work under conditions of task inter-dependence and uncertainty.’ (p. 1156) ‘A temporally unfolding and contextualized process of input regulation and interaction articulation to realize a collective performance.’ (p. 1157)</td>
</tr>
<tr>
<td>Quinn and Dutton (2005)</td>
<td>‘Coordination is the process through which people arrange actions in ways that they believe will enable them to accomplish their goals.’ (p. 36)</td>
</tr>
<tr>
<td>Ballard and Seibold (2003)</td>
<td>‘Coordination can be defined as the collective accomplishment of individual goals through a cooperative process.’ (p. 401)</td>
</tr>
<tr>
<td>Heath and</td>
<td>‘Organizing individuals so that their actions are aligned.’ (p. 154)</td>
</tr>
</tbody>
</table>
2.4.2 Coordination Mechanisms

Coordination mechanisms are often viewed as pre-designed or ongoing practices that are used to achieve conditions for coordination. For example, Crowston (1997) defines coordination mechanisms as the means of managing the interfaces between actors, resources and tasks. Okhuysen and Bechky (2009) suggest coordination mechanisms are ‘the organisational arrangements that allow individuals to realise a collective performance’ (p. 472). Previous coordination literature identifies many specific mechanisms for coordination. Interestingly, the typologies of coordination mechanisms are often studied in a dyad dimension, such as plan versus feedback (March & Simon, 1958), impersonal versus mutual adjustment (Van de Ven et al., 1976), formal versus informal (Kraut & Streeter, 1995), programme versus communication (Argote, 1982), as well as structured versus improvised (Kotlarsky et al., 2014). Typically, coordination mechanisms adopted in organizations include both planned, formal elements (e.g., processes, routines, tools, and technologies) as well as emergent and social elements (e.g., relationships and interactions).
Several scholars suggest various classifications of coordination mechanisms. For instance, Okhuysen and Bechky (2009) identify five different types of mechanisms that encapsulate how emergent practices assist in coordination: 1) plans and rules; 2) objects and representations; 3) roles; 4) routines; and 5) proximity. Coordination mechanisms are extensively studied in the offshoring and outsourcing context. In particular, Sabherwal (2003) examines coordination in the outsourcing context and summarizes coordination mechanisms into four categories: 1) standards, 2) plans, 3) formal mutual adjustment, and 4) informal mutual adjustment. In a similar vein, Srikanth and Puranam (2011), focusing on offshoring teams, establish scale items on three types of coordination mechanisms: 1) modularisation, 2) ongoing communication and 3) tacit coordination mechanisms (TCMs). In addition, Kotlarsky, Van Fenema, and Willcocks (2008) suggest four categories of mechanisms for coordinating knowledge in globally distributed teams: 1) organizational design mechanisms, 2) work-based mechanisms, 3) technology-based mechanisms, and 4) social mechanisms. In order to encapsulate all the identified coordination mechanisms, this research has adopted the classifications proposed by Okhuysen and Bechky (2009). Table 3 identifies the specific coordination mechanisms of each category, and illustrates how this typology could fit well with others.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Specific Coordination Mechanisms</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plans and rules</td>
<td>Pinto et al. (1993)</td>
</tr>
<tr>
<td></td>
<td>Temporal map</td>
<td>Ballard and Seibold (2003)</td>
</tr>
<tr>
<td></td>
<td>Compatibility standards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design rules</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sign-offs</td>
<td>Adler (1995)</td>
</tr>
<tr>
<td></td>
<td>Data dictionaries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Error tracking procedures</td>
<td></td>
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<tr>
<td></td>
<td>Modification requests</td>
<td></td>
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<tr>
<td></td>
<td>Delivery schedules</td>
<td></td>
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<tr>
<td></td>
<td>Project milestones</td>
<td></td>
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<tr>
<td></td>
<td>Requirements specifications</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test plans</td>
<td>Kraut and Streeter (1995)</td>
</tr>
<tr>
<td>Objects and Representation</td>
<td>Task specification/partitioning</td>
<td>Mirani (2007)</td>
</tr>
<tr>
<td>----------------------------</td>
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</tr>
<tr>
<td></td>
<td>Electronic calendaring and scheduling groupware, shared databases</td>
<td>Kotlarsky et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Data spreadsheets</td>
<td>Mark (2002)</td>
</tr>
<tr>
<td></td>
<td>Written notes and emails</td>
<td>Metiu (2006)</td>
</tr>
<tr>
<td></td>
<td>Discovery matrix</td>
<td>Kellogg et al. (2006)</td>
</tr>
<tr>
<td></td>
<td>Maps of inter-dependencies</td>
<td>Mark (2002)</td>
</tr>
<tr>
<td></td>
<td>Drawings and prototypes</td>
<td>Henderson (1991)</td>
</tr>
<tr>
<td></td>
<td>Boundary objects</td>
<td>Bechky (2003); Carlile (2002)</td>
</tr>
<tr>
<td></td>
<td>Electronic communication infrastructure including remote collaboration techniques</td>
<td>Shikanth and Puranam (2011)</td>
</tr>
<tr>
<td></td>
<td>Scaffolding</td>
<td>Majchrzak et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>Using technologies that enable observation of the work progress and context across sites</td>
<td>Srikanth and Puranam (2011)</td>
</tr>
<tr>
<td></td>
<td>Sharing protocol</td>
<td>Faraj and Xiao (2006)</td>
</tr>
<tr>
<td></td>
<td>Enterprise Connectivity Interface (ECI)</td>
<td>Dalmolen, Moonen, and van Hillegersberg (2015)</td>
</tr>
<tr>
<td>Roles</td>
<td>Liaison roles</td>
<td>Van de Ven et al. (1976); DeSanctis and Jackson (1994)</td>
</tr>
<tr>
<td></td>
<td>Liaison contacts</td>
<td>Kotlarsky et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Boundary spanners</td>
<td>Gittell (2002)</td>
</tr>
<tr>
<td></td>
<td>Technicians serve as brokers</td>
<td>Barley 1996</td>
</tr>
<tr>
<td></td>
<td>Plug-and-play teaming</td>
<td>Faraj and Xiao (2006)</td>
</tr>
<tr>
<td>Routines</td>
<td>Coordination meetings</td>
<td>DeSanctis and Jackson (1994); Adler (1995)</td>
</tr>
<tr>
<td></td>
<td>Procedures</td>
<td>Kraut and Streeter (1995)</td>
</tr>
<tr>
<td></td>
<td>Procedure trajectory</td>
<td>Long and Ellis (1996)</td>
</tr>
<tr>
<td></td>
<td>Routines</td>
<td>Feldman (2006); Gittell (2002); Long and Ellis (1996)</td>
</tr>
<tr>
<td></td>
<td>Design review meetings</td>
<td>Adler (1995); Kraut and Streeter (1995)</td>
</tr>
<tr>
<td></td>
<td>Status review meetings</td>
<td>Kraut and Streeter (1995)</td>
</tr>
<tr>
<td>Proximity</td>
<td>Co-location</td>
<td>Kraut and Streeter (1995)</td>
</tr>
<tr>
<td></td>
<td>Joint Actions</td>
<td>Mani et al. (2011)</td>
</tr>
<tr>
<td></td>
<td>Impromptu communication</td>
<td>Van de Ven et al. (1976)</td>
</tr>
<tr>
<td></td>
<td>Transition teams</td>
<td>Adler (1995)</td>
</tr>
<tr>
<td></td>
<td>Co-presence</td>
<td>Klein et al. (2006)</td>
</tr>
<tr>
<td></td>
<td>Working relationships</td>
<td>Kotlarsky et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Social cognition</td>
<td>kotlarsky et al. (2008)</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Developing trust</th>
<th>Liang et al. (1995); Regans et al. (2005)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visibility and familiarity</td>
<td>Okhuysen et al. (2009)</td>
</tr>
<tr>
<td>Staffing distributed teams with employees who worked together before Pre-project shared training programmes Sharing space</td>
<td>Srikanth and Puranam (2011)</td>
</tr>
<tr>
<td>Informal meetings</td>
<td>DeSanctis and Jackson (1994); Kraut and Streeter (1995)</td>
</tr>
</tbody>
</table>

1) Plans and Rules

As fundamental types of coordination mechanisms, plans and rules are commonly used to define responsibilities for the tasks and actions that different parties have to accomplish (Okhuysen et al., 2009; Pinto et al., 1993). Faraj and Xiao (2006) indicate the importance of plans and rules in combining diverse expertise and determining the sequence of activities that are required. Furthermore, plans and rules establish links between different parts of the organization and facilitate individuals’ responsiveness as work progresses (Okhuysen & Bechky, 2009). Plans and rules can be useful for the allocation of different resources (Crowston, 1997); for instance, schedules organize the limited time resource by creating a temporal sequence of activities with predefined points of timing reference (Ballard & Seibold, 2003). Following established rules is essential for resource allocation and the avoidance of conflicts or disruptions (Okhuysen & Bechky, 2009). Additionally, plans and rules facilitate coordination through the agreement that they create among the different parties. Conflicts and discrepancies are likely to be identified during the co-development of plans, leading to a final plan that reflects a mutual agreement for different stakeholders (Okhuysen & Bechky, 2009). These plans and rules can also provide a positive impact on cooperation across individuals at a group level (Pinto et al., 1993).

2) Objects and Representations

Objects and Representations support coordination by providing information and offering a common basis for interaction and creating shared meaning (Okhuysen & Bechky, 2009). The
information technologies (such as Enterprise Connectivity Interface) plays an essential role in enabling and supporting the collaboration between suppliers (Dalmolen et al., 2015), in particular, in cloud-based inter-supplier collaboration (Chandra & van Hillegersberg, 2015). Boundary objects can be employed by different parties incorporating both social and technical information as well as mobilizing action (Star & Griesemer, 1989). Representations can provide a common platform that highlights the task boundaries and inter-dependencies (Kellogg, Orlikowski, & Yates, 2006); for instance, ‘inter-dependency maps’ are used by different parties or individuals involved in a project, these inter-dependency maps indicate what to anticipate, who is delivering a piece of work, and who is the receiver (Mark, 2002). Carlile (2002) also underlines the significance of clear and documented inter-dependencies, which also facilitates the resolution of problems and work alignment (Bechky, 2003). These mechanisms create a common shared perspective to facilitate coordination (Okhuysen & Bechky, 2009). In the case of geographically distributed client and supplier teams, technology-based coordination tools are suggested to be used to enable task and expertise coordination (Kotlarsky et al., 2008; Levina, 2005).

3) Roles

Representing structured expectations associated with a specific position (Biddle & homas, 1966), roles are also discussed in literature as a vital element in coordinating work. Roles reflect hierarchies, relationships and reporting lines; therefore, roles allow the coordination of behaviours through monitoring and updating. For instance, group tasks can be coordinated through subordinates reporting their activities to group leaders/supervisors, or supervisors checking task progress (Klein, Ziegert, Knight, & Xiao, 2006). As Bechky (2006) argues, rotational roles in different teams or departments within organizations can also help individuals create a common perspective and a holistic understanding of tasks. In an inter-organizational setting, roles can help to create a common perspective across organizations. Several studies suggest that liaison contacts, boundary spanners, and brokers can help groups in coordinating their tasks (Van de Ven et al., 1976; DeSanctis & Jackson 1994; Kotlarsky et al., 2008; Gittell, 2002; Barley, 1996; Faraj & Xiao, 2006).
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4) Routines

Routines benefit coordination by providing ‘a template for task completion’ (Okhuysen & Bechky, 2009 p. 477). Routines may vary from simple methods through which independent parties are able to monitor task progress to complex ways in which subtasks and their respective responsible parties are defined (Feldman, 2000). Moreover, routines may be executed repeatedly by different people in an organization. Therefore, routines place more emphasis on task completion, learning and improvement, and less on how work progressed or objectives were met (Okhuysen & Bechky, 2009).

Another way in which routines coordinate work is by determining ways in which workflows among independent parties and deliverables are handed-off from one party or individual to another. An example is described by Kellogg et al. (2006), who analyse a set of procedures to exchange files to revise them for presentations; routines can ensure that a task is completed and another party or individual can take over (Okhuysen & Bechky, 2009). From the social meanings and social interaction perspective, regular meetings (DeSanctis & Jackson, 1994; Adler, 1995; Kraut & Streeter, 1995) can bring groups together and help them increase their awareness on other parties’ tasks, create connections through interactions, and eventually assist in the creation of a common perspective and overall task coordination (Feldman et al., 2002; 2004).

5) Proximity

Proximity refers not only to the physical distance of individuals or parties within an organization but also to the relationships among team members. This category is similarly termed as social or inter-personal coordination mechanisms by Kotlarsky et al. (2008). Proximity — be it physical proximity (Allen, 1984), co-presence (Goffman, 2009; Mead, 2009), trust (McEvily, Perrone, & Zaheer, 2003; Reagans, Argote, & Brooks, 2005), or working relationships and experience (Reagans et al., 2005) — may result in visibility, familiarity, task performance, and finally coordination outcomes. In addition, some mechanisms rely on pre-project familiarity among team members, shared knowledge of each other’s work procedures and visibility of information across locations. These mechanisms aim at
achieving sufficient common ground to facilitate coordination without direct communication and pre-planned interfaces. Such mechanisms are proposed and termed by Srikanth and Puranam (2011) as Tacit Coordination Mechanisms (TCMs) and typically rely on a transaction memory system between (often dispersed) team members.

2.4.3 Implications

The coordination mechanisms suitable for using within an organization are not always sufficient for managing inter-firm relationships (Gittell & Weiss, 2004), especially multi-sourcing relationships. Mechanisms for inter-firm coordination have to enhance flexibility (Okhuysen & Bechky, 2009) to deal with uncertainty, novelty and problem complexity (Jarzabkowski, Le, & Feldman, 2012). Therefore, coordination mechanisms in multi-sourcing can be extended by other means; for instance, reputation, trust, collective actions, working groups, procedures, costs and revenue-sharing rules in inter-organizational contexts (Gardet & Mothe, 2011). The following paragraphs discuss implications for the coordination mechanisms that are suitable for multi-sourcing.

**Plans and Rules** are commonly used to define tasks, activities and responsibilities (Okhuysen & Bechky, 2009). These formal regulations are indicated as one of the most important formal mechanisms for coordination in outsourcing contexts (Saunders et al., 1997; Lacity & Willcocks, 1996). Therefore, plans and rules are likely to play a fundamental role in multi-sourcing contexts. In multi-sourcing contexts, contracts and commercial agreements (including SLAs and OLAs) define all the parameters of multi-sourcing arrangements, including responsibilities, deadlines, deliverables and all relevant aspects of the agreement. The contracts and commercial agreements in multi-sourcing can also involve several types of standards and methodologies, identifying milestones, activities and specific tasks with responsibility and accountability.

**Objects and Representations** may also help multiple stakeholders to share information, align their work and create shared meanings in the context of multi-sourcing. In such settings, project plans and project-related documents need to be shared through the communication tools and knowledge-sharing platforms between parties involved in multi-sourcing projects.
to bridge organizational boundaries between multiple suppliers and the client. These mechanisms can provide a basis for knowledge sharing, interaction, creating common understanding, and facilitating task verifiability (verification of deliverables) and task visibility (reviewing work progress and updating task progress) in multi-sourcing settings.

**Roles** play a key role of monitoring work progress and coordinating tasks in outsourcing (Beulen et al., 2006; Willcocks et al., 2010). Established roles may also help team members from multiple teams identify interaction lines and specific contact persons, as suggested by Kotlarsky et al. (2008). Furthermore, a project coordinator can also play a key role in overseeing work progress and managing suppliers in multi-sourcing relationships. Such a coordinator is likely to play a service integrator role in multi-sourcing projects. The primary role of a service integrator is to maximize performance and ensure the quality of IT services provided to the client firm. Service integrating is typically responsible for end-to-end service performance and achievement of the required performance standards (such as SLAs and KPIs). The service integrator of a multi-sourcing project can be either an in-house client team member or an external service provider.

**Routines**, which are ‘repeated patterns of behaviour’ (Feldman, 2000 p. 611), can be adopted in multi-sourcing projects as well. Regular work progress and task completion reviews are indicated as important management practices in outsourcing projects (Willcocks et al., 2010). These reviews can be performed through regular meetings between multiple suppliers. Regarding multi-sourcing contexts, such routines may involve work progress and task completion, resolution of emerging issues and inter-supplier interactions.

**Proximity**, especially relational proximity, plays an important role in the coordination of inter-organizational relationships. However, in multi-sourcing projects, proximity between multiple parties is not likely to be feasible, which will cause communication and interaction barriers. This is mainly because team members from different organizations are usually from geographically dispersed locations and hold diverse knowledge. Although coordinators or project managers are engaged in formal meetings, there is little opportunity for informal communications. Therefore, good relationships between the client and its multiple suppliers
allow opportunities for informal communications and interactions among team members. In addition to direct communication and pre-planned interfaces, implementing tacit coordination mechanisms (Srikanth & Puranam, 2011) can also create familiarity and visibility among the client and its multiple suppliers, resulting in achieving expected coordination outcomes.

2.4.4 Concluding Remarks

Coordination across organizational entities is a necessary prerequisite in inter-firm collaborations, such as multi-sourcing engagements. In addition to client-supplier coordination, a multi-sourcing arrangement requires the coordination of activities among the multiple stakeholders from different organizations. In particular, the primary interest of this thesis is supplier-to-supplier interface, information exchange and communication among multiple suppliers.

2.5 Extra Costs in Outsourcing

This section reviews previous work on extra costs for outsourcing. Specifically, relevant concepts of extra costs, determent factors of extra costs and cost classifications are summarized in the following paragraphs.

2.5.1 Relevant Concepts

Before decomposing specific cost categories, it is necessary to define the broad term ‘extra costs’. Hidden costs can be understood as the costs that are not anticipated in the various stages of strategic decision-making (Reitzig & Wagner, 2010). Outsourcing contracts are occasionally changed during the service delivery phase, and these contract adaptations may result in additional payments to the supplier. Other similar concepts include invisible costs (Stringfellow, Teagarden, & Nie, 2008) and extra costs (Dibbern, Winkler, & Heinzl, 2008). In particular, extra costs are defined as ‘all costs in terms of time, effort, and resources spent by the client organization that go beyond the actual payments to the supplier’ (Dibbern et al., 2008 p.335). Table 4 summarizes relevant concepts of extra outsourcing costs.
Table 4: Relevant Concepts of Extra Costs in Outsourcing

<table>
<thead>
<tr>
<th>Source</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handley and Benton (2013)</td>
<td>‘The time, effort, and resources associated with achieving adequate levels of provider control and inter-firm coordination are prominently noted hidden costs with outsourcing.’ (p. 110)</td>
</tr>
<tr>
<td>Larsen, Manning, and Pedersen (2012)</td>
<td>‘The unanticipated costs of implementation that arise in strategic decision-making processes.’ (p. 1)</td>
</tr>
<tr>
<td>Dibbern et al. (2008)</td>
<td>‘All costs in terms of time, effort, and resources spent by the client organization that go beyond the actual payments to the supplier.’ (p. 335)</td>
</tr>
<tr>
<td>Stringfellow et al. (2008)</td>
<td>‘Hidden communication-related costs associated with the use of foreign service providers.’ (p. 166)</td>
</tr>
<tr>
<td>Overby (2003)</td>
<td>‘Hidden costs of outsourcing—areas in which you’ll have to invest more up front than you might think, places where things such as productivity and poor processes can eat away at potential savings, and spots where, if you’re not careful, you could wind up spending.’ (p. 1)</td>
</tr>
</tbody>
</table>

2.5.2 Three Perspectives of Extra Costs

As mentioned in the above section, there are several different terminologies associated with extra costs. The concept variations are mainly because of the different theoretical focuses. Generally speaking, the concept of extra costs can be related to three research perspectives (see Table 5), and this section elaborates on these.

Table 5: Three Perspectives on Costs in Outsourcing

<table>
<thead>
<tr>
<th>Theoretical Focus</th>
<th>Research Question</th>
<th>Examples</th>
<th>Literature</th>
</tr>
</thead>
</table>
| Costs of Managing Inter-organizational Engagements | How do outsourced tasks and activities in outsourcing create additional management issues for client firms? | Coordination costs | Dibbern et al. (2008)  
Kumar et al. (2009)  
Stringfellow et al. (2008)  
Handleby et al. (2013) |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------|---------------------------------------------------------------------|
Reitzig and Wagner (2010)  
Larsen et al. (2012) |
|                                                  | How do outsourced tasks and activities in outsourcing create additional management issues for client firms? | Control costs | Hazel Taylor (2006)  
Reitzig and Wagner (2010)  
Larsen et al. (2012) |
|                                                  | How do outsourced tasks and activities in outsourcing create additional management issues for client firms? | Knowledge transfer costs | Hazel Taylor (2006)  
Reitzig and Wagner (2010)  
Larsen et al. (2012) |

The first perspective focuses on the impact of extra costs on outsourcing cost-efficiency. In particular, Barthelemy (2001) and Overby (2003) suggest that additional costs for managing an outsourcing project need to be taken into account. By emphasizing the challenges of outsourcing, these articles attempt to specify and quantify the unforeseen financial costs of outsourcing. In addition to contract-based payments, some other costs, such as information searching costs, contacting costs, contracting costs and monitoring costs, are identified and studied in these research papers.

The second perspective discusses outsourcing costs in relation to strategic choices between outsourcing and in-house development. According to this perspective, outsourcing (i.e., shifting ownership to an external provider) results in the depletion of strategic resources leading to a loss of competence (Aundhe & Mathew, 2009), loss of flexibility and control (Larsen et al., 2012) and transaction costs (Larsen et al., 2012). Therefore, a firm’s capabilities and resources may be eroded by outsourcing (Larsen et al., 2012). Fifarek, Veloso, and Davidson (2008) indicate that the outsourcing of knowledge work may place firms at a long-term disadvantage, because of loss of process knowledge. Similarly, Reitzig and Wagner (2010) also argue that extra outsourcing costs can disrupt incremental in-house learning processes.

More recently, a third perspective of extra costs appears. This stream of research suggests
that the extra costs are associated with re-locating and re-designing tasks and processes within an orchestrated value-generating system. In other words, extra costs are caused through re-configuring a firm’s internal and external value chains (e.g. Dibbern et al., 2008; Handley & Benton, 2013; Kumar et al., 2009; Srikanth & Puranam, 2011). In line with this perspective, outsourcing (by either external or internal service providers) can be regarded as the process of re-configuring value chain activities across organizational boundaries (Contractor, Kumar, Kundu, & Pedersen, 2010; Manning & Massini, 2008). Therefore, extra costs might stem from additional management needs, and these management needs are usually associated with inter-organizational management activities; for instance: knowledge transfer, management of task inter-dependence, training and coaching, the protection of intellectual capital, control mechanisms, and building inter-firm relationships (Dibbern et al., 2008; Handley & Benton, 2013; Kumar et al., 2009; Srikanth & Puranam, 2011).

2.5.3 Constituent Parts of Extra Costs

In general, outsourcing arrangements can be divided into three stages: the pre-contractual stage, the transition stage, and the service delivery stage. The extra costs of outsourcing may arise from the activities in all three stages. In particular, Dibbern et al. (2008) list all costs categories that arise for the client organization. Their study focuses on the non-contracture costs in an offshoring setting, namely, the costs associated with requirements specification and design, knowledge transfer, control, and coordination. An overview of the relevant cost categories and their definitions is also given in their paper (see Table 6).

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification</td>
<td>Client costs associated with the process of explaining and defining what services are required from the system and identifying the constraints on systems operation and development.</td>
</tr>
<tr>
<td>Design</td>
<td>Client costs associated with the ‘description of the structure of the software to be implemented, the data which is part of the system, the interfaces between the system components, and, sometimes, algorithms used.’</td>
</tr>
<tr>
<td>Knowledge transfer</td>
<td>Costs associated with the communication of knowledge from the client organization so that it is learned and applied by the offshore vendor.</td>
</tr>
<tr>
<td>Coordination</td>
<td>Costs for integrating and linking together client and vendor resources to</td>
</tr>
</tbody>
</table>
accomplish a collective set of tasks.

| Control | Costs for ensuring that the vendor acts and performs in a manner that is consistent with achieving the desired objectives of the client. |

Based on two necessities for effectively managing inter-organizational relationships (e.g. White & Lui, 2005), Handley and Benton (2013) conceptualize two categories of extra costs — control costs and coordination costs. Control costs are ‘reflected by the degree to which the costs to manage and monitor contracts are incurred’, while coordination costs are ‘the time, effort, and resources the outsourcing organization expends to coordinate with the service provider effectively’ (Handley & Benton, 2013 p.115).

### 2.5.4 Influencing Factors of Extra Costs

Although studies have been conducted to identify and disaggregate the extra costs for outsourcing (Dibbern et al., 2008; Handley & Benton, 2013), the central issue is how to determine such costs. Just as the words ‘hidden’ or ‘invisible’ imply, it is not easy to explicitly and accurately quantify these costs. Nevertheless, it is feasible to identify factors that influence these extra costs from different theoretical perspectives (Stringfellow et al., 2008). Thus, some attempts have been made to examine the sources of these extra costs.

Drawing from operations management literature and the studies on communications and culture, Stringfellow et al. (2008) explore and identify antecedents of invisible costs. Centred on interaction intensity and interaction distance, their paper analyses the invisible costs of offshoring by proposing a conceptual framework (see Figure 3). Drivers of these costs include service content, services process, geographic distance, language distance and cultural distance. In addition to the conceptual framework, Stringfellow et al. (2008) also suggest the invisible costs of offshoring (extra communication-related costs) can be controlled through better contract design and managerial procedures.
Based on transaction cost economics and the knowledge-based view of the firm, Dibbern et al. (2008) also develop a theoretical framework to analyse the client’s extra costs in offshoring projects. After decomposing the client’s extra costs, they argue that the degree of required client-specific knowledge and offshore-specific client-supplier distance are likely to increase the client’s extra costs; whereas the suppliers’ absorptive capacity negatively influences the degree of the extra costs for client firm. In addition, the degree of required client-specific knowledge plays a moderating role on the impact of offshore-specific client-supplier distance and the suppliers’ absorptive capacity on extra costs. Figure 4 elaborates key constructs and their relationships in the framework.
In addition, Larsen et al. (2012) investigate the relationships between offshoring complexity and hidden costs, and suggest that cost-estimation errors (a manifestation of hidden costs) can be explained by offshoring complexity. More specifically, they define offshoring complexity as a combination of configuration complexity (including structural, operational and social layers of the organizational configuration) and task complexity. In line with previous research on complexity, they argue that the level of offshoring complexity is positively associated with the amount of cost-estimation errors in the decision-making period (Larsen et al., 2012).

More recently, Handley et al. (2013) examine how dimensions of outsourcing complexity influence inter-organizational management costs for the client firm in a global outsourcing relationship. In particular, Handley et al. (2013) investigate two key sets of relationships: the impact of task- and location-specific complexity on inter-firm control costs, and the impact of task- and location-specific complexity factors on inter-firm coordination. Three characteristics of task-specific complexity (i.e., scale of service, breadth of tasks, and service customization) and three contributors of location-specific complexity (i.e., geographic dispersion, geographic distance, and cultural distance) are identified and examined in this paper. With regard to their findings, Handley et al. (2013) indicate that service scale and geographic distance increase both control and coordination costs; the breadth of tasks and geographic dispersion positively influence the degree of control costs, whereas the degree of service customization has a significant negative relationship with control costs.

2.5.5 Summary and Critique

Outsourcing has gained momentum in recent decades; however, the initial outsourcing expectations are not always achieved and outsourcing may eventually prove more costly than expected (Dibbern et al., 2008; Handley & Benton, 2013). Reasons for these disappointing outcomes include: the budget, time and efforts needed to adequately manage inter-firm relationships in outsourcing are usually underestimated (Aron & Singh, 2005; Dibbern et al., 2008; Overby, 2003). In other words, managing inter-organizational relationships (e.g., outsourcing) requires additional expenses to initial estimations (White &
Moreover, studies also suggest that implementation of outsourcing (Handley & Benton, 2013), offshoring (Dibbern et al., 2008; Larsen et al., 2012) and multi-sourcing (Gallivan & Oh, 1999) can trigger extra costs, and these costs negatively affect outsourcing success. In outsourcing literature, these additional expenses are generally referred to as the extra costs of outsourcing. In order to accurately estimate the extra costs of outsourcing, scholars have explored the categories and sources of these costs (see Barthelemy, 2003; Dibbern et al., 2008; Handley & Benton, 2013; Larsen et al., 2012; Overby, 2003; Stringfellow et al., 2008).

As reviewed above, there are several papers exploring the extra costs for outsourcing; for instance, the extra costs on reducing the threat of opportunism (i.e., control costs) and extra costs on coordinating (Carmel & Nicholson, 2005; Gallivan & Oh, 1999). The primary aims of these studies are to uncover how these costs undermine anticipated financial value (e.g., Barthelemy, 2001; Overby, 2003), how to estimate unanticipated costs during the outsourcing decision-making process (e.g., Larsen et al., 2012; Stringfellow et al., 2008), and what unanticipated organizational needs could result in unexpected costs for the client firm (e.g., Dibbern et al., 2008; Srikanth & Puranam, 2011; Stringfellow et al., 2008). So far, many costs categories are identified in the existing literature, including the costs of selecting a supplier, coordination costs, design/specification costs, control costs, knowledge transfer costs, and contracting costs (Larsen et al., 2012). Given that there are many papers identifying such costs in outsourcing, it is apparent that these costs are not actually hidden (Handley & Benton, 2013). Accordingly, this research prefers to use ‘extra costs’ rather than ‘hidden costs’ during analysis.

Nevertheless, the studies on extra costs of outsourcing are dominantly from a client’s perspective, and research on supplier costs are limited. However, it is clear that both supplier and client firms confront difficulties in accurately estimating the costs incurred in outsourcing. Regarding the cost issues in outsourcing, the concerns from the suppliers’ viewpoint is different from the client’s. For instance, clients may be less concerned about a supplier’s effort incurs in developing a software while supplier’s may view these efforts as constraining and expensive (Sabherwal, 2003). It is an undeveloped understudied area in the
outsourcing context.

In spite of the prevalence of multi-sourcing, one critical success factor — extra costs — has not received enough attention by multi-sourcing practitioners. This provides an answer to the question as to why the economic benefit varies among different multi-sourcing engagements. In academic literature, research on additional costs in multi-sourcing and its influence on multi-sourcing performance is in short supply, in contrast to the intensive literature on the visible costs of outsourcing (e.g., actual payment and labour costs). Given that one of the motivations for outsourcing is cost efficiency (Su & Levina, 2011), the extra costs of multi-sourcing may also impede initial outsourcing expectations, and this opens another stimulating area for my research.

To conclude, above five sections provide a review of four related research areas: multi-sourcing, inter-dependence, coordination, and outsourcing costs. Research gaps and some implications for the current research are identified and discussed in this chapter. This review serves as a theoretical basis for integrating all related factors that contribute to the suppliers’ coordination efforts in multi-sourcing engagements. The next section develops and presents a research framework for the empirical investigation.

2.6 Developing an Analytical Lens

This research intends to develop a comprehensive understanding of the efforts that suppliers invest to coordinate with each other in a multi-sourcing engagement. In order to explore this phenomenon in depth, an empirical investigation into inter-supplier coordination in multi-sourcing is undertaken. It is important to note that the majority of the literature, both outsourcing literature and coordination studies, is not able to explain the phenomenon. Also, the study of multi-sourcing from the suppliers’ perspective is absent. Therefore, empirical investigation undertaken in this study is exploratory to a great extent. The previous sections reviewed five related research streams, and these serve as a theoretical basis for this research.

Previous literature have highlighted that task inter-dependence as a primary factor,
determining inter-firm control and coordination requirements. Converting these findings into multi-vendor scenarios, the inter-dependence of multi-sourced tasks determines a higher level of interaction between multiple suppliers, which results in communication and coordination needs. In contrast to single-sourcing, multi-sourcing requires more interfaces, standards, and/or outcome exchanges between the client and its multiple suppliers. Accordingly, the time and effort of managing these efforts (coordination mechanisms) are increased. On the other hand, a supplier firm is independently accountable to the client through Service Level Agreements (SLAs), and is not necessarily accountable to other suppliers (Bhattacharyya & Atri, 2006). In order to ensure accountability among multiple suppliers, it is suggested that commercial regulations are adopted in multi-sourcing settings; therefore, the time and effort of regulation and monitoring are accordingly increased. Informed from multi-sourcing studies, supplier-supplier control and supplier-supplier coordination among multiple suppliers are likely to be two major concerns in the context of multi-sourcing, as these issues do not arise in single-sourcing settings (Bapna et al., 2010).

As Okhuysen and Bechky (2009) suggest, a variety of coordination mechanisms are adopted to achieve the three integrative conditions for coordination: accountability, predictability, and common understanding. In this research, the term ‘integrative conditions for coordination’ is simply converted to ‘coordination states’. In particular, this research details two discrete but intertwined perspectives (Gomes & Joglekar, 2008; Handley & Benton, 2013) to analyse two requirements for accomplishing coordination: accountability, and alignment between multiple suppliers.

Coordination can be understood as a regulation control process (Das & Teng, 1996), ‘attempting to ensure individual act[s] [happen] in a manner that is consistent with achieving desired objectives’ (Choudhury & Sabherwal, 2003 p.292). The uncertainty in terms of other partners’ behaviours is studied as one of the primary coordination issues in inter-organizational relationships (Arino & De La Torre, 1998; Handley & Benton, 2013). From this perspective, coordination efforts are spent to minimize the risks which stem from other parties’ opportunistic behaviours (Williamson, 1991). Handley and Benton (2013) suggest coordination efforts arise when one party (e.g., a supplier firm) deploys mechanisms
intended to align the behaviour of other parties (e.g., other suppliers) with the pre-determined outcomes of the focal firm (e.g., the client). Translating this into the multi-supplier settings, coordination efforts are required to create conditions that motivate multiple suppliers to achieve expected outcomes.

Apart from managing transaction risks (such as uncertainty of other suppliers’ actions), another coordination imperative aims to align/fit with others to achieve individual or joint objectives. Studies from this perspective emphasize the effective integration of process (Crowston, 1997), resources (Dibbern et al., 2008), and information (Clemons, Reddi, & Row, 1993) among different organizations.

Grounded in different theoretical perspectives, managing behavioural uncertainties and performance risks are two coordination imperatives for inter-supplier coordination in multi-sourcing settings, creating the requirements to accomplish alignment and accountability between different suppliers. Although they are conceptually different, both accountability and alignment issues lead to coordination efforts when suppliers manage inter-dependent tasks.

Integrating these two perspectives, task inter-dependence raises challenges when a supplier firm has to work with other supplier firms, for instance, coordination and communication of inter-dependent tasks, and controls on the desired service level of other suppliers. In light of this, this study has identified two requirements of coordination in multi-sourcing scenarios: accountability and integration between suppliers.

Drawing from above discussion, Figure 6: provides a theoretical lens for subsequent empirical studies. Although the proposed framework is supported by the studies outlined in sections 2.1 to 2.5, it is not constrained by only these elements. During the empirical stage, the multi-sourcing characteristic (inter-dependence), inter-supplier managerial activities, and associated coordination efforts in multi-sourcing summarized in the framework are examined and revised. The empirical research is designed to understand how the multi-sourcing characteristic (inter-dependence) may raise challenges when suppliers coordinate and collaborate with others. The next chapter will describe and explain the
method adopted in this research and the research process of this study.

Figure 5: Research Framework
CHAPTER 3 – METHODOLOGY AND RESEARCH DESIGN

This chapter describes the rationale and approach of conducting interpretive case studies. The research design process is depicted in Figure 1. This chapter firstly describes the motivation for adopting an interpretive case study research methodology, and then elaborates on the design process of the fieldwork. Next, three case studies at Pactera (Microsoft account) and TCS (British Airway and Lloyds accounts) are discussed, followed by techniques for processing and managing the collected data. This chapter also indicates how the data are analysed (both within-case and cross-case analysis). The section ends with a discussion on the quality of the empirical research.

3.1 Methodology: Interpretive Qualitative Case Study

As opposed to the quantitative perspective, scholars taking a qualitative approach are able to talk to interviewees and analyse their verbalization of experiences (Myers & Avison, 1997). Qualitative research aims to understand processes and meanings which are not easily quantified (Myers & Avison, 1997), and places stress on how social experiences are created and given meaning (Myers & Avison, 1997). Qualitative research also prevents the loss of the social and institutional context when textual data is quantified (Kaplan & Maxwell, 2005). This thesis intends to investigate coordination issues in multi-sourcing projects from the suppliers’ perspective. Although it may be possible to identify extra costs, it is difficult to measure objectively or estimate the amount of time and effort spent on coordination and control activities. Therefore, the phenomenon of this research cannot be easily quantified and this provides a suitable ground for a qualitative study. Also, this research intends to explore the influence of multi-sourcing on suppliers’ coordination and control costs; therefore, it is essential to retain its social context (i.e., the multi-sourcing engagement) Put simply, through an in-depth understanding of real-life, multi-sourcing projects, a qualitative study can contribute to the validity of the empirical research and the relevance to both scholars and practitioners.

The underlying philosophical assumption of this qualitative study will be interpretive.
‘Interpretive studies generally attempt to understand phenomena through the meanings that people assign to them’ (Myers & Avison, 1997). Interpretive research may enable researchers to gain access to reality through social constructions such as language, consciousness and shared meanings (Myers & Avison, 1997). In this research, the social interactions of all stakeholders in a multi-sourcing engagement and their behaviours will be analysed, with the aim of understanding their influence on coordination and control activities.

Orlikowski and Baroudi (1991) suggest the use of an interpretive approach when the research question and nature of the research phenomenon are complex. As a multi-sourcing project implies collaboration between multiple suppliers and the client organization, its coordination and control issues are much more complex, compared to a single-sourcing project. Because of the complexity of the research phenomenon, an interpretive perspective serves an appropriate lens to better understand participants’ thoughts and actions in social and organizational contexts (multi-sourcing), and has the potential to produce deep insights (Klein & Myers, 1999).

Another advantage of an interpretive perspective is it provides a higher degree of openness towards collected data and leads to richer analysis and identification of new issues (Walsham, 1995). Unlike the positivist approach that predefines dependent and independent variables and loosely connects to empirical reality (Lee, 1991), an interpretive approach focuses on the full complexity of human sense-making as the situation emerges (Myers & Avison, 1997). Therefore, an interpretive approach is preferable to explore the emerging phenomenon of multi-sourcing costs.

In addition, because of the dearth of literature on the suppliers’ perspective of multi-sourcing, it is not possible to provide theoretically-sound constructs to carry out a positivist study, such as hypothesis testing (survey) and evidence of formal propositions (positivistic case study).

In order to generate valid interpretive knowledge, it is important to understand the thoughts and actions of participants within their social and cultural contexts (in this case, the network of a client organization and its multiple suppliers), because individuals and their social and
cultural contexts are closely connected to each other (Orlikowski & Baroudi, 1991). Case study is suggested as an appropriate method for interpretive investigations (Walsham, 1995). In particular, Yin (2014) discusses how to select an appropriate research method from experiments, surveys, archival analysis, histories and case study. Drawing from Yin (2014), the research method in this thesis is based on three conditions.

1) Form of Research Question

The nature of a research question is defined by the interrogative word used in that sentence. Key words include ‘who’, ‘what’, ‘where’, ‘how’, and ‘why’ (Yin, 2014). In this thesis, research questions move from ‘what’ to ‘how’ questions. The first ‘what’ questions ask for descriptions. In general, for this type of question, any research method can be adopted. ‘How’ questions are explanatory and Yin (2014) suggests that case studies, experiments or histories can be used. However, the use of experiments does not allow entry into real-life multi-sourcing projects. Historic research appears a less relevant strategy because a multi-sourcing project is usually a contemporary phenomenon. In light of this, case study is employed as the method of research.

2) The Extent of Control an Investigator Has Over Actual Behavioural Events

The research method is also determined by the researcher’s access to an empirical setting. There is an opportunity to conduct on-site research with two supplier firms: Pactera (one outsourcing arrangement) and TCS (two outsourcing arrangements). This made it possible to move beyond a historic research. Experiments would provide a high degree of control but lack the flavour of a project in real business environments. The intention in the research is to explore suppliers’ coordination efforts in a multi-sourcing project, focusing on the examination of a contemporary occurrence, and these efforts are truly beyond the control of the investigator. In light of this, case study is employed as the method of my research.

3) The Degree of Focus on Contemporary Versus Historical Events

As Yin (2014) mentions, the case study methodology is an appropriate approach for
contemporary events. The operational existence of a setting – as opposed to that of a historic study – implies that the researcher can deploy a broad range of data collection sources, including interviews, observations, and (electronic) documentation. In terms of this research, the complexity of the phenomenon (inter-supplier coordination) entails studying the phenomenon within its context (i.e., multi-sourcing relationships). Drawing upon the above analysis, case study is employed as the research method of my study.

3.1.1 Criticism about Case Study

There are several concerns about qualitative research. One limitation of doing qualitative research, in particular, a case study research, is that empirical data could lack rigor (Yin, 2008). Different from quantitative research, qualitative data could be influenced by researchers, for instance, the questions they ask and how they ask them. However, such bias could be reduced through triangulation, which means the results would come from using different sources of data (Yin, 2008). Furthermore, the results of a qualitative study may not be generalizable. As understanding and interpretation of the phenomenon is closely relevant to the context, whether a similar results can be concluded in different settings. Therefore, ‘generally accepted’ and ‘law-like’ theories can hardly produce through qualitative studies. In spite of these criticisms, researchers can reduce such limitations by choosing multiple-case studies and interpreting the data with existing theories (Lukka & Kasanena, 1995). Additionally, multiple case study is criticized because it is usually time-consuming in terms of data collection and analysis (Hodkinson & Hodkinson, 2001; Yin, 2008).

3.1.2 Multiple-case Study

Researchers tend to choose a multiple-case study as it brings several merits, such as predicting how similar or different results will be and providing more convincing and robust evidence. As is mentioned by Thomas (2004), multiple cases represent “varied attributes of the population from which they are drawn”. Furthermore, multiple-case study is argued to be able to expand the research question and give a broader theoretical elaboration (Eisenhardt & Graebner, 2007).
3.2 Case Selection and Preparation

The cases studied in this research was selected based on the factors outlined below.

First, the supplier firm has recently experienced or is engaging in a multi-sourcing project with at least one other supplier team. Multi-sourcing implies the situations where a set of suppliers work together to deliver integrated services to their client. Suppliers must collaborate with others when delivering services. Therefore, apart from client-vendor interactions, multi-sourcing usually involves the interactions or information exchange among multiple suppliers. It is worth to notice that ‘selective sourcing’ is not the focus of this research. Although ‘selective sourcing’ also implies multiple vendors, the vendors actually work on independent tasks, which is similar to single-sourcing. Also, the supplier firm has high interaction frequency with other supplier teams in a multi-sourcing engagement, so that they may experience all the potential issues when delivering tasks in multi-sourcing.

Secondly, the nature of the project should concentrate on IT outsourcing (ITO) and business process outsourcing (BPO) rather than manufacturing and retail outsourcing. ITO consists of a wide array of services from Infrastructure Management Services (IMS), Application Development (AD), Application Maintenance (AM) to IT consulting, R&D, etc. (Software, 2004; Beulen et al., 2005). BPO includes a number of services, such as back end data processing, HR, Finance and call centre operations, design & product development, etc.

Third, the supplier firm shows an interest in the topic of multi-supplier outsourcing projects; this interest includes a willingness to discuss their multi-sourcing challenges and give access to key team members for interviews, relevant documentation and meetings, and so on.

For reasons of feasibility, the scale of supplier team should be medium to large size (about 10 to 30 people). The projects with sites in different continents (such as the US, Europe, and Asia/Pacific region) were preferred, as it may bring different insights and diverse knowledge across the projects in different markets. The tasks shared between different suppliers are not necessarily complex (such as application development), bug-fixing may be selected as long as the work involved collaboration between suppliers.
Finally, three multi-sourcing engagements that met the above criteria were selected in this research.

- **Case 1**: Pactera Microsoft Account – localization and testing of Microsoft software.
- **Case 2**: TCS BA Account – development, implementation and integration of British Airways’ IT applications and services.
- **Case 3**: TCS Lloyds Account – development and implementation of IT platform and IT-related services for Lloyds Bank.

All of the three cases investigated in the study satisfy the above three criteria. Before going to data collections, an interview protocol was developed (see Table 7), which fits within the conceptual lens and research questions. The interview questions were designed for semi-structured interviews. The interviewees from the Pactera case are all Chinese, so the interview questions were translated into Chinese and sent to Pactera before the interviews took place.

**Table 7: High-Level Interview Guidelines**

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>QUESTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>What is your role in this team? Which aspects do you concentrate on?</td>
</tr>
<tr>
<td>Project Overview</td>
<td>Why did your firm decide to engage in this multi-sourcing project?</td>
</tr>
<tr>
<td></td>
<td>What are the tasks to be completed, and how are they interrelated?</td>
</tr>
<tr>
<td></td>
<td>How many other suppliers are involved? How is the structure of this project</td>
</tr>
<tr>
<td></td>
<td>organized?</td>
</tr>
<tr>
<td></td>
<td>Which parts of the function are your firm undertaking? Is there any</td>
</tr>
<tr>
<td></td>
<td>particular service integrator or is your company playing this role?</td>
</tr>
<tr>
<td>Challenges</td>
<td>What are the advantages and disadvantages of working with other suppliers?</td>
</tr>
<tr>
<td></td>
<td>What issue arises due to the inter-dependence of multi-sourced tasks?</td>
</tr>
<tr>
<td></td>
<td>What are the key challenges or differences that can be identified when</td>
</tr>
<tr>
<td></td>
<td>engaging in a multi-sourcing project?</td>
</tr>
<tr>
<td>Inter-supplier</td>
<td>What are the main mechanisms for coordinating with the client and other</td>
</tr>
<tr>
<td>Coordination (on Integration)</td>
<td>What types of coordination approach or mechanisms need to be imposed</td>
</tr>
<tr>
<td></td>
<td>when working with other supplier partners?</td>
</tr>
<tr>
<td></td>
<td>How does your firm, the client firm or other suppliers stimulate</td>
</tr>
<tr>
<td></td>
<td>inter-organizational coordination?</td>
</tr>
<tr>
<td>Inter-supplier</td>
<td>How is the multi-sourcing project controlled/governed by the client?</td>
</tr>
<tr>
<td>Coordination</td>
<td>How are your collaborative agreements (e.g., SLAs and OLAs) with other</td>
</tr>
</tbody>
</table>
3.3 Data Collection Process

3.3.1 Pactera Microsoft Account

The data collection involved semi-structured interviews with Pactera employees in various roles. Between 7 May 2014 and 9 May 2014, Professor Julia Kotlarsky and I (the researchers) conducted thirteen interviews in Pactera’s Beijing office. Each interview lasted 45-90 minutes. The designations of the people interviewed were as follows: the CMO of Pactera, Vice President (Marketing), Vice President (Microsoft Projects), senior project manager (Microsoft projects), several project managers, leads and engineers. All the interviews were audio recorded and later transcribed. My supervisors (Professors Ilan Oshri and Julia Kotlarsky) also asked for some internal project documents, contract details, and direct observation opportunities. However, owing to Microsoft projects’ security issues, Pactera was reluctant to provide such access for us. Therefore, the data was collected mainly from on-site interviews, coupled with the informal conversations with managers in Pactera and information from public reports. Table 8 summarizes the names of interviewees, their roles, and the specific application they were responsible for.

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Job Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-May-14</td>
<td>Zili Tong</td>
<td>VP of MSODC Beijing</td>
</tr>
<tr>
<td>6-May-14</td>
<td>Jeff Wu</td>
<td>CMO</td>
</tr>
<tr>
<td>6-May-14</td>
<td>Ken Schulz</td>
<td>VP of Marketing</td>
</tr>
<tr>
<td>7-May-14</td>
<td>Yang Yu</td>
<td>Senior Project Manager</td>
</tr>
<tr>
<td>7-May-14</td>
<td>Jiabo Wu</td>
<td>Project Manager, Microsoft Office</td>
</tr>
<tr>
<td>7-May-14</td>
<td>Haifang Wang</td>
<td>Project Manager, Microsoft Office</td>
</tr>
<tr>
<td>7-May-14</td>
<td>Huiyan Zhao</td>
<td>Engineer, Microsoft Lync</td>
</tr>
<tr>
<td>7-May-14</td>
<td>Wenting Jin</td>
<td>Engineer, Microsoft Office</td>
</tr>
<tr>
<td>8-May-14</td>
<td>Chen Li</td>
<td>Engineer, Microsoft Office</td>
</tr>
<tr>
<td>8-May-14</td>
<td>Jing Zhan</td>
<td>Engineer, Microsoft Office</td>
</tr>
<tr>
<td>8-May-14</td>
<td>Luxuan Wang</td>
<td>Lead, LOC Service</td>
</tr>
<tr>
<td>8-May-14</td>
<td>Lisha Ma</td>
<td>Engineer, Microsoft Office</td>
</tr>
</tbody>
</table>
3.3.2 TCS BA Account

The data collection involved semi-structured interviews with TCS on-site employees in various roles. Between 29 October 2014 and 30 October 2014, Professor Julia Kotlarsky and I conducted fourteen interviews at British Airways Head Office (Waterside, London). The empirical investigation included visits to the BA Head Office in London, and three phone interviews with on-site employees based at the BA Newcastle office. Each interview lasted about 30 minutes. All the interviews were audio recorded and then transcribed. The designations of the people interviewed were: TCS relationship manager for BA/IAG, head of delivery, programme managers, project managers, technical architect, technical leads and developers. The data was collected mainly from on-site interviews and three telephone interviews, coupled with informal conversations with the relationship manager and information from public reports. Table 9 summarizes the details of interviewees: names, roles and locations.

### Table 9: Interviewees of Case 2

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Job Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-Oct-14</td>
<td>Vishwas Dubey</td>
<td>TCS Relationship Manager</td>
<td>Waterside</td>
</tr>
<tr>
<td>29-Oct-14</td>
<td>Ganesh Kannan</td>
<td>Developer</td>
<td></td>
</tr>
<tr>
<td>29-Oct-14</td>
<td>Paulami Dutta</td>
<td>Project Manager</td>
<td></td>
</tr>
<tr>
<td>29-Oct-14</td>
<td>Mohan Kumar</td>
<td>Delivery Head</td>
<td></td>
</tr>
<tr>
<td>29-Oct-14</td>
<td>Ayyappan Mohandoss</td>
<td>Head of Support</td>
<td></td>
</tr>
<tr>
<td>29-Oct-14</td>
<td>Nancy Malik</td>
<td>Developer</td>
<td></td>
</tr>
<tr>
<td>29-Oct-14</td>
<td>KrishnaMurty Bhamidipati</td>
<td>Program Manager</td>
<td></td>
</tr>
<tr>
<td>30-Oct-14</td>
<td>Anurag Chatterjee</td>
<td>Developer</td>
<td>Newcastle</td>
</tr>
<tr>
<td>29-Oct-14</td>
<td>Abhishek Mukherjee</td>
<td>Technical Architect</td>
<td></td>
</tr>
<tr>
<td>30-Oct-14</td>
<td>Ponvizhi Ramasamy</td>
<td>Program Manager</td>
<td></td>
</tr>
<tr>
<td>30-Oct-14</td>
<td>Vishwas Dubey</td>
<td>TCS Relationship Manager</td>
<td>Waterside</td>
</tr>
<tr>
<td>30-Oct-14</td>
<td>Jyothi Monala</td>
<td>Technical Lead</td>
<td></td>
</tr>
<tr>
<td>30-Oct-14</td>
<td>Abilash Madhavan</td>
<td>Technical Lead</td>
<td>Newcastle</td>
</tr>
<tr>
<td>30-Oct-14</td>
<td>Aswini Dasika</td>
<td>Technical Lead</td>
<td>Newcastle</td>
</tr>
</tbody>
</table>
3.3.3 TCS Lloyds Account

The empirical investigation included a visit to Lloyd’s Red Lion Court in London, and four telephone interviews with on-site employees based at the TCS Edinburgh office. Each interview lasted about 30 minutes. All the interviews were audio recorded and then transcribed.

On 20 November 2014, Professor Ilan Oshri and I (the researchers) visited Lloyd’s Red Lion Court and interviewed six TCS on-site people, consisting portfolio managers, project managers, and technical leads. Four additional employees (consisting portfolio managers, developers, and employees from the TCS Academy) were interviewed via a conference call on 27 November 2014; these were conducted by Professor Julia Kotlarsky and me. Table 10 summarizes information for interviewees: names, roles and locations.

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Job Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-Nov-14</td>
<td>Lavakumar Mukka</td>
<td>Engagement Manager</td>
<td>London</td>
</tr>
<tr>
<td>20-Nov-14</td>
<td>Anbumani Dhayalan</td>
<td>Platform Lead</td>
<td></td>
</tr>
<tr>
<td>20-Nov-14</td>
<td>Subhav Mahaveer</td>
<td>Program Manager</td>
<td></td>
</tr>
<tr>
<td>20-Nov-14</td>
<td>Varma Kishore Gottunukkala</td>
<td>Technical Lead</td>
<td></td>
</tr>
<tr>
<td>20-Nov-14</td>
<td>Prasad Chelikani</td>
<td>Environments Delivery Manager</td>
<td></td>
</tr>
<tr>
<td>20-Nov-14</td>
<td>Sunil Kumar</td>
<td>Platform Lead, Relationship Manager</td>
<td></td>
</tr>
<tr>
<td>27-Nov-14</td>
<td>Vjirumbhan Lade</td>
<td>Program Manager</td>
<td></td>
</tr>
<tr>
<td>27-Nov-14</td>
<td>Kapila Khaded</td>
<td>Portfolio Manager</td>
<td></td>
</tr>
<tr>
<td>27-Nov-14</td>
<td>Padam Singh Yadav</td>
<td>Project Manager</td>
<td></td>
</tr>
<tr>
<td>27-Nov-14</td>
<td>Priti Yadav</td>
<td>Developer</td>
<td></td>
</tr>
</tbody>
</table>

3.4 Data Processing and Analysis

Each multi-sourcing engagement represents a case with sub-cases as the unit of analysis. Informed by the theoretical lens proposed in Chapter 2 (see Figure 5), each engagement was split into projects that begin with a task inter-dependence (i.e. input) and end with supplier effort (i.e. outcome) occurred in an inter-supplier coordination process. The analysis of empirical data was conducted in an iterative way: findings of earlier phases informed later stages, and vice versa (cf. Huber et al. 2014).
Phase 1 – Understanding Project Context. The first analysis was based on the description of the projects and their organizational and technological context (cf. Faems, Janssens, Madhok, & Van Looy, 2008; Jain, Simon, & Poston, 2011). At the end of this phase, a basic understanding was gained of the services provided by TCS/Pactera (i.e., the suppliers studied), as well as the services provided by other suppliers. An attempt was also made at this stage to identify the workflow between multiple supplier teams.

Phase 2 – Pattern Matching. The second phase was also primarily built on the transcripts of interviews, but the focus is to identify different types of task inter-dependence. During this stage, the understanding of the workflow for each project in phase 1 helped me to match the task inter-dependence I have observed with the types of inter-dependence studied in previous research. The results of this phase are several preliminary reports which summarise task inter-dependence of each project. In addition, the findings were presented and discussed at internal seminars and workshops, these efforts were made to further improve internal validity.

Phase 3 – Data Coding and Sorting. The third phase relied on an iterative reading of the data using open-coding techniques (Corbin & Strauss, 2014). In this stage, collected data was analysed via Nvivo 10 so as to code and group these codes into themes (Bringer, Johnston, & Brackenridge, 2004). Codes, which are chunks of texts that are partial or complete sentences or expressions describing specific activities (Corbin & Strauss, 2014), were associated with categories, subcategories, and concepts.

For example, the sentence ‘Chinasoft and Pactera need to work together to figure out what we need to do for the next step’ illustrates coordination activities (i.e. planning and scheduling with others): therefore, following open-coding technique, they were marked as codes. Likewise, phrases ‘check in advance to see if this kind of issue has to be filed for Wipro’ and ‘PMs from Pactera, Chinasoft and Microsoft will discuss the KPIs’ illustrate coordination practices (i.e. updating work status among vendors and clarifying responsibility and rules among suppliers, respectively), therefore they were marked as codes.

Then I abstracted conceptual categories from the empirical data through grouping codes that
share something in common into broader themes (Strauss and Corbin 1998). Codes illustrating (i) coordination challenges, and (ii) managerial practices, which were discovered from the empirical data during step 1, were consolidated into broader themes (referred to as categories) and categories were classified into concepts. This data sorting and linking approach is illustrated in Figure 6: The Data Sorting Approach.

When analysing suppliers’ coordination challenges, alignment- and accountability-specific issues identified in the theoretical lens (Figure 5) served as concepts. Thus, statements illustrating coordination challenges were coded, then codes were consolidated into broader themes (categories): each category represented a specific type of coordination challenges. Finally, each category was connected to one of the two existing concepts (alignment- and accountability-specific issues). If a coordination challenge could not be associated with any of existing two types, a new type was identified (a new concept emerged). Such sorting process was continually conducted until no new concept or categories emerged. The coding of coordination practice followed the same procedure. For example, managerial practice is a concept; coordinating task inter-dependence is one of the categories that represent managerial practice (i.e. concept); and aligning plans and schedules with others, paying attention to work status of others, requiring information from other and clarifying information for other are four codes that represent coordinating task inter-dependence (i.e. the category). Based on this approach, the managerial practices in Chapters 4, 5 and 6 were classified and presented into four broad categories: (i) coordinating task inter-dependence, (ii) dealing with accountability issues, (iii) facilitating supplier cooperation, and (iv) coping with supplier competition.
3.5 Research Quality

Validity is the extent to which the data and findings of the research are ‘true’ and ‘accurate’ (Collis & Hussey, 2003). The validity of a case study aims to address the issue of credibility (Yin, 2014). In particular, the validity of interpretive research has three aspects: construct validity, internal validity, and external validity.

**Construct validity** refers to establishing correct measures for the concepts being studied (Yin 2014). Multiple sources of evidence can provide multiple measures of the same phenomenon (Yin, 2014) and ensure stronger substantiation of constructs and hypotheses (Eisenhardt, 1989). Therefore, the tactic of gathering evidence from a variety of sources is adopted in this research. In addition, establishing a chain of evidence is proposed by Yin (2014) to track the original collected data. By including quotes from interviews, this research makes the chain of evidence transparent. Another approach to increase the validity of research is having multiple investigators (such as working with the author’s supervisors). By doing this, biases caused by personal characteristics of single investigator should be reduced (Eisenhardt, 1989).

**Internal validity** implies that a research underpins his/her causal claims or explanations as strongly as possible. In order to establish internal validity, a researcher compares predicted patterns with those found in an empirical case (Yin, 2014). Before data collection, the author reviews relevant literature and draws initial assumptions on patterns likely to be found in actual cases. Having elaborated and analyzed the three cases, this study includes an integrative chapter that brings together expected and actual patterns. Additionally, the approach of multiple investigators is also adopted as it allows multiple perceptions to clarify meaning and enhances confidence in the findings (Eisenhardt, 1989).

**External validity** implies the generalizability of the research findings (Yin, 2014). For qualitative research, the word ‘generalization’ means ‘replication logic’ rather than ‘statistical generalization’. Drawing on the literature review, an indicial research framework was developed and it was consistently used for guiding the empirical research. These results are presented and summarized in Chapter 2. Then, three case studies were carried out to assess replication of the findings. In addition to the analysis of each case, a cross-case analysis was
conducted in this research. This enables identification of recurrent themes and strengthens applicability of research findings (Yin, 2014).

**Reliability** indicates whether the research process (such as the data collection and procedures) is independent from the researcher (Yin, 2014); namely, the research can be repeated with the same results. A reliability test aims to minimize the errors and biases. Yin (2014) suggests two approaches to ensure reliability: case study protocol and case study database. In this research, data collection was guided by an interview protocol which is designed to capture key concepts identified in the theoretical lens. Furthermore, interviews were recorded and transcribed. Third, using Nvivo allows systematic and consistent analysis of qualitative data (Bringer et al., 2004).

In summary, four tests are used to improve the quality of this research: construct validity, internal validity, external validity, and reliability. Table 11 describes the four quality criteria and the tactics used in this research.

<table>
<thead>
<tr>
<th>Tests</th>
<th>Tactics used in this Research</th>
</tr>
</thead>
</table>
| **Construct Validity** | * Multiple sources of evidence  
                     | * Establishing chain of evidence  
                     | * Multiple investigators        |
| **Internal Validity**   | * Analytical lens                                 |
| **External Validity**   | * Analytical lens                                 |
| **Reliability**         | * Case study protocol  
                     | * Case study database  
                     | * Qualitative software (i.e., Nvivo) |

Table 11 Quality Criteria for Case study Research
CHAPTER 4 – THE PACTERA CASE

4.1 Background

4.1.1 Company Profile of PACTERA

Pactera Technology International Ltd. (Pactera) is a leading consulting and IT service provider in China. In 2012, Pactera was formed through a ‘merger of equals’ between two leading Chinese IT services firms: HiSoft Technology International Ltd and VanceInfo Technologies Inc. In 2014, Pactera became part of the Blackstone Portfolio. Since 1995, VanceInfo Technologies Inc. has provided consulting, solution and outsourcing services for more than 70 multinational and domestic companies, spanning many industries. With its global headquarters located in Beijing (China), Pactera’s operations now span the North America, Europe and the entire Asia Pacific, with 35 offices and offshore delivery centres located in the US, Europe, Australia, Japan, Singapore, Malaysia, and China. Since the time of merger, Pactera employs more than 23,000 people across the world. Most of Pactera’s clients come from the technology industry, the banking and financial services, and the insurance industry; historically, these industries have represented a significant proportion of outsourcing spending.

Aiming at being a ‘partner for a new era’, Pactera offers IT and business process outsourcing project execution in a variety of onshore and offshore delivery models, depending on the nature of the work and the client’s needs. Pactera claims its Offshore Development Centre (ODC) has created significant value for its clients, such as IBM and Microsoft, stretching over multiple decades. Pactera’s offshore development centres have been awarded several industry-leading certifications, such as CMMI and ISO 2000.

4.1.2 Case Description

This research focuses on Pactera’s long-term outsourcing engagement with its key client – Microsoft. As a leading multinational software corporation in the world, Microsoft needs to localize a wide range of its software products (such as MS Office, MS Windows) into various languages. Localization includes engineering, translation, testing and release management.

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4 www.macroaxis.com/invest/market/PACT--Pactera-Technology-International-Ltd
5 www.pactera.com/about
Since 2006, Microsoft has decided to outsource its part of the localization work to external service providers. Microsoft needed to localize a series of software in about nineteen languages. Pactera took ownership of the localization testing services for different Microsoft software products.

As one of the strategic partners of Microsoft⁶, Pactera has more than 1,500 employees who are currently working on the Microsoft-Pactera engagement, located in different delivery centres around the world (on-site and off-site centres). In Beijing, Pactera has established a dedicated Microsoft Offshore Development Centre (MS ODC). Although in the same Pactera building in Zhongguancun Software Park (Beijing), the MS ODC is located separately from Pactera’s other offices with a strict security procedure. The total space of the MS ODC is more than one thousand square meters. The facility is very well-equipped and connected directly to the same network of Microsoft – Microsoft Corpnet.

Since 2013, Microsoft has increased volumes drastically and Pactera faced throughput issues. Therefore, Microsoft started the multi-sourcing initiative. For instance, Microsoft has introduced Chinasoft as the second supplier for its software products. Therefore, localization testing services are currently divided between Pactera and Chinasoft. During the early stage, the testing work was divided according to the languages; which implies that each firm was responsible for several languages. More recently, services have been divided by different applications; this means each company is responsible for all the languages’ localization of the assigned application.

At the time of the research, there were about 67 experienced off-site team members devoted to the testing work in Beijing: project managers (PMs), leads, engineers (including test analysis specialists and testing engineers). Figure 7 depicts the organizational structure of Pactera Beijing offshore employees for the Microsoft project. The project manager of Pactera became the main contact person to communicate with external teams (including various teams of Microsoft and Chinasoft).

In the Microsoft project, Microsoft took ownership of the entire localization workflow, from the engineering, translation and testing to release management. The localization testing services were delivered by Pactera and other suppliers (for instance, Chinasoft and Wipro) in a collaborative manner. More specifically, for the research, four subcases (i.e., specific projects) were studied, namely, MS Office (including Word, Outlook, and OneNote), MS Windows, MS Lync and LOC Service. The following sub-sections will elaborate these four projects.

**Project 1 – Localization Testing of Microsoft Office (MS1)**

Microsoft Office is an office suite of desktop applications, servers and services for the Microsoft Windows and iOS operating systems. There are various different applications, including Word, Excel, PowerPoint, Outlook, OneNote, Visio, to name but a few. In this project, Pactera did the localization testing for the newly added features of Microsoft Office.

It was noted that Microsoft had adopted two different strategies when they assigned the testing work to Pactera and Chinasoft. In the first period, the testing work of MS Office 15 was divided by languages; this means Pactera and Chinasoft were responsible for the testing of some specific languages. After that, the testing work of MS Office 16 was divided by applications, meaning that each supplier was responsible for all the languages of several specific applications, and Pactera and Chinasoft testing teams worked on the same or similar protocol.
In terms of the team composition, there were four to five PMs and roughly 70 engineers in Pactera MS ODC. In particular, there were two different roles for the engineers in the testing team: some of the engineers were responsible for creating test cases, which was referred to as OST in Pactera, while some of the engineers were responsible for testing each test pass, which was referred to as OET in Pactera. In addition, the testing of Microsoft Office involved several external members. Some of these members came from other companies, while others were external teams for Pactera. More specifically, there were: the Microsoft IPE team (approximately 20-30 people) based in Redmond; the Microsoft IPM team (approximately 20-30 people) based in Dublin; the Chinasoft IPE team based in Redmond; the Chinasoft testing team based in Beijing, and several Pactera project managers based in Dublin and Redmond. In the Microsoft Windows project, the main task of localization testing was organized by the Microsoft team, and the localization testing task was performed by Pactera and Chinasoft. In addition, the Chinasoft IPE also had to fix the bugs reported by the testers from Pactera and Chinasoft.

*Project 2 – Automation Testing of Microsoft Lync (MS2)*

Similar to Windows Live Messenger, Microsoft Lync is an instant messaging tool. However, it has a different feature set that is targeted towards corporate environments. In this project, two suppliers – Pactera and Chinasoft – were introduced to conduct the automation testing for Microsoft Lync. In terms of the team composition, there were two engineers from Pactera Beijing and four engineers from Chinasoft Beijing. Microsoft FTEs in Dublin were also involved in this task. Although both Pactera and Chinasoft were doing the automation testing for Lync, they were responsible for two different platforms.

*Project 3 – Compatibility Testing of Microsoft Windows (MS3)*

Microsoft Windows is a series of graphical interface operating systems, including various versions. In this project, two suppliers – Pactera and Wipro – were dedicated to the compatibility testing of the latest Microsoft Windows builds. Focusing on third party applications from the local market, their work involved finding and reporting bugs to Microsoft FTE. Pactera was responsible for international applications compatibility while Wipro was responsible for English applications compatibility. Key stakeholders in this project involved Microsoft FTE (Redmond and Dublin), Wipro (India) and Pactera (Beijing).
**Project 4 – LOC Service (MS4)**

The LOC Service project differed from the previous three in that it did not focus on the testing of specific Microsoft software. Instead, Pactera was responsible for the development of various internal tools, such as LOC service. These tools were used in the SQL localization team and to support their localization testing work. In this project, Pactera’s main task was to help their users to resolve issues and unblock their jobs. There were 30 to 40 users, including IPMs (who came from Microsoft Redmond and Dublin) and IPEs (who came from Pactera and Chinasoft). In terms of the internal team composition, five engineers worked on development and coding for the LOC service. The LOC Service team in Pactera directly communicated with the project owner (Microsoft FTE at Redmond). The project owner verified and collected the issues from Redmond and assigned the task to Pactera through emails. The LOC Service team had to troubleshoot and address unexpected issues encountered by the users from different companies. Therefore, in addition to the communication with Microsoft FTEs, the LOC Service team also had to interact with the users from different companies, including the localization testing team at Chinasoft and Pactera.

The LOC service team provided technical support for the localization testing teams. Their users included the Pactera internal testing team, the Chinasoft testing team and the Chinasoft IPE team. Usually, the MS FTEs collected requirements from Redmond and assigned the task to the LOC service team at Pactera; each work was completed independently within the LOC service team. In addition, when Chinasoft employees had problems with localization tools, they depended on the LOC service team to solve their issues so that the testers could continue their work.

All these projects were under the umbrella of the multi-sourcing engagement between Pactera and Microsoft; therefore, they were analysed together as one ‘embedded’ case study (Yin 2014): the four projects in this case are sub-units analysis. An overview of the above four projects is provided in Table 12.

<table>
<thead>
<tr>
<th>Project</th>
<th>Task of Pactera</th>
<th>External Team Composition</th>
<th>Internal Team Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS1</td>
<td>Localization testing for the newly added features of 20-30 Microsoft IPE (Redmond)</td>
<td>4-5 PMs and roughly 70 engineers (OST and OET)</td>
<td></td>
</tr>
</tbody>
</table>
### 4.1.3 Team Composition in the Microsoft Project

A multi-sourcing project usually involves multiple teams from different organizations. In terms of the Microsoft multi-sourcing project, each sub-project (such as the localization of the Microsoft Office) consists of the Microsoft IPE team, Microsoft IPM team, Pactera testing teams, Chinasoft testing team, and Chinasoft IPE team.

iCrew is a basic organizational structure for each software product, containing three functional teams: International Project Managers (IPMs), International Project Engineers (IPEs), and Testers. Each function team involves full-time employees (FTEs) from various companies, including Microsoft, Pactera and Chinasoft.

IPMs focus on the localization work of the core product, creating the files based on the localized version, dividing localization testing work and ensuring work quality. IPMs are MS FTEs based in Dublin, Ireland.

IPEs focus on the application development and deal with the changes of the applications. IPEs consist of MS FTEs who are based in Redmond, US. In addition to Microsoft FTEs, Chinasoft IPE is responsible for the bug fixing work in the Microsoft multi-sourcing project.

Testers are mainly responsible for the applications’ testing work. Among all the testing work, MS FTE has only outsourced its non-functional testing tasks to external suppliers. For
instance, in the Pactera-Microsoft engagement, the localization testing is divided and assigned to Pactera and Chinasoft, both based in China.

It is important to acknowledge that some other suppliers may be involved in the Microsoft project; for example, the compatibility testing of Windows is divided and assigned to Pactera and Wipro, based in China and India, respectively.

### 4.2 Task Inter-dependence

Data from interview transcripts revealed that Pactera faced task inter-dependence in the Microsoft multi-sourcing arrangement. The inter-dependence varied from pooled, sequential, and integrative, and reciprocal to intensive in its nature. More specifically, Pactera encountered three types of inter-dependence, as analysed in the following paragraphs.

#### 4.2.1 Integrative Inter-dependence

Integrative inter-dependence refers to a situation in which similar tasks are separately operated by different suppliers; these parallel tasks need to be integrated or fitted, rather than there being a simple linear summation. Take MS2 as an example: Pactera and Chinasoft were dedicated to the automation testing of Microsoft Lync. As shown in Figure 8, the overall testing of Microsoft Lync was divided into two parts that addressed different components of the work (i.e., client site and website), as explained by the following interviewee:

> ‘We supported Microsoft Lync, worked on different platforms, such as the website, client site, so Pactera was responsible for the client site, and Chinasoft responsible for the website […] we should do the reporting to the same Microsoft guys.’ – Huiyan Zhao (Engineer, MS2)
Testers of Pactera and Chinasoft did their testing work in parallel as they were responsible for two different platforms of MS Lync. Each parallel task did not have much value in itself (i.e., the website and client site could not work separately); they acquired value as part of the integrated whole software. As the integration of the parallel stream of activities required a fitting or integration process (i.e., the modification of the source code by MS FTEs), actors in each of the individual parallel activities had to be aware of the status and changes of the others’ work. In the MS2 project, both Pactera and Chinasoft testers had permission to modify the source code of Microsoft Lync; before making any changes, it was necessary to get the latest version and source code, and avoid any conflicts before submitting changes.

'We are responsible for automation testing [...] we use the same tool, if each of us do some changes, other guys can see these changes. – Huiyan Zhao (Engineer, MS2)

'Every day or every week, we should do some operation to think the code, get the latest code.' – Huiyan Zhao (Engineer, MS2)

Apart from the MS2 project, pooled inter-dependence was also identified in the Microsoft Windows compatibility testing project (MS3). The integrative inter-dependence in MS3 is shown in Figure 9.

Apart from the MS2 project, pooled inter-dependence was also identified in the Microsoft Windows compatibility testing project (MS3). The integrative inter-dependence in MS3 is shown in Figure 9.

Testers of Wipro and Pactera tested the same Windows builds in the English and Dutch markets, respectively (i.e., working separately in parallel). This is supported by the following quote:

'I think that one (Wipro) would be the closest (supplier working with us), because both of us are doing application compatibility testing (app CMPT). The only difference between us is
they are doing only the English app CMPT in English languages, they won’t do it in Dutch or German, that’s us; they will do in UK or America, the apps written in English, that’s what they will focus on and we don’t. We only focus on non-English, international apps, so we don’t do English or Irish.’ – Maikel Lied (Lead, MS3)

As shown in Figure 9, although Pactera and Wipro operated their testing work on their own, they were testing the same Windows builds and Microsoft needed to integrate their outcomes (i.e., bugs) in the end. Thus, both Pactera and Wipro had to be mindful of the outcomes of one another. For instance, Pactera had to track what bugs had been reported by Wipro, so that they could avoid re-testing the applications.

‘We get a lot of bug information from them (Wipro), because usually they start the test pass a little bit earlier, probably because they have done work with Microsoft for a longer time, and so we get a lot of information from them; for example, we would get hands-up like there is a bug on this, for part of our testing is like test Window updates, there is a bug found there, they already found it, so we would get hands-up from them through the Microsoft FTE.’ – Maikel Lied (Lead, MS3)

Pactera and Wipro shared the same databases. Before reporting a bug into the database, Pactera had to check if any similar issues had been filed, in order to avoid duplication. This can be seen from the quote below:

‘Whenever they found a bug in the Microsoft database, you can track, so you can see the status of it, and when it is fixed, and as it is fixed, then you need to verify whether it is fixed or not […] We can see that, we are all sharing the same database.’ – Maikel Lied (Lead, MS3)

4.2.2 Sequential Inter-dependence

Sequential inter-dependence refers to the situation where one supplier’s work is handed-off to the next supplier, each supplier adding incremental value to the whole project in a serial manner. The MS1 project was a typical example of sequential inter-dependence. The sequential inter-dependence in MS1 is shown in Figure 10.
Typically, a bug was found and reported by a tester from either Pactera or Chinasoft. After that, Chinasoft IPEs had to add some detailed information about the reported bugs. Then the bug was assigned to Microsoft/Chinasoft FTEs for fixing. When the bug was resolved by Microsoft/Chinasoft FTEs, the information was sent back to Chinasoft IPEs. After verification by Chinasoft IPEs, it was assigned back to Pactera. Once again, the testers of Pactera had to verify the bug and close the bug. The work flowed from the Pactera to Chinasoft IPEs, to Chinasoft/Microsoft FTEs, and then flowed back. Each supplier team performed its own task separately, but each team needed to hand-off its work to the next, and there were noticeable temporal lapses. The following interviewee describes the workflow between Pactera and Chinasoft in detail:

‘Basically, the (Chinasoft) IPE is responsible for the bug fixing, and we log bugs and they will input some detailed information about the bugs, and then, and they will assign the bugs to their FTE, so their FTE resolve the bugs, assign them back to Chinasoft IPE and then they will verify it. And if the bug is resolved, they will assign them back to us, so we verify it and close the bugs.’ – Chen Li (Engineer, MS1)

The following conversation between the interviewer and Wenting Jin (Engineer, MS1) also suggests the sequential nature of task inter-dependence between Pactera and Chinasoft IPEs:

- Chinasoft is taking care of bug fixing, so when our bugs have some problems, we need to confirm with them.
- So, basically, if you came across some bugs, then they will…?
- Go to Chinasoft.
- And then? When they fixed the bugs?
4.2.3 Reciprocal Inter-dependence

Reciprocal inter-dependence means a cyclical situation where the output of one supplier is regularly used as the input of another supplier. An example would be the communication between suppliers in the MS4 project. The reciprocal inter-dependence in MS4 is shown in Figure 11.

Pactera provided the LOC service (specific localization tools) to support the testing work of from Chinasoft and Pactera. Any issues or bugs of these localization tools were passed from the users (i.e., testers from Chinasoft or Pactera) to Pactera’s LOC service teams, who, in turn, provided troubleshooting services (i.e., resolved the issues) to their users. The communication between the LOC service team (i.e., Pactera) and the testing team (either Chinasoft or Pactera) was not unidirectional, as it would go back and forth between them to find out the problems and address them. The normal procedure of Pactera work is described by the following interviewee:

‘When the users (for instance, Chinasoft IPEs) encountered the issues of the tools or the tools have bugs, if the user wants to report this error, the user clicks yes, we will get the information, an email information about this. Usually, we can’t just resolve the issue just through the emails, we have to follow up with the specific supplier and I meet with this user and we will ask for the report steps and she will reply to me. I will maybe through the Lync talk to her to share her screenshot with me and I will get into her testing environment to see where the real issue is.’ – Luxuan Wang (Lead, MS4)

In summary, three different types of inter-supplier task inter-dependence were encountered by Pactera (see Table 13). Many challenges or managerial issues emerged when Pactera experienced these task inter-dependences. As can be seen from the above analysis, in order
Chapter 4 – The Pactera Case

to manage different types of task inter-dependence, various coordination activities were adopted by Pactera. The various implications of task inter-dependence on the suppliers' coordination efforts will be further discussed in Chapter 7.

Table 13: Inter-dependencies in the Four Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Inter-dependence</th>
<th>Stakeholder(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS1</td>
<td>Sequential</td>
<td>with Chinasoft IPEs</td>
</tr>
<tr>
<td>MS2</td>
<td>Integrative</td>
<td>with testers of Chinasoft</td>
</tr>
<tr>
<td>MS3</td>
<td>Pooled</td>
<td>with testers of Wipro</td>
</tr>
<tr>
<td>MS4</td>
<td>Reciprocal</td>
<td>with testers of Chinasoft</td>
</tr>
</tbody>
</table>

4.3 Managerial Practices

Pactera’s managerial challenges and their coping practices are grouped into four specific categories (as is described in Section 3.4 Data Processing and Analysis), and they are analysed in the following sub-sections.

4.3.1 Practice I: Coordinating Task Inter-dependence

As analysed in section 4.2, the services provided by Pactera, Chinasoft and Wipro were inter-dependent in different forms. The findings of this case study revealed that Pactera came across a number of challenges when performing inter-dependent tasks in a multi-supplier context.

One of the managerial challenges that Pactera encountered in the multi-sourcing relationship was work hand-offs between suppliers. Pactera and Chinasoft could not rely on the transference of information or documents in work hand-overs; extensive communication and clarification efforts were required. For instance, once a tester from Pactera found a bug in Microsoft Office, he/she had to report this bug to Chinasoft IPE for bug fixing. However, transferring the bug information from the testers of Pactera to Chinasoft IPEs was not an easy process. This was mainly because the Chinasoft IPEs were not using the same testing environment and testing approach, so the testers of Pactera needed to provide more information and clarification to Chinasoft IPEs. This could be a typical challenge for Pactera when handing over its work to Chinasoft, and this challenge is indicated by the following quote:

‘Sometimes they (Chinasoft IPEs) are not very familiar with the apps, and they may need...’
you to re-provide more information about the testing environment, and some build information, because we have a different kind of build, maybe they don’t know how to build the environment, they also need your help.’ – Chen Li (Engineer, MS1)

Another managerial challenge that Pactera encountered was task-related conflict between suppliers. As described in the MS2 project, testers from Pactera and Chinasoft were simultaneously performing parallel tasks. As the same source code of Microsoft Lync could be edited by Pactera or Chinasoft, it was very likely to come across conflict when both of the suppliers were editing the same source code or submitting changes. Therefore, mitigating and resolving conflicts between suppliers brought another challenge for Pactera. This is supported by the following quote:

‘In the document, you (want to) insert a picture, I also want to insert a picture, we should have some talks and choose (which picture can be inserted). Before I submit my changes, I should resolve all the conflicts.’ – Huiyan Zhao (Engineer, MS2)

In a similar vein, avoiding work duplication was observed as another managerial challenge for Pactera in the MS3 project. Although focusing on different markets, Wipro and Pactera tested the same builds of Microsoft Windows. Thus, the same bugs could be found and reported by the testers for both suppliers. This created the necessity of reducing work duplication. The issue of work duplication is indicated by the following interviewee:

‘Usually, whenever they find an issue, most of the time we find it as well, because they don’t have the time to update the source code or bug fix. We have to check the database to see if similar issues have been filed, if it is the same issue we do not file it because it is a duplicate.’ – Maikel Lied (Lead, MS3)

Process integration with other suppliers was one of Pactera’s management concerns in this multi-supplier scenario. This was mainly because each supplier’s testing process and their understanding were different; Pactera had to deal with these issues with its peer suppliers. In light of this, aligning the process with other suppliers created another managerial challenge for Pactera to keep pace with its peer suppliers. This challenge is mentioned in the following statement:

‘We do not have flexibility […] Process would be integrated with Microsoft, and even Chinasoft side.’ – Yang Yu (Senior Project Manager, MS1)

As can be seen from the above analysis, inter-supplier task inter-dependence resulted in
various management issues and challenges for Pactera. In order to manage these challenges and achieve efficient inter-supplier coordination, Pactera adopted various coping coordination practices; these managerial practices are analysed and exemplified in the following paragraphs.

1) Aligning Plans and Schedules with Others

As both Pactera and Chinasoft were operating inter-dependent services simultaneously, the unpredictability/uncertainty of Chinasoft’s timeline could impede Pactera’s work progress. In order to reduce this uncertainty, Pactera had to spend some time and effort to manage their project plans and schedules in accordance with the other supplier’s timelines and deliverables. Take the MS1 project as an example, the connected activities – testing, bug reporting and bug fixing – had to be well aligned, requiring a close interaction between Pactera and Chinasoft IPE. In light of this, the planning and scheduling in multi-sourcing could not be completed by one supplier alone: both Pactera and Chinasoft had to be aware of each other’s timelines and deliverables. This required Pactera to communicate with employees from Chinasoft, so as to develop appropriate plans and schedules. Pactera’s efforts in planning and schedule management are supported by the following quotations:

‘Chinasoft and Pactera need to work together to figure out what we need to do for the next step [...] We usually talked about testing schedule, test scope, block issues, and maybe potential risk or something.’ – Haifang Wang (Programme Manager, MS1)

‘We have to talk to different people, so that we can get that schedule working more properly, what’s the new change for the assignments, so basically, we have to talk to the people in Chinasoft.’ – Yang Yu (Senior Project Manager, MS1)

2) Paying Attention to Each Other’s Work Status

In the MS2 project, testers from both Pactera and Chinasoft had permission to change and edit the same source code, so it became necessary for both suppliers to check and get the correct version of the source code before testing. This coordination activity was adopted to reduce potential conflict in bug fixing and the re-work of testing. As indicated by the following interviewee:

‘We should put our status to the Notebook [...] every day or every week, we should do some operation to get the latest code.’ – Huiyan Zhao (Engineer, MS2)
'Before I submit my change, I should resolve all the conflict.' – Huiyan Zhao (Engineer, MS2)

This coordination practice – checking each other’s work status – was also found in the MS3 project. Although the testers in Pactera and Wipro did not need to change the source code, it was still necessary for Pactera testers to be aware of what bugs had been reported, to avoid duplication of bug information and reduce the likelihood of re-testing the same issue. Checking made sure that Pactera did not report the same bugs already filed by Wipro, as can be seen in the following quote:

‘(We) have to check in advance to see if this kind of issue has been filed by (Wipro), regardless of languages, to avoid duplicates.’ – Maikel Lied (Lead, MS3)

3) Requiring Information from Each Other

When testing the Microsoft software, Pactera also needed to capture task-related information or requirements (such as testing details) from other suppliers, rather than from the client firm. The efforts taken to obtain such requirements were noticeable in the MS1 project, where testers from Pactera had to communicate with Chinasoft IPEs to confirm specific testing requirements. For instance:

‘Sometimes, you know, there are strings we need to test, but sometimes they have not been checked in build; the strings have been checked in but not included on the current build we are using, so sometimes we will contact the IPE to confirm issues like this, so we will not file bugs for the strings that haven’t been seen by us […] Some languages have been translated but some strings have not, so sometimes we will raise a question with Chinasoft IPEs.’ – Jing Zhan (Engineer, MS1)

Such efforts were also observed in the MS4 project. The LOC service team from Pactera had to communicate with their users (for instance, testers from Chinasoft) to gain a clear understanding of what the issues were and how they came about before resolving these issues. This can be seen from the quote below:

‘Most of the time, we need to get access to their computers, and get into their specific environments to troubleshoot […] we need to work with them, I mean (get access to) their environments to troubleshoot.’ – Luxuan Wang (Lead, MS4)
4) Clarifying Information for Each Other

As analysed earlier, the work transfer between suppliers was not an easy process, requiring communication and clarification efforts. In the MS1 project, bugs were found by Pactera and these bugs were reported to Chinasoft IPEs for fixing. However, only informing identified bugs to Chinasoft IPEs was seen to be insufficient; this was because Chinasoft IPEs required more detailed information of the bugs and how Pactera found the bugs (i.e., the testing approach). Pactera had to provide additional information according to Chinasoft IPEs’ requests, and to clarify any unclear issues. These activities are supported by the following statements:

‘Sometimes they (Chinasoft IPEs) are not very familiar with the apps, and they may need you to re-provide more information about the testing environment, and some build information, because we have a different kind of build, maybe they don’t know how to build the environment, they also need your help […] if (Chinasoft) IPEs cannot re-produce the steps, they will also email you, something like that. You need to re-provide more information about the bugs, and maybe you need to confirm with the IPE in Chinasoft, so something like that.’ – Chen Li (Engineer, MS1)

‘Sometimes they (Chinasoft) will ask us for help, such as the detailed information of the test pass, the build number, or anything else, or the (information of testing) environment. Sometimes, if they really cannot understand the bugs, they may call us, and we will have some discussion on the all steps.’ – Jing Zhan (Engineer, MS1)

‘If they Chinasoft IPEs) really don’t understand how the test is running, how did they get the bugs, then I need to (explain).’ – Lisha Ma (Engineer, MS1)

4.3.2 Practice II: Dealing with Accountability Issues

As noted by Wiener and Saunders (2014), inter-supplier inter-dependence also leads to limited transparency and accountability issues, such as the ambiguity in each supplier’s responsibility, hand-off points and interfaces. For example, the expectation between Pactera and Chinasoft were not clearly defined in the contract with the client, as indicated by the following interviewee:

‘But it (the contract) is not really in enough detail to say exactly what we are expected to do.’ – Yang Yu (Senior Project Manager, MS1)

Although supplier firms were independently accountable to the client through contracts, coupled with Service Level Agreements (SLAs), suppliers were not necessarily accountable
to each other”. As the work of Pactera and Chinasoft were inter-related, accountability issues could lead to some undesirable outcomes for Pactera, including performance prevention or work delays caused by the other supplier.

In the MS1 project, some bugs needed to be fixed before Pactera testers could continue their testing work. However, the bug fixing service was provided by the Chinasoft IPEs. If the bugs were not fixed on time, Pactera’s testing work would be delayed. The following quotes reveal what happened to Pactera when such issues arose:

> ‘If a bug is blocking a test case, we can’t run (testing).’ – Jiabo Wu (Project Manager, MS1)
> ‘Usually there will be some (testing) cases blocked by some kind of bugs, and our engineer will raise a flag to me, and if it is very urgent, we need to let the (Chinasoft) IPEs know to fix the bugs as soon as possible.’ – Haifang Wang (Project Manager, MS1)

In a similar vein, testers in the MS1 project could not start their testing until they received a clear testing specification. There was a negative influence on Pactera’s testing schedule if the task information was delayed, missing or changed by other suppliers. This is described by the following interviewee:

> ‘We cannot always get the information on time, so our test pass maybe cannot start at the right time, the test pass may be delayed, and some changes made […] If we cannot start the test pass on time, other test passes will also have some troubles about the resource problems.’ – Chen Li (Engineer, MS1)

In addition to testing the case source code, Pactera had to do the localization testing of ‘strings’. These strings (which were embedded in the software) were translated by another supplier. Therefore, Pactera’s testing work could stagnate if some of the strings were not completely translated for testing. This challenge is exemplified with the following quote:

> ‘Sometimes there are some strings, from the localization view, some languages have been translated but some strings are not, so sometimes we will raise a question to Chinasoft IPEs […] Sometimes, you know, there are strings we need to test, but sometimes they have not been checked in the build, some strings have been checked in but not included on the current build we are using, so sometimes we will contact the IPE to confirm issues like this.’ – Jing Zhan (Engineer, MS1)

In light of this, **performance prevention or work blocked by other suppliers** was highlighted as a coordination challenge for Pactera. In order to manage this challenge,
managers from Pactera paid particular attention to several coordination activities, including identifying inter-supplier inter-dependence as well as defining responsibilities, deadlines, budget and deliverables. The following sub-sections analyse several coping coordination practices which were adopted by Pactera.

5) Developing Mutual Agreements

In the context of the multi-sourcing arrangement, Operational Level Agreements (OLAs) can be co-established by all participating parties, by way of demarcating responsibilities among suppliers, and defining interaction for delivery of services. In the MS1 project, Pactera also spent time and effort in establishing collaborative agreements and regulations with other suppliers. For instance, before a project started, Pactera, Chinasoft and Microsoft had to work together and jointly develop the key performance indicators (KPIs) for each supplier; this practice was mentioned by a Pactera senior project manager:

‘(At the beginning of the project, we (PMs from Pactera, Chinasoft and Microsoft) will discuss the KPIs, and decide how we are going to monitor the health of the project [...] we do that effort jointly.’ – Yang Yu (Senior Program Manager, MS1)

In addition to identifying the performance indicators of each supplier, the agreements and rules between Pactera and Chinasoft also clarified the delivery time for bug fixing and turnaround time. For instance, once Pactera found and reported a bug to Chinasoft IPEs, Chinasoft IPEs needed to compete bug-fixing within a limited period. This is indicated by the quote below:

‘They (Chinasoft IPEs) are expected to fix the bug within around 30 days.’ – Haifang Wang (Project Manager, MS1)

6) Complying with Pre-designed Agreements

The case finding revealed that pre-designed rules and agreements between suppliers were followed by the Pactera team. Take the MS1 project as an example: when Pactera’s testers reported bugs, each bug had to be filed with a code, depending on its priority and severity. The same principle was followed by all the testers from Chinasoft. This is supported by the following quote:

‘If we log a bug in the product studio, there is an option called priority, and severity as well,
so when you flag it up like that, it means you need a reaction in 24 hours, so there is a kind of agreement with Chinasoft [...] So we have an agreement that it depends on the P-Priority, then you need to react on that, we try to follow that.' – Lisha Ma (Engineer, MS1)

The MS4 project illustrates another example. Testers from Chinasoft and Pactera used specific localization tools for testing, and they had to contact the Pactera LOC service team when they encountered operational issues. Chinasoft’s work would be stuck until the Pactera LOC service team solved the problem. Therefore, Pactera had to respond to their users and resolve their issues according to a pre-designed rule (e.g., a turnaround time). This is supported by the following quote:

‘Actually, if it isn’t a big issue, we will help them to resolve the issue in 24 hours, because we are in the same time zone, but if it needs some improvement or database improvement, it will be a little longer. I need to ask, I mean, my project owner. Let her know what’s going on, and if we need to publish an improvement version immediately, because if we update the tools, our production may affect other users, and she will evaluate if it’s worth doing it right now, or maybe later.’ – Luxuan Wang (Lead, MS4)

7) Jointly Monitoring Work Progress

In addition to performing the testing work, each supplier was also required to engage in a joint meeting, to update and understand each supplier’s outputs and deliverables. In the MS2 project, testers from Pactera had to spend time updating their work progress on a daily basis. The following quote describes how the project manager prepares for the review meeting:

‘Each guy should talk about what he did today, what issues you have today, such as these. Different people are responsible for different tasks, so you just should talk about your work, your issues […] For each meeting we should go through all the items we put on to the agenda […] I’ve mentioned we have two guys in Pactera […] I will collect both of our data together, and then put to Notebook.’ – Huiyan Zhao (Engineer, MS2)

8) Reminding Each Other

As mentioned earlier, late responses and work delays by the Chinasoft IPEs could impede Pactera’s work progress. This required Pactera to spend additional time and effort communicating with Chinasoft IPEs. In the MS1 project, Pactera’s testing work could be delayed until specific bugs were fixed. This was daunting when Pactera had to complete their testing within a tight schedule. Therefore, Pactera had to communicate with Chinasoft
IPEs and urge them to address the bugs. These efforts are referred to in the following quotes:

‘Usually there will be some (testing) cases blocked by some kind of bugs, and our engineer will raise a flag to me, and if it is very urgent, we need to let the (Chinasoft) IPEs know to fix the bugs as soon as possible.’ – Haifang Wang (Project Manager, MS1)

‘Our PM may push (Chinasoft IPEs) to fix the bug.’ – Wenting Jin (Engineer, MS1)

4.3.3 Practice III: Facilitating Inter-supplier Cooperation

Interviewees in Pactera considered the temporal, cultural and geographic differences as barriers to inter-organizational communication. In addition, the difference in testing environments was also pointed out as a barrier to the service delivery of the Microsoft project. The following sections illustrate various communication barriers in multi-sourcing that were observed in the case study, and how those factors created challenges for inter-supplier cooperation.

One of the communication barriers Pactera encountered in the Microsoft project was the geographic separation of different supplier teams. As two of the interviewees mentioned, the testers of Pactera, Chinasoft and Wipro were working in different places, so it was not easy for them to meet with each other.

‘Because our working areas are totally different, we are located here, we have users located at their own companies, so there is distance, but we didn’t meet.’ – Luxuan Wang (Lead, MS4)

‘We (Pactera and Chinasoft) are in different building […] I never see them, I never know what he looks like.’ – Huiyan Zhao (Engineer, MS2)

Interviewees also indicated that the knowledge difference, such as different communication networks, lab environments and testing procedures/steps, resulted in additional barriers to the communication between Pactera and Chinasoft. For instance, when exchanging information about bugs, different testing environments or testing approaches could impede the level of shared understanding between Pactera and Chinasoft. This is referred to by the following interviewees:

‘Sometimes the environment […] such as the network, or maybe the lab environment, has some differences, so there are some issues that just Chinasoft have, but we don’t have, so we cannot understand what issues they have, maybe their lab environment has some problems, such as those things.’ – Huiyan Zhao (Engineer, MS2)

‘Everybody understands differently, that’s probably one of the typical discussions we
Due to geographic separation and inter-supplier diversity, engineers from Pactera had to have a chain of e-mail communication and/or on-line conferences to solve project-related issues with their peers at Chinasoft. This resulted in employees’ resistance to working with other suppliers. As several interviewees mentioned, task-related information could be better explained and discussed in a face-to-face manner, and less common understanding made the communication process complex and difficult. This challenge is evidenced by the following quotes:

> ‘If the IPE teams were in our company we can just talk to each other face-to-face, it’s more efficient.’ – Haifang Wang (Project Manager, MS1)
>
> ‘This (work with internal teams) will be easier to do the communication […], but maybe (work with) different companies, it’s not easy to explain something.’ – Huiyan Zhao (Engineer, MS2)

In addition to resistance to inter-supplier cooperation, another barrier to inter-supplier cooperation arose from the perceptions of imbalance in information sharing. For instance, Pactera spent time and effort sharing their knowledge and communicating with other suppliers, but felt they received less in return. This could hinder Pactera’s willingness to invest more time and effort in inter-supplier cooperation, as indicated by the quote below:

> ‘We shared the best practices […] we are putting in several hours for communication, but we get far less results back, so it’s not really equal.’ – Yang Yu (Senior Project Manager, MS1)

These issues or barriers could impede the efficient communication and coordination between supplier firms. In order to overcome these barriers and facilitate the communication with Chinasoft, Pactera adopted a number of managerial practices, which are analysed in the following paragraphs.

9) **Engaging in IT-enabled Communication**

Collaborative technologies can be used to facilitate communication between multiple parties, and these technologies may help to counter inefficient and unproductive meetings. In order to support spontaneous communication and efficient coordination between multiple teams
On-line Chat (through MS Lync)

Every member of the Microsoft project had an account with MS Lync; this software enabled real-time remote contact between Chinasoft and Pactera. Many interviewees stressed the frequency of using MS Lync, and below are some examples:

‘Through the communication tool, we can remind the IPE, and we will chat with each other and get some problem fixed as soon as possible.’ – Haifang Wang (Project Manager, MS1)

‘We just use Lync to communicate with each other.’ – Lisha Ma (Engineer, MS1)

‘I never see them, I never know what he looks like […] We mostly (talk) through the Lync.’ – Huiyan Zhao (Engineer, MS2)

Email

As being commonly adopted for troubleshooting, information exchanges and negotiations, email was suggested as a more formal way for communication in the Microsoft project. For example:

‘So if there is any unclear information in the bugs, the engineer in Chinasoft needs to double-check with the engineers in our team, maybe they will just send emails.’ – Haifang Wang (Project Manager, MS1)

‘Very often, we need to send emails every day directly, most times, we need to send emails to communicate.’ – Luxuan Wang (Engineer, MS4)

‘[…] mostly through the email.’ – Huiyan Zhao (Engineer, MS2)

On-line Conference

Because of the geographic and temporal distance between multiple delivery teams (teams were located in the US, Ireland and China), video or on-line conferences were used to discuss work progress and other issues. On-line conferences were frequently used in some teams; for instance, Huiyan Zhao, a Pactera engineer (MS2) indicated that:
[...] we usually call in the afternoon, maybe at 4:00 or 5:00 pm.’

10) Using Task Management Tools

Task management tools or software (such as shared databases, professional tools for testing and tracking bugs) were adopted in the Microsoft project. These tools ensured that everyone had a common understanding of the information and status of reported bugs. For example, Pactera and Chinasoft used the same tool to check and obtain the latest source code; this allowed testers from different suppliers to work on the latest version of files and components. This is supported by the following quote:

‘No matter Pactera and Chinasoft or Microsoft we use the same tool to control the source code.’ – Huiyan Zhao (Engineer, MS2)

In the MS1 project, Pactera had to verify some bugs which were found and reported by another supplier. Professional management tools, such as MS Product Studio, were used by Pactera to track and receive these bugs in real-time.

‘From the PS – Product Studio, we had the tool to track all the bugs. We have a tool to notify us, so we will see some bugs come to us.’ – Jing Zhan (Engineer, MS1)

In the MS3 project, shared databases and Alias were used to observe work progress and context across suppliers. Therefore, testers from Pactera and Wipro were able to clearly understand what bugs had been reported and their details:

‘We (Microsoft, Pactera and Wipro) share the same database, and you can see who reports the bug and you see who makes a comment, as everything is logged; you also can track who edits the bugs even if they haven’t made a comment, anyone who touched the bug, did something, and saved it, you can track who did these at one time, according to Alias.’ – Maikel Lied (Lead, MS3)

11) Increasing Reachability

Formal and informal communication lines or contact lists were clearly established by different supplier firms. This reduced the difficulty of contacting the right person when issues emerged. Interviewees indicated the fact that communication between Pactera and Chinasoft was much easier if they knew who to contact. In the MS1 project Pactera’s testers were able to make direct contact with their counterparts at Chinasoft, without going through
their (Pactera) manager. This is supported by the following statements:

‘We do have a counterpart at Chinasoft. We will contact the engineer who works with us. So they know all the information, he/she will tell you who to contact.’ – Wenting Jin (Engineer, MS1)

‘They can have the channel to contact each other without me.’ – Jiabo Wu (Project Manager, MS1)

12) Delegating Liaison Contacts/Coordinators

In addition to identifying the contact person at other suppliers, Pactera established specific coordinators to facilitate their communication with Chinasoft. In general, the project manager played an important role for inter-firm communication. Just as a Pactera project manager emphasized, the coordination with Chinasoft had taken much of their work:

‘Communication and coordination (with Chinasoft) should be the most important responsibility of a PM (project manager).’ – Haifang Wang (Project Manager, MS1)

13) Increasing Familiarity Among Multiple Suppliers

High supplier competition may also impede the development of mutual trust between supplier firms (Wiener and Saunders, 2014). As trust plays a positive role for inter-firm cooperation, fostering rapport between supplier firms becomes important in a multi-supplier environment. In the Microsoft project, many Pactera employees participated in various kinds of social events to meet with people from Microsoft and Chinasoft. The following quotes illustrate the importance of building mutual rapport in multi-supplier scenarios:

‘Especially for the management team of the other company, we maintained a quite good relationship; we are personally friends.’ – Zili Tong (VP of MSODC Beijing)

‘They (Microsoft) invite us (Pactera and Chinasoft people) for dinners so we meet with each other and take pictures.’ – Lisha Ma (Engineer, MS1)

Although engaging in these relationship building and social events required time and effort, interviewees from Pactera indicated that communication with their colleagues from other suppliers became easier. Frequent informal communication between suppliers was also observed, as mentioned in the following quotes:

‘We always chat with each other.’ – Jiabo Wu (Project Manager, MS1)
‘We talked a lot, and were familiar with each other.’ – Chen Li (Engineer, MS1)

4.3.4 Practice IV: Coping with Supplier Competition

Multi-sourcing creates an environment which requires not only close supplier cooperation but also intense supplier competition. As the multi-sourcing engagement with Microsoft meant the introduction of multiple supplier firms, it was inevitable that Pactera felt the pressure of the competition. This was especially so when the two suppliers were bidding for more portions of testing work. For example:

‘Usually it (competition) is in the bidding stage […] There are two (supplier) companies; we still have to compete with Chinasoft.’ – Zili Tong (VP of MSODC Beijing)

‘You have to engage with Microsoft at a different level; it’s not enough that you did a good job.’ – Zili Tong (VP of MSODC Beijing)

Apart from the pressure of competition during the contract bidding phase, multi-sourcing also brought pressures to Pactera when the project started. This was mainly because Pactera had to demonstrate its superb performance in comparison to the other suppliers, in terms of the quality and speed of task execution. The following quote reveals the pressure that was perceived by Pactera when working in the multi-supplier environment:

‘We are under pressure because Microsoft is trying to compare who is doing faster, who is doing better.’ – Yang Yu (Senior Project Manager, MS1)

‘The project owner will give the requirement to a few companies, so ask them (different suppliers) to compete – who sends the people of a good quality, who sends quicker, they’ll get the position.’ – Zili Tong (VP of MSODC Beijing)

In order to safeguard Pactera’s position in the multi-supplier environment, Pactera made additional investments in order to compete effectively.

14) Demonstrating Capability

One critical factor for winning a contract is the manpower of a supplier firm. Therefore, staffing became an important factor in Pactera’s overall investment in multi-sourcing. Engaging in the Microsoft project required Pactera to prepare sufficient human resources and talent pool, and this client-specific investment is evidenced by the following quotes:

‘There are about 1500 engineers working on the Microsoft projects in different delivery centres around the world.’ – Zili Tong (VP of MSODC Beijing)
In order to ensure a secure testing environment, Pactera also made an investment in IT infrastructure and the working environment for the Microsoft project. For instance, Pactera established a dedicated Microsoft Offshore Development Centre (MS ODC), which is separate to Pactera’s other offices with a strict entry procedure. This is supported by one of our interviewees:

’We are in a secure lab from the rest of the Pactera team.’ – Maikel Lied (Lead, MS3)

### 4.4 Conclusion

As observed in the above sections, Microsoft’s tasks were typically divided into several smaller tasks or functions. These tasks were assigned to Pactera and Chinasoft/Wipro who worked together in a collaborative manner. Although Pactera and Chinasoft/Wipro were working separately to complete their primary task/service, the service of each supplier was likely to be the input of another’s service, creating sequential or reciprocal inter-dependence. Occasionally, parallel tasks were pooled together or fit with each other to create an integrated and seamless service for the client, creating pooled inter-dependence. In short, Pactera had to understand and identify different types of task inter-dependence when working with others.

This chapter also identified and summarised managerial issues or challenges that Pactera came across in this multi-supplier scenario (see Table 14). Project specific issues mainly arise from the factors affecting the suppliers’ task execution and service delivery. These factors include: (I) inter-supplier task dependence, (II) accountability issues, and (III) coordination barriers, while relationship specific issues emerge because of Pactera’s (IV) perceptions of supplier competition in the multi-supplier scenario.

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<th>Managerial Challenges</th>
<th>(I) Task Inter-dependence</th>
<th>(II) Accountability Issues</th>
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<td></td>
<td>Work hand-over between suppliers</td>
<td>Performance prevented or work blocked by other suppliers</td>
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<td>Mitigating and resolving the conflicts between suppliers</td>
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<td></td>
<td>Avoiding work duplication</td>
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<td></td>
<td>Aligning process with other suppliers</td>
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In order to deal with the issues they met, a considerable amount effort were made by Pactera. As the case reveals, coordination effort mainly derived from the following activities: 1) work hand-over between suppliers, 2) mitigating and resolving the conflicts between suppliers, 3) avoiding work duplication, and 4) aligning process with other suppliers. Pactera coordinated with Chinasoft (or Wipro) through a set of activities, and these coordination activities result in a considerable amount of time and effort. Therefore, a supplier should be taken these factors into account when managing alignment-specific issues in multi-sourcing contexts.

As inter-dependence also brought accountability-specific issues, a set of coordination activities were undertaken when Pactera dealing with these issues. Pactera had to not only identify potential issues but also these emerged issues when working with others. In order to deal with these issues, effort and time were commonly spend in 1) developing mutual agreements, 2) complying with pre-designed rules, 3) monitoring and updating work progress and 4) reminding other suppliers.

Furthermore, the case findings also noted that other contingencies (communication barriers, supplier competition) also influence supplier’s managerial effort. For example, geographic separation hindered the on-going, informal coordination between Pactera and Chinasoft. Also, in order to response to the highly competitive environment and obtain additional work from Microsoft, Pactera also invested time and resources to ensure the quality and speed of service delivery. In light of this, effort and time were often made to facilitate efficient work execution in multi-sourcing settings. In summary, fourteen specific managerial activities adopted by Pactera were identified and summarised (see Table 15: Managerial Practices in the Four Projects). In the next chapter, the case study of TCS (BA account) is presented and analysed.

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<thead>
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<th>Table 15: Managerial Practices in the Four Projects</th>
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In order to deal with the issues they met, a considerable amount effort were made by Pactera. As the case reveals, coordination effort mainly derived from the following activities: 1) work hand-over between suppliers, 2) mitigating and resolving the conflicts between suppliers, 3) avoiding work duplication, and 4) aligning process with other suppliers. Pactera coordinated with Chinasoft (or Wipro) through a set of activities, and these coordination activities result in a considerable amount of time and effort. Therefore, a supplier should be taken these factors into account when managing alignment-specific issues in multi-sourcing contexts.

As inter-dependence also brought accountability-specific issues, a set of coordination activities were undertaken when Pactera dealing with these issues. Pactera had to not only identify potential issues but also these emerged issues when working with others. In order to deal with these issues, effort and time were commonly spend in 1) developing mutual agreements, 2) complying with pre-designed rules, 3) monitoring and updating work progress and 4) reminding other suppliers.

Furthermore, the case findings also noted that other contingencies (communication barriers, supplier competition) also influence supplier’s managerial effort. For example, geographic separation hindered the on-going, informal coordination between Pactera and Chinasoft. Also, in order to response to the highly competitive environment and obtain additional work from Microsoft, Pactera also invested time and resources to ensure the quality and speed of service delivery. In light of this, effort and time were often made to facilitate efficient work execution in multi-sourcing settings. In summary, fourteen specific managerial activities adopted by Pactera were identified and summarised (see Table 15: Managerial Practices in the Four Projects). In the next chapter, the case study of TCS (BA account) is presented and analysed.
<table>
<thead>
<tr>
<th>Practices</th>
<th>Inter-dependence</th>
<th>(II) Dealing with Accountability Issues</th>
<th>(III) Facilitating Supplier Cooperation</th>
<th>(IV) Coping with Supplier Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Paying attention to work status of others</td>
<td>Developing mutual agreements</td>
<td>Engaging in IT-enabled communication</td>
<td>Demonstrating capability</td>
</tr>
<tr>
<td></td>
<td>Requiring information from others</td>
<td>Complying with pre-designed rules</td>
<td>Using task management tools</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clarifying information for others</td>
<td>Monitoring and updating work progress</td>
<td>Increasing reachability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reminding other suppliers</td>
<td>Delegating liaison contacts/coordinators</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increasing familiarity among multiple suppliers</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 5 – THE TCS (BA ACCOUNT) CASE

5.1 Background

5.1.1 Company Profile of TCS

Established in 1968, Tata Consultancy Services Ltd. (TCS) is a leading Indian IT services business solution and outsourcing provider and among the top ten technology firms in the world. With its global headquarters located in Mumbai, India, TCS has 199 offices across 44 countries and 124 delivery centres in 21 countries. By the end of 2015, TCS has over 335,620 employees in 46 countries.

TCS aims to provide innovative, best-in-class, consulting IT solutions and services for its customers. It is the world’s first organization to achieve an enterprise-wide Maturity Level 5 on CMMI® and P-CMM® based on SCAMPI™, the most rigorous assessment methodology. TCS provide services to a variety of industries, such as Banking Financial Services and Insurance, Retail and Consumer Packaged Goods, Telecom, Manufacturing, High Tech, as well as Transportation and Hospitality. TCS has generated a total revenue of US$ 14.44 billion (2013-14), and is listed on the National Stock Exchange of India Ltd. (NSE) and Bombay Stock Exchange (BSE).

5.1.2 Case Description

This research focuses on TCS’s long-term outsourcing engagement with one of its key clients – British Airways (BA). As the largest international scheduled airline in the UK, British Airways carries over 35 million customers every year to more than 550 destinations across the world. In 2011, BA’s merger with Spanish carrier Iberia created the world’s sixth-largest airline by annual revenue and the third largest by annual revenue in Europe. At the same time as synergies between BA and Iberia are being realized, phasing out BA’s own legacy IT systems, as well as integrating and updating BA’s existing IT-related services became a big concern. BA has a long experience in outsourcing its IT-related services to external contractors. Initially, British Airways outsourced its IT work to Indian companies such as

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9 The information in this section is based on the TCS website, Wikipedia as well as from other TCS brochures and reports.
NIIT and TCS. But recently, BA had also outsourced its IT-related services to some near shore suppliers, such as Cognizant (UK-based) and Amadeus (a French company). As the majority of BA's IT activities were selectively outsourced to different suppliers with core competencies in specific areas, this brought multiple suppliers on board to handle different parts for BA's whole IT functions.

The outsourcing deal between British Airways and TCS involved many projects. In this case study, four projects were investigated:

**Project 1 – Know Me Programme (BA1)**

‘When you call the call centre, they (BA) know exactly what your history is and probably know what you are calling for.’ – Ponvizhi Ramasamy (Programme Manager)

Previously, BA's knowledge of customers was soloed across seven different channels, including BA.com, BA Holidays, brochure requests, promotions, and travel agencies. In order to improve customer centricity and remember passengers’ personal preferences, British Airways launched a loyalty programme called ‘Know Me’. Since 2013, the ‘Know Me’ programme has been running for two years\(^\text{11}\) and expected to run for another three years. It was primarily implemented by TCS to enrich and obtain customer data for BA. In addition to TCS, BA's Know Me programme was powered by analytics services from Opera Solutions, and supported by e-mail marketing services (EMS) from E-dialog. Opera Solutions analysed BA's customer data and sent back information and requirements to BA's systems. E-dialog provided customized EMS to support TCS's marketing campaigns.

**Project 2 – SME Loyalty Programme (BA2)**

‘They (BA and Iberia) just want to bring in a centralized system which will manage the loyalty points for multiple airlines together, so that when you register with Iberia, you can earn your (points) at BA.’ – Ganesh Kannan (Developer)

In order to help Small and Medium Enterprises (SME) make the most of their travel budget, British Airways launched a unique loyalty scheme – the SME Incentive Programme. After the synergy between BA and Iberia, the loyalty points of all IAG’s airlines had to be integrated together. Therefore, a centralized system was brought in and integrated with BA's

\(^{11}\) Until the interview date (October 2014)
existing systems. The major portion of this work was done by TCS, while several suppliers were also involved in this case. For example, the centralized product was provided by Comarch – a Polish supplier, while the data migration from BA’s existing systems to the Comarch system was performed by Cognizant – a UK-based supplier. In addition to technical architects from TCS, one solution architect who came from NIIT was also dedicated to this project.

**Project 3 – Travel Programme (BA3)**

> ‘IBM supplies the basic hardware. Domneg, another supplier, contributes on these servers on top of IBM software. And then on top of that, the hardware, the Aurea platform is sitting there. On top of the Aurea platform, the services are delivered by TCS and SITA platform.’ – Mohan Kumar (Head of Delivery)

As one of BA’s biggest expenditures and investments, the Travel Programme focused on BA’s Flight Migration (FM) and Customer Management (CM). BA’s legacy airline software platform Transaction Processing Facility (TPF) was being phased out; therefore, the travel programme had to be moved from the legacy system to a modernized platform (offered by Amadeus and SITA). This task started in 2008 and was expected to be completed in 2016. TCS was chosen as one of BA’s suppliers, providing application development and service integration. In order to realize the functionality of BA’s travel programme, the front-end application had to be connected to the back-end. In light of this, TCS needed to interact with many other supplier teams who provided different functions of the travel programme. Various stakeholders became involved in this project; for example, the back-end suppliers in this project included IBM, SITA and Amadeus, and middleware suppliers included AURUS and OPERA.

**Project 4 – BA.com Programme (BA4)**

> ‘What we do is change (the flight ticket’s) price in BA.com; we would then test that to make sure it’s working. So before (the updated information is) going out to customers, we want to make sure everything is working fine, so nothing breaks down (on the website).’ – Nancy Malik (Developer)

BA.com is the company website of British Airways, focusing on the customer and commercial area. British Airways updates its website (BA.com) monthly; therefore the BA.com programme involves frequent updates of the website pages, such as changes to
login pages, on-line check-in pages and flight management pages. In addition to TCS, two other suppliers – NIIT and FTM – also became involved in this programme. The developers came from these three supplier firms and worked closely as a team to design, develop and release the website. Although they worked together, they actually worked on different specific tasks assigned by BA managers.

All these projects were under the whole outsourcing engagement between BA and TCS, therefore, they were analysed together as one ‘embedded’ case study (Yin 2014): the four projects in the case of the BA engagement are a sub-units analysis. An overview of the four projects and the key stakeholders is provided in Table 16.

<table>
<thead>
<tr>
<th>Project</th>
<th>Task of TCS</th>
<th>External Team Composition</th>
<th>Internal Team Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA1</td>
<td>Know Me Programme</td>
<td>Opera Solutions E-dialog</td>
<td>TCS On-shore and off-shore teams (more than 100 people)</td>
</tr>
<tr>
<td>BA2</td>
<td>SME Loyalty Programme</td>
<td>NIIT (1 solution architect) Cognizant (5 to 6 people) Comarch (50 people) BA technical team (10 people)</td>
<td>TCS (about 50 people)</td>
</tr>
<tr>
<td>BA3</td>
<td>The Travel Programme</td>
<td>BA technical team (300-400 people)</td>
<td>TCS On-shore and off-shore teams (700 people)</td>
</tr>
<tr>
<td>BA4</td>
<td>BA’s Website – BA.com</td>
<td>NIIT (2 people) FTM (3 people) BA technical team (unknown)</td>
<td>TCS (unknown)</td>
</tr>
</tbody>
</table>

### 5.1.3 Team Composition in the BA Project

TCS has been engaged with British Airways (BA) for over 18 years and has established many areas of trusted partnership. TCS’s development and support of BA’s IT systems took place in a globally distributed environment, involving four different locations: two on-site teams at Waterside (British Airways Head Office) and Newcastle, UK and two offshore teams at the development centres of TCS in Chennai and Bunai, India. There were around 920 people developing, implementing and supporting BA’s IT systems, and about 200 on-site people were based in BA’s two offices (i.e., London and Newcastle). A schematic illustration of the organizational structure of TCS’s on-site team (in the BA London Office) is shown in Figure 12.
5.2 Task Inter-dependence

In order to analyse the types of inter-dependence in each project, the sub-sections below identify and present the inter-dependence that TCS encountered in each of the four BA projects. The reason for this analysis logic is that TCS encountered more than one types of inter-dependence in each of the four projects.

5.2.1 Inter-dependence in the Know Me Programme (BA1)

Both sequential and reciprocal inter-dependences were observed in the BA1 project. As described in section 5.1.2, TCS provided the end-to-end service delivery of the Know Me programme, based on the analysis of Opera and BA’s requirements. As the output of Opera (analysis on customer data) became the input of TCS (requirements), the workflow between Opera and TCS was sequential in its nature (see Figure 13). This is supported by the following quotes:
'The requirements are all driven by Opera—Opera’s feed. So they do a lot of analysis on the customer data. And they say, depending on this trend, I think this set of customer will be needed. So when they give us requirements, and we realize that we need to add more data into our system, that’s when the requirement gets driven and all the system changes happen.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

‘They (i.e. Opera) do a lot of analysis with British Airways data, yes, business analysis and they provide a lot of insights into which kind of customer (we should target) […] they send the segmentation of (BA’s customer) data to our IT system, a few of them are automated and a few of them are manually given to us. And then, we try to implement it in our IT systems to do (our market) campaigns.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

After receiving the customer data and requirements from Opera, TCS designed and tested the Email Marketing Services offered by E-dialog. On the one hand, TCS sent requirements and functional changes to E-dialog, and E-dialog provided customized EMS to fit with TCS’s requirements. For instance:

‘They (i.e., E-dialog) have to change their systems (i.e., EMS) in line with what we’re changing.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

On the other hand, TCS aligned with E-dialog’s timeline and deliverables to implement the Know Me programme. Put simply, the output of TCS became the input for E-dialog and vice versa, and information flowed back and forth between the two suppliers. In light of this, the task inter-dependence between TCS and E-dialog was reciprocal in its nature (also illustrated in Figure 13), and this is supported by the following quotes,

‘That’s the system (e-mail marketing services provided by E-dialog) that sends all emails to BA customers, so any development we’re able to do, we have to manage it end-to-end. So the project manager – who is predominately from TCS – is kind of interacting with the E-dialog and ensure they have done their design and testing work, and give the necessary input to us, before we implement our projects.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

‘Although we can’t estimate what E-dialog can do, we kind of estimate our work, and we say at this point and time when I’m doing my system testing, I will need the E-dialog system to ensure it complements their development assignment so that we can do a bit of testing before that. During the end-to-end testing, this system has to be working, so we can do end-to-end testing.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

5.2.2 Inter-dependence in the SME Loyalty Programme (BA2)

Both sequential and reciprocal inter-dependences were observed in the BA2 project. Because of the synergy of BA with Iberia, BA was integrating its existing systems into one centralized
system – Worldwide Dealing System (provided by Comarch). Before the TCS team integrated and developed services on this platform, Cognizant had to migrate the data from BA’s existing systems to the new system. This meant only when Cognizant finished their data migration could TCS develop their services on the new system. The data migration (by Cognizant) preceded the work of systems integration (by TCS), suggesting **sequential** inter-dependence between Cognizant and TCS (see Figure 14). This is indicated by the following interviewee:

> ‘Okay, the dependency with the Cognizant team is, they are kind of the data migration […] (Cognizant migrated the data) into this tool (by Comarch), so that the IT work has been connected with them. Once they (Cognizant) do it, there are multiple other systems which we are planning to integrate with the new product.’ – Ganesh Kannan (Developer, BA2)

![Figure 14: Workflow and Main Stakeholders of BA2](image)

In terms of the workflow relationship between TCS and Comarch, on the one hand, specific information and documents of Comarch’s product were essential for TCS to start their integration work. TCS could not conduct product integration (including high level design and analysis) until some functionalities of Comarch were completed. On the other hand, Comarch had to develop and change the functionality of its own product to meet TCS’s specific requirement. In light of this, the development of Comarch depended on TCS’s requirements and the product integration relied on Comarch’s deliverables, suggesting **reciprocal** inter-dependence between TCS and Comarch (see Figure 14). The following quotes serve to illustrate reciprocal inter-dependence between TCS and Comarch.

> ‘Just to give an example, this Friday we were supposed to get one of the deliverables from Comarch, for us to do the integration testing.’ – Ganesh Kannan (Developer, BA2)

> ‘For us, to start a high level design and analysis we need so and so documents from them on that date. We say we need the document, with also information, on this date. If they provide this, then we will be doing our high level design and completing on this date.’ – Ganesh Kannan (Developer, BA2)
‘In this project, we are more dependent on Comarch […] what they get is a requirement. We provide them the requirements, and explain to them what we want from them; that is the dependency we have on them.’ – Ganesh Kannan (Developer, BA2)

5.2.3 Inter-dependence in the Travel Programme (BA3)

Multiple inter-dependencies were also found in the Travel Programme (BA3). In this programme, front-end applications were developed and connected to the back-end infrastructure to realize their functionalities. Back-end suppliers (e.g., IBM, Amadeus, SITA, and Oracle) provided IT infrastructures and data sources for TCS. As TCS connected front-end applications and back-end services, TCS had to closely engage with multiple suppliers. For example, in terms of requirement analysis, TCS had to work with the users of the front-end application. TCS had firstly to understand the needs from users and then conduct a feasibility analysis of their requirements. As indicated by the following quotes, the inter-dependence between TCS and the users of the front-end application would be sequential in its nature (see Figure 15).

‘And the actual drafting of the requirement is, you know, working with the business (people) who are actually going to be the users of this front-end application, who are deploying all the airport systems, you know, and the people who are going to work at the airport are going to be the users, on their terminals for their daily duties. So we collect the requirements from them. We then assess the dependence upon the back-ends, to find out whether the data is even available, and try to map out what the legacy system can offer today.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

Once the front-end users’ requirements were collected, TCS had to work with back-end providers (such as Amadeus) to figure out how and whether the requirements could be met by them. As described by the following statements, the negotiations process between TCS and the back-end providers was bidirectional, creating reciprocal inter-dependence between them (also illustrated in Figure 15).
‘You need to understand the back-end first, understand what they (back-end suppliers) could deliver. And then to see whether our requirements are going to be able to be met by all these back ends (suppliers).’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

‘If there was a new requirement, like they would say the legacy system is not supporting enhancements, we then have to assess, you know, sitting with Amadeus again to see, if they are going to able to deliver all the data components which are required for it […] So we have to, you know, sit with them, liaise with them what they have at their disposal and see if it suits the requirements. So collection of the requirements, for the collection we have to, you know, engage these for additional requirements, we again have to go through this documentation and have sessions with them.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

The following statements also reveal that there was a heavy usage of other suppliers’ products when TCS was implementing the functionality of BA’s travel programme.

‘Aurea provides the basic platform for BA; it involves the technology stack which they deliver. We have to deliver functionality for that programme, on top of this platform; now there is a huge dependence on Aurea for us to complete our development and testing.’ – Mohan Kumar (Delivery Head, BA3)

In particular, the travel service platform (TSP) was a product which had been developed by TCS, providing printing, security and messaging services for BA. According to the following interviewees, the TSP was built based on a product by Aurea:

‘New hardware, new builds or environments are supplied by Aurea, then we are trying to develop software on that.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

‘We wanted to kind of develop the TSP with the Aurea’s suite of products […] the products that we are using are called Sonic ESB, Sonic MQ and Intermediary Actional Management Server. These products were, when we began the Travel Programmes around 2008, were owned by a company called Progress. Okay. What happened is, around 2012, Progress sold these products to Aurea.’ – Abhishek Mukherjee (Technical Architect, BA3)

In addition to Aurea’s products, TCS also relied on other suppliers’ services to complete the functionality of the travel programme; this is referred to in the following quotes:

‘Oracle is actually heavily involved […] We have used Oracle there and XML DB, which is one of the first in the airline industry, and we had to engage with Oracle quite closely because there was a heavy, heavy usage of that.’ – Abhishek Mukherjee (Technical Architect, BA3)

‘Within the services we’ve got suppliers who provide us the technology stack, like, Adaptris and Aurea, and sometimes Oracle is involved.’ – Abhishek Mukherjee (Technical Architect, BA3)

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As depicted in Figure 15, TCS relied on various products or services of multiple suppliers to realize the functionality of the travel programme. The outcomes of other suppliers (i.e., specific products and services) were the prerequisites for TCS to develop and integrate front-end applications. In light of this, the product inter-dependence between TCS and the abovementioned suppliers was **sequential** in its nature (see Figure 15).

### 6.2.4 Inter-dependence in the BA.com Programme (BA4)

Pooled inter-dependence is the situation where contributions and outputs of each supplier firm do not rely on another supplier’s work: each supplier firm performs its task individually. Each supplier firm performs similar tasks on its own; therefore, there are no workflows and work hand-offs between parallel activities. This form of task inter-dependence was observed in the BA.com Programme (BA4). As shown in Figure 16, developers from TCS, NIIT and FTM worked on different tasks in parallel when they were developing and updating BA’s website. Each developer’s individual contributions were pooled for the whole project and had independent values. This can be seen from the quote below:

> ‘My project is very independent […] all the other suppliers have exactly the same access (to the website).’ – Nancy Malik (Developer, BA4)

According to the above observation, the nature of inter-dependence that TCS encountered in the BA engagement was primary sequential and reciprocal. This was mainly because multiple suppliers in the BA project provided different services or products for BA, they were focusing on their own tasks or specific domains, and there were rare opportunities for them to develop the same components or products. In order to provide a clear view of the inter-dependence TCS faced, Table 17 summarizes the inter-dependence and relevant suppliers in each project.
Table 17: Inter-dependencies in the Four Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Inter-dependence</th>
<th>Stakeholder(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA1</td>
<td>Sequential</td>
<td>with Opera</td>
</tr>
<tr>
<td></td>
<td>Reciprocal</td>
<td>with E-dialog</td>
</tr>
<tr>
<td>BA2</td>
<td>Sequential</td>
<td>with Cognizant</td>
</tr>
<tr>
<td></td>
<td>Reciprocal</td>
<td>with Comarch</td>
</tr>
<tr>
<td>BA3</td>
<td>Reciprocal</td>
<td>with back-end service providers (e.g., Amadeus)</td>
</tr>
<tr>
<td></td>
<td>Sequential</td>
<td>with Aurea/Adaptris</td>
</tr>
<tr>
<td></td>
<td>Sequential</td>
<td>with users of front-end application</td>
</tr>
<tr>
<td>BA4</td>
<td>Pooled</td>
<td>with NIIT and FTM</td>
</tr>
</tbody>
</table>

5.3 Managerial Practices

TCS’ managerial challenges and their coping practices are grouped into four specific categories (as is described in Section 3.4 Data Processing and Analysis), and they are analysed in the following sub-sections.

5.4.1 Practice I: Coordinating Task Inter-dependence

As discussed in section 5.2, the services provided by TCS and other suppliers were highly dependent on each other, creating either sequential or reciprocal inter-dependence. Managing inter-dependence tasks required coordination activities, and these efforts could be exacerbated when tasks were distributed among multiple suppliers. Therefore, the coordination between TCS and other suppliers created several challenges for TCS.

BA’s IT project was so complex that it involved numerous back-end infrastructures, middleware platforms and front-end applications from multiple suppliers. Thus, TCS had to develop and implement their applications based on other suppliers’ products or platforms, creating the necessity of integrating with other suppliers’ products. This challenge was commonly encountered by TCS and indicated by many interviewees. For instance, when the SME Loyalty programme was moving from BA’s legacy platform to a new Comarch platform, the functionalities of the TCS application had to be developed and implemented based on this new platform, necessitating TCS to integrate its products with the Comarch platform. This is referred to in the following quote:

'We need to be aligned in terms of understanding the product of our two. So we both are at the same level of understanding. So that’s one of the reasons, you know, where we put together all the meetings and any decision you make, it will be a joint decision, because they will be viewing that tool and information is a part of the tool. For that purpose of data
migration and we are the ones who are going to consume it. So both should be aligned.’ – Ganesh Kannan (Developer, BA2)

Another example can be found in the BA3 project. The services and applications of the travel programme were developed on top of Aurea’s development environment, so TCS had to adjust its services to fit with Aurea’s products. This is indicated by the following quotes:

‘BA’s platform is built on the software which is provided by the third party supplier called Aurea; so Aurea provides the basic platform for BA, it involves the technology stack\(^{12}\) which they deliver. Now we have to deliver functionality for that programme on top of this platform.’ – Mohan Kumar (Head of Delivery, BA3)

‘Aurea as a platform provider, they’ve got a suite of products which they are actually providing to BA, (we need to figure out) how do we use that product for our development, so there is the integration part of that product which is involved.’ – Mohan Kumar (Head of Delivery, BA3)

The case findings also suggest that aligning work processes between suppliers was another important challenge that TCS faced in the BA project. Take the BA1 project as an example: the implementation of the Know Me programme was supported by E-dialog’s email marketing services (EMS). In order to commit to the project delivery, before the project started, TCS had to understand whether the TCS timelines and schedule could be fitted or aligned with E-dialog, or vice versa. This is illustrated by the following statement:

‘I will need the E-dialog system to ensure they complete their development assignment so that we can do a bit of testing before that. So we are kind of very closely dependent on their timeline. So only when, if we get a commitment from them, do we say they are aligning to our timeline.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

In addition, changes of other suppliers were also observed as a coordination challenge for TCS. Tasks in the multi-supplier environment were inter-dependent on each other; therefore, any changes of a preceding supplier could lead to adjustments for the succeeding supplier. In the BA3 project, the application development (performed by TCS) was dependent on multiple back-end and middleware services, and any changes of these suppliers could make TCS have to adjust its process or services in accordance with the new circumstances. This challenge was exemplified by the following quote:

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12 A technology stack comprises the layers of components or services that are used to provide a software solution or application.
According to the above observation, the inter-dependent tasks of TCS and its peer supplier firm created several management issues and challenges for TCS. Specific practices were required to cope with these inter-supplier coordination challenges. The following paragraphs present and discuss various inter-supplier coordination activities that were employed by TCS.

1) Aligning Plans and Schedules with Other Suppliers

In the case of the BA project, different supplier firms were performing different services and products for the whole project. Although their tasks were inter-related, different suppliers were working separately on their own tasks. In light of this, uncertainties with respect to other suppliers’ work timelines could adversely affect the service delivery of TCS. In order to commit to the service delivery, TCS had to align with other suppliers’ timelines and deliverables. TCS could not make their timelines and schedules solely by themselves, as they had to manage and adjust their project plans and schedules in accordance with other suppliers’ timelines and deliverables.

Take the BA1 project as an example: TCS relied on E-dialog’s email marketing services (EMS) to send out personalized emails to BA’s customers. Although the modification of the EMS was delivered by E-dialog, testing and implementation of the EMS was performed by TCS. In light of this, the planning and scheduling of the project could not only be completed by TCS; TCS had to understand and align itself with E-dialog’s agenda as well. These efforts – in terms of planning and schedule management – are revealed in the following statement:

‘At the initial stage, before we even start the project, we need to understand if they’re binding to our time and if we’re binding to their timeline […] it could take some time for us […] the project manager interacts very closely with E-dialog to understand their timeline.’
– Ponvizhi Ramasamy (Programme Manager, BA1)

In addition to fitting with other suppliers’ timelines, TCS also engaged in multi-party meetings for the joint project design, as can be seen in the following quote:

‘The workshop, which involves all the key stakeholders, so, that involves the project team, the BA team, any other stakeholders from business, any other stakeholders from any other
suppliers, they all sit together and say: this is all the solution we are going to come up with, and these are the potential things that we are looking into doing, and we come out the inter-dependencies. Yes, this is the right solution that we had to follow.’ – Mohan Kumar (Head of Delivery, BA3)

2) Checking Other Suppliers’ Deliverability

Interviewees also indicated that communication and discussions between supplier teams occurred intensively and regularly before the project started. As observed in the BA3 project, TCS frequently engaged in joint meetings with its back-end and middleware providers. The reasons for these efforts were because TCS had to understand the deliverability of the back-end providers, and check with them whether the front-end users’ requirements could be met by them. For instance:

‘(We are) sitting with Amadeus again to see if they are going to be able to deliver all the data components which are required for (our work).’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

‘We have a joint event, you know, even TCS and Auditor come together several times.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

The efforts of checking the others’ deliverability were also reported in the BA2 project, for instance:

‘Generally what we do is we always expect a certain set of deliverables from them (Comarch), on so and so date to start our work […] they need to be aware of what we are able to give them and they need to be aware of what we get from them.’ – Ganesh Kannan (Developer, BA2)

3) Clarifying Requirements for Other Suppliers

As mentioned earlier, some services provided by TCS relied on other suppliers’ products or platforms; therefore, clarification of what TCS required became essential. In the BA1 project, communication between TCS and E-dialog helped them to establish a clear understanding of TCS’s requests, for instance:

‘During the requirement (analysis phase), we interact to understand what would be the scope for E-dialog and what would be asked for.’ – Ponvizhi Ramasamy (Programme Manager, BA1)
4) Sharing Information Between Suppliers

Information sharing between suppliers was also mentioned as a commonly adopted practice. This is because regular (and frequent) inter-supplier information sharing ensured the consistency of service delivery progress, thereby identifying potential risks and issues. For instance, the task-related information was shared between TCS and E-dialog in order to establish a common understanding and mutual awareness; this was mentioned by the following statements:

‘The test plans are shared quite well in advance [...] Before we start testing, we share our test scenario, test cases between both of us, so we understand if there is any gap, they can pick up any test cases that they have missed out, and vice versa.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

‘Everyone has to be on the same page, we all share the data, and you know, common privileges between each other.’ – Nancy Malik (Developer, BA4)

5) Incidents/Issues Management

Most of the interviewees indicated that communications between supplier teams occurred frequently. One purpose of these inter-supplier discussions was for problem reporting and issue resolution. As mentioned by the following interviewees, (technical) issues cannot be addressed within the TCS team, creating the necessity of communicating and negotiating with other supplier teams.

‘If there is an issue, you need to talk to someone who is external, and then get help, [...] incident management that will constitute around 60% of the effort.’ – Ayyappan Mohandoss (Head of Support)

‘It sometimes has got conflicting interests (among multiple suppliers). But, then you have to just manage.’ – Abhishek Mukherjee (Technical Architect, BA3)

Take the BA3 project as another example: TCS faced many problems when using the services of Oracle, resulting in regular discussions between TCS and Oracle.

‘We found plenty of problems with Oracle. And, because BA is a platinum account member with Oracle, we had regular sessions with their (Oracle) US team.’ – Abhishek Mukherjee (Technical Architect, BA3)

6) Re-design and Re-estimation

Sometimes, because of delays or hold-ups caused by other suppliers and the changes of
requirement, TCS was unable to continue performing the task in accordance with its initial plans and schedules. In this situation, TCS had to modify and adjust previous plans and estimation, or re-design the work process with its peer suppliers. In the BA2 project, if there were any changes, TCS had to once again sit with its peer suppliers to discuss and adjust their previous plans and schedules.

‘When we have multiple change requests which are coming in, and that requires a face-to-face interaction, so we bring all the parties in (the discussion). People from IBM come here and people from Poland come here and all these teams you know folks from NIIT, Cognizant and TCS they all get together and we discuss that.’ – Ganesh Kannan, (Developer, BA2)

‘(The) major reason for having the workshop is because there are quite a lot of change requests which are coming on top of the requirements.’ – Ganesh Kannan, (Developer, BA2)

Also observed in the BA3 project, additional negotiation between suppliers teams could not be avoided if changes arose. TCS and other suppliers had to adjust their delivery timelines to meet the new changes. This is shown in the quote below:

‘We have got strict delivery timelines. So every time you bring in a new process, our delivery timelines might be affected, so we have a negotiation (to adjust their delivery timelines).’ – Abhishek Mukherjee (Technical Architect, BA3)

7) Mapping out Inter-dependence

Typically, the inter-dependencies between suppliers were not clearly defined in the client’s contract. Therefore, identifying and mapping out the inter-dependence between suppliers became essential for supplier firms. The collected data suggested that TCS spent time and effort in indicating and referring to the service inter-dependence before they commenced the project. For instance, during the contractual negotiation phase, TCS mentioned the service inter-dependence and their expectations of other suppliers, in terms of timeline and deliverables. This is supported by the following quote:

‘What we agree on the contract is the plan, mentioning the dependencies, so we said that, OK, if we had to deliver this project in a three months’ window, I need this delivery from this supplier at this appointed time.’ – Mohan Kumar (Head of Delivery, BA3)

‘We sat down before the programme started to find out which are the dependencies. So TCS helped them (BA) to analyse and find out this is what you expect from Amadeus and this is the timeline.’ – KrishnaMurty Bhamidipati (Programme manager, BA3)
In a similar vein, TCS had to work out and indicate if there is any dependence on other suppliers’ services when bidding for additional assignments. This is referred to in the following quotes:

‘We may give the costing and the estimates on the timeline and we give our proposal (to BA) in our TCS format. We say this is the scope, this is out of the scope, these are the assumptions, and this is the plan in which we will be going to deliver, and any dependencies on any third party (i.e., other suppliers).’ – Ponvizhi Ramasamy (Programme Manager, BA1)

‘We say the dates by which we want the EMS to provide us what. We specify these are the dependencies and these are the dates when we need input from E-dialog.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

### 5.4.2 Practice II: Dealing with Accountability Issues

It is can be difficult for a supplier’s contract with the client to indicate clearly each of the different suppliers’ responsibilities and deliverables, and this can create accountabilities issues later on. Finger pointing between suppliers is a common issue encountered in the multi-supplier environment. This is supported by the following quote:

‘It’s very easy to […] just wash your hands by saying that there is nothing wrong with my part, it’s probably yours.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

As the services or functions of multiple suppliers are inter-dependent on each other, the ambiguity in inter-supplier responsibility and expectation can create potential risks for supplier firms, such as performance prevention or work delays caused by other supplier(s).

For example, in the BA2 project, specific functionalities needed to be delivered by Comarch so that TCS could continue its service integration work. As TCS’s work was based on Comarch’s product, if the quality of their product was unsatisfactory, TCS had to re-schedule their tasks. This is supported by the following quotes:

‘You assume that they will give you the quality (as) you expected, if it doesn’t come, then you (have to) re-estimate the work.’ – Ganesh Kannan (Developer, BA2)

‘There is always a risk in terms of you’ll find multiple surprises when you really start integrating it.’ – Ganesh Kannan (Developer, BA2)

Take, as another example, the BA1 project: delays caused by Opera could negatively impact TCS’s work progress, as the implementation of the project (e.g., supporting BA’s marketing
campaigns) required Opera’ analysis of BA customer information. This is illustrated in the following statement:

‘Some campaigns need to be done quickly, we can’t wait for six month to do a campaign […] but sometimes because Opera gives us the analysis quite (late), sometimes things came quite late, we might have to do some quick small project.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

In the same project, the performance of the project could be held up by E-dialog even when TCS had completed their work. As supported in the quote below, the project could not be implemented by TCS because the delivery of EMS was delayed.

‘When we finished, but (the project) can’t go live, because they haven’t completed what they should do.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

According to the above observation, **performance prevention or work blocked by other suppliers** was indicated as another coordination challenge for TCS. The data reveals that several coordination practices were adopted by TCS to overcome this challenge. These coping practices are analysed in the following sub-sections.

**8) Developing Mutual Agreements/Expectations**

‘Because there is an agreement which was automatically (followed), the conflicts were not there.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

Collaborative agreements can be co-established by all participating parties, by way of demarcating responsibilities, deadlines and deliverables among the suppliers. In the BA3 BA3, both Adaptris and TCS developed the front-end applications and they had to clarify the responsibilities between them, as evidenced by the quotes below:

‘The software (development) was being shared between Adaptris and TCS, so we need to look at the demarcation of who does what.’ – KrishnaMurty Bhamidipati (Programme manager, BA3)

‘TCS and all the suppliers have actually signed up to have a central technical assurance team […] to decide which task is best to be done by whom.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

The efforts of developing mutual agreements between suppliers were also observed in the BA1 project. As described in the following statements, the agreement between TCS and E-dialog was established and was also added into the client’s contract.
Chapter 5 – The TCS (BA Account) Case

‘The project manager interacts quite a lot with the third party provider (i.e., E-dialog), so they interact and then we come to an agreement and the contract we sign off, individual contracts by British Airways.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

‘During the workshop, it becomes clear at least the directions that each of us will be taking, and we agree on some actions at that point and time.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

9) Monitoring and Updating

Regular project reviewing was observed as an efficient practice to track other suppliers’ work progress and issues, and to ensure that the TCS service delivery was not influenced negatively by other suppliers. For example, in the BA1 project, a project manager from TCS monitored the progress and delivery of E-dialog, as mentioned by the following interviewee:

‘So the project manager – who is predominately from TCS – is kind of interacting with the E-dialog and ensure they have done their design and testing work, and give the necessary input to us, before we implement our projects.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

In a similar vein, a joint governance meeting was held regularly for the BA project. TCS and other suppliers participated in this meeting to ensure each supplier fulfilled their responsibilities as well as to resolve any issues.

‘We will ensure that operational obligations are met. So, on the ground we directly interact with them closely, so if there is an issue, we don’t need to go to BA always. So we directly manage the relationship. So, if things are not going well, then maybe we will have the channel […] something like you report issues on a weekly basis and still if things are not moving, we will have a kind of a monthly governance where we take it up, and where the senior level management as well as the supplier senior manager will sit and try to resolve things.’ – Ayyappan Mohandoss (Head of Support)

In particular, the joint meetings were observed in the BA3 project. TCS and other suppliers regularly engaged in an inter-supplier discussion session to identify and report any the issues they had. This practice was mentioned by the following interviewees:

‘We actually get involved in that working group discussion on a daily basis, to track the status of that.’ – Mohan Kumar (Head of Delivery, BA3)

‘There was a feedback session, regular feedback session every month to, kind of, review what problems we are facing.’ – Abhishek Mukherjee (Technical Architect, BA3)

Furthermore, in the BA2 project, TCS participated in meetings with Comarch on a daily base.
There they reported any problems they had encountered. This is supported by the following quote:

‘You need to have a “stand up” representative for a daily 30 minutes just to say the progress issues and blockers.’ – Ganesh Kannan (Developer, BA2)

10) Finding out the Responsible Supplier

In a multi-sourcing context, if a problem occurs, it can be very difficult to work out what the issue is and which supplier should take care of it. This can lead to finger pointing between suppliers. In order to address this, TCS engaged in a regular joint workshop for discussions with other peer suppliers and to decide who should take over and resolve any issues. This is revealed in the following quote:

‘So we have a joint event, you know, even TCS and Auditor come together several times […] Obviously we had (came across some) issues, so we have to have mechanisms of how to try out these issues and decide how to, which team actually decides, and where the issue is.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

11) Re-developing and Improving Other Suppliers’ Work

As discussed earlier, the services of TCS were mainly built on other suppliers’ products or services. Occasionally, some of the products or services provided by the other suppliers did not meet expectations, in terms of quality and performance. For example, some of Comarch’s products were not mature enough to be directly used by TCS:

‘Even though the features and capabilities (of other suppliers’ product) were chosen which are fit for the (BA’s business) purpose. But they were not readily available.’ – Ganesh Kannan (Developer, BA2)

In these situations, TCS had to re-develop or improve the other suppliers’ work before using these products. This is supported by the following statements:

‘There are some scenarios where absolutely you can do nothing, except for doing a complete re-build or re-write the application.’ – Ayyappan Mohandoss (Head of Support)

5.4.3 Practice III: Facilitating Inter-Supplier Communication

In a multi-supplier scenario, employees from different suppliers perform different tasks. They are not automatically aware of what is going on outside their working teams. These
information gaps surface when each supplier’s services are inter-dependent. Interviewees from TCS emphasized the frequency of inter-supplier cooperation and communication when they coordinated their task with other suppliers. Four practices that TCS adopted to facilitate inter-supplier communication were identified in the BA project, and the following sub-sections discussed them respectively.

12) **Engaging in IT-enabled Communication**

Communication tools can facilitate efficient communications between different teams, and help to counter inefficient and unproductive meetings. In order to satisfy the frequent communication and coordination needs, communication tools were prevalently used by TCS, for instance:

**On-line chat (e.g., JIRA)**

Team members from TCS gained access to professional software: JIRA. This task management tool enabled real-time remote contact, and interviewees from TCS stressed their usage of JIRA, as shown by the following quote:

> ‘We do use it (JIRA) for all the projects.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

**Email**

Email was a more traditional way of communication between team members, and it was also commonly adopted for troubleshooting, information exchanges and negotiations in the BA project.

> ‘They can’t meet in person, they have to meet through emails and phones and other things, we do contact if needed.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

In spite of this, the disadvantage of using email was also pointed out. For example:

> ‘We don’t want to send it in an email, as you have to copy in a few people. And whenever we discuss, you need to go to find out what we discussed and what we agreed.’ – Ganesh Kannan (Developer, BA2)

**On-line/telephone**

Because of the geographic distance between the multiple delivery
Conference  

teams (teams were located in UK, India, Poland), on-line and telephone conferences were adopted to discuss progress and other issues. For instance:

‘Our role is to conduct this teleconference on a need basis, almost every week, and then ensure that all the key parties are aligned together to deliver.’ – Ganesh Kannan (Developer, BA2)

13) Engaging in Face-to-Face Discussions

Although TCS extensively used various communication tools to communicate with other supplier teams, it was viewed as a complement to, not a substitute for, face-to-face discussions. In addition to IT-enabled communications, interviewees from TCS also spent a considerable amount of time and effort on face-to-face discussion, as evidenced by the following quotes:

‘(The change of requirement) requires a face-to-face interaction (among NIIT, Cognizant and TCS), so we bring all the parties in (the discussion).’ – Ganesh Kannan (Developer, BA2)

‘Sit with them, liaise with them (i.e., back-end services providers) to see if it suits the requirements.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

Sometimes, because of the geographic distances between TCS and Comarch, these face-to-face discussions incurred travelling costs, as one interviewee mentioned:

‘A team from here flying to Poland or the team from Poland comes to London.’ – Ganesh Kannan (Developer, BA2)

14) Delegating Liaison Contacts/Coordinators

Coordinators had the expertise and ability to handle emerging problems; therefore, TCS established several contact people to enhance communications with other supplier teams. This is supported by the following statements:

‘What happens is we normally forward one of our leads, to be part of that group (i.e., joint steering committee), because they have regular meetings with Amadeus, and then it is fortnight or monthly, what they call it joint steering committee.’ – Mohan Kumar (Head of Delivery, BA3)

Specific roles were set up to facilitate efficient interactions between multiple suppliers, for
instance:

‘I set the architecture guidelines for the programme and I, kind of, interact with various suppliers and suppliers who are part of this programme […] I’m just acting as a BA person and kind of, interacting with Aurea and Adaptris, to kind of, what the fixes are, what the problems are, how to mitigate etc.’ – Abhishek Mukherjee (Technical Architect, BA3)

‘You (supplier firms) need to have a “stand up” representative.’ – Ganesh Kannan (Developer, BA2)

15) Increasing Familiarity Among Multiple Suppliers

Fostering the familiarity between team members is indicated as an essential factor in inter-organizational relationships. In the BA4 project, employees from TCS and other suppliers organized and engaged in various team-building and social events, for example:

‘We are very social; we do go out every month, we go for team building activities, so like we go for bowling[…] I take all the organizations (of the team building), there is another woman, not just me. So I take hold of all these events, organizing team dinners, lunches, and parties, etc.’ – Nancy Malik (Developer, BA4)

5.4.4 Practice IV: Coping with Supplier Competition

BA’s multi-sourcing arrangement introduced multiple suppliers, creating a competitive environment for supplier firms. This was indicated by the following interviewees:

‘It was a competition, as NIIT was there, Cognizant was there, TCS was there.’ – Ganesh Kannan (Developer, BA2)

‘Although TCS is a very big player, there are still suppliers (which are) very niche in a specific field, offering work much superior than us. So, in spite of being well connected, they (BA) found another solution (from other suppliers).’ – Vishwas Dubey (TCS Relationship Manager with BA)

In addition, client firms usually have less switching costs in multi-sourcing, and a supplier’s work can easily be replaced by another supplier, as mentioned in the quotes below:

‘If BA is not happy with that supplier for some reason, then they will go to some other suppliers.’ – Vishwas Dubey (TCS Relationship Manager with BA)

‘Even if I have connected (with BA) at a high level, it does not make sense, because the decision will come from the bottom, like, this project manager will say: “Ok, for this pieces of work I don’t think TCS is our partner, let’s go with another supplier.” So the connection and relationship with each of them is very important […] connecting with all areas from different levels is a big challenge.’ – Vishwas Dubey (TCS Relationship Manager with BA)
In light of this, supplier firms may feel great pressure in such a competitive environment. In order to build their credibility in the multi-supplier environment, TCS had to not only pay attention to service delivery of its primary task but also create additional value for BA. As revealed in the quote below, **creating additional value** for BA was perceived as another challenge for TCS.

>'I would say that the relationship is mature to a certain extent for all the suppliers, but the rate is no longer the winning angle, so you have to get something extra, either you have to put in a big team rather than put a small team, or you are giving a very strong solution which other suppliers are not proposing, so it’s a very different level of competition arrangement, which I would say, from my role from the sales perspective, is very challenging.' – Vishwas Dubey (TCS Relationship Manager with BA)

In order to survive in the multi-supplier environment and obtain further assignments, TCS spent additional investment and efforts to cope with supplier competition. Four practices TCS adopted in the BA project were observed and are analysed in the sub-sections below.

### 16) Demonstrating Capability

TCS as well as other supplier firms were selected as BA's preferred IT partners. All participating suppliers had to build their credibility and prove that they could perform well and meet expectations. Competitive behaviour was observed in the TCS BA project, and this is illustrated by the following quotation:

>'TCS try to deliver the quality for BA. To prove that you are one of the chosen ones and you still hold good for the next assignment for BA.' – KrishnaMurty Bhamidipati (Programme Manager, BA3)

### 17) Continuously Bidding for more Assignments

Although TCS was selected as one of the suppliers in a particular project, TCS employees had to continuously apply and prepare proposals for specific tasks. This **on-going bidding process** was also indicated as a challenge for TCS and this is supported by the following statements:

>'If there is an area where everyone has the equal presence, then again like they go for kind of a competitive bidding and then whoever gives the best offer they take that into support.' – Ayyappan Mohandoss (Head of Support)

>'You need to again give a quote, and there could be a negotiation and then, like you’ll be
taking it up... but if the position is neutral, if there are multiple players who are equal persons, then obviously they will go for the kind of a bidding, and there it will be kind of a competitive tender and then you have to give a quote and then you have to get it to support.’

– Ayyappan Mohandoss (Head of Support)

18) Providing Additional Services

The case findings revealed that TCS had made some strategic investments in BA, such as providing extra services (i.e., the Travel Services Platform) free of charge. This investment was mentioned by the following interviewees:

‘TCS did make investments in that, we will develop a platform to all this free, messaging and security, providing the functionality, that is an entirely TCS investment.’ – Mohan Kumar (Head of Delivery, BA3)

‘They (BA) got that value (i.e., travel services platform) for free.’ – Vishwas Dubey (Relationship Manager)

‘The key is relationship management [...] We put some (relationship) investment from our site.’ – Vishwas Dubey (Relationship Manager)

19) Paying Attention to Confidentiality

The multi-sourcing relationship creates many opportunities for joint discussion and communication among multiple suppliers.

‘We would need interactions with several suppliers.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

However, employees from supplier teams need to pay attention to what they say, and to try to avoid mentioning critical things with a supplier firm. This need is referred to in the following statements:

‘Sometimes when we do discuss things together as we do the same routine, we need to make sure we’re not discussing next to any of the other suppliers, so they shouldn’t get any insight, they know we’re not saying any secrets or anything. We just make sure we go outside and speak separately, and not in front of other people, other suppliers in our projects.’

– Nancy Malik (Developer, BA4)

‘I am friendly connected with my counterpart, whoever that competitors do here, like NIIT, for example, we meet and we talk about what is happening. But of course, nobody shares their secrets, right?’ – Vishwas Dubey (Relationship Manager)
5.5 Conclusion

As observed in the above sections, BA's tasks were typically divided into several smaller tasks or functions. These tasks were assigned to TCS and other suppliers who worked together in a collaborative manner. Although TCS and other supplier (such as E-dialog, Cognizant and Comarch) were working separately to complete their primary task/service, the service of each supplier was likely to be the input of another’s service, creating sequential or reciprocal inter-dependence. In addition, parallel tasks were pooled together or fit with each other to create an integrated and seamless service for the client, creating pooled or integrative inter-dependence. Put simply, TCS had to understand and identify different types of task inter-dependence when working with others.

This chapter also identified and summarised managerial issues or challenges that TCS came across in this multi-supplier scenario (see Table 18). Project specific issues mainly arise from the factors affecting the suppliers’ task execution and service delivery. These factors include: (I) inter-supplier task dependence and (II) accountability issues, while relationship specific issues emerge because of Pactera’s (III) perceptions of supplier competition in the multi-supplier scenario.

<table>
<thead>
<tr>
<th>Managerial Challenges</th>
<th>(I) Task Inter-dependence</th>
<th>(II) Accountability Issues</th>
<th>(III) Perceptions of Supplier Competition</th>
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<td></td>
<td>Integrating with other suppliers’ product</td>
<td>Performance prevention or work blocked by other suppliers</td>
<td>Supplier’s work can be easily replaced by another supplier</td>
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<td></td>
<td>Aligning work process between suppliers</td>
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<td>Creating additional value for the client</td>
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<td></td>
<td>Changes of other supplier</td>
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<td>Ongoing bidding process</td>
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In order to deal with the issues they met, a considerable amount effort were made by TCS. As the case reveals, coordination effort mainly derived from the following activities: 1) aligning plans and schedules with other suppliers, 2) checking others’ deliverability, 3) clarifying requirements for other suppliers, 4) information sharing between suppliers, 5) incidents and issues management, 6) re-design and re-estimation, and 7) mapping out inter-dependence. TCS coordinated with other suppliers through a set of activities, and these coordination activities result in a considerable amount of time and effort. Therefore, a supplier should be taken these factors into account when managing alignment-specific
issues in multi-sourcing contexts.

As inter-dependence also brought accountability-specific issues, a set of coordination activities were undertaken when TCS dealing with these issues. TCS had to not only identify potential issues but also these emerged issues when working with others. In order to deal with these issues, effort and time were commonly spend in 1) developing mutual agreements, 2) monitoring and updating, 3) finding out the responsible supplier, and 4) complying with pre-designed agreements.

Furthermore, the case findings also noted that other factors, such as supplier competition also influence supplier’s managerial effort. TCS have to continually bid for additional work under the same engagement. In light of this, effort and time were often made to facilitate efficient work execution in multi-vendor scenarios. In summary, nineteen specific managerial activities adopted by TCS were identified and summarised (see 导师引用无效）。In the next chapter, the case study of TCS (Lloyds account) is presented and analysed.

Table 19: Managerial Practices in the Four Projects

<table>
<thead>
<tr>
<th>Managerial Practices</th>
<th>(I) Coordinating Task Inter-dependence</th>
<th>(II) Dealing with Accountability Issues</th>
<th>(III) Facilitating Supplier Cooperation</th>
<th>(IV) Coping with Supplier Competition</th>
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<tbody>
<tr>
<td></td>
<td>Aligning plans and schedules with other suppliers</td>
<td>Developing mutual agreements</td>
<td>Engaging in IT-enabled communication</td>
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<td></td>
<td>Checking others’ deliverability</td>
<td>Monitoring and updating</td>
<td>Engaging in face-to-face discussions</td>
<td>Continuously bidding for more assignments</td>
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<td></td>
<td>Clarifying requirements for other suppliers</td>
<td>Finding out the responsible supplier</td>
<td>Delegating liaison contacts/ coordinators</td>
<td>Providing additional services</td>
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<td></td>
<td>Information sharing between suppliers</td>
<td>Re-developing and improving other suppliers’ work</td>
<td>Increasing familiarity among multiple suppliers</td>
<td>Paying attention to confidentiality</td>
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</tbody>
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CHAPTER 6 – THE TCS (LLOYDS ACCOUNT) CASE

6.1 Background

6.1.1 Company Profile of TCS

Refer to Section 5.1.1.

6.1.2 Case Background

This chapter focuses on TCS’s outsourcing engagement with one of its clients in the Banking & Financial Services industry – Lloyds Banking Group (LBG or Lloyds). As a major British financial institution, LBG’s history began in 1765 with the foundation of Lloyds Bank. LBG provides extensive services and products, including Retail and Commercial Banking, Pensions & Insurance, and Consumer Finance. These services and products are provided by various LBG brands: the Halifax, TSB, and Lloyds Bank brands are used in England and Wales, while the Bank of Scotland and TSB brands are used in Scotland. The headquarters of LBG are located in London (UK), and its served areas also include the US, Europe, the Middle East and Asia. Until 2013, LBG had 90,260 employees and generated a total revenue of £21.163 billion.

In order to replace and modernize the Bank’s redundant and complex systems, Lloyds entered into a wide range of outsourcing agreements and replaced over 80% of its IT workforce. Lloyds had a long track record of outsourcing its IT and back-office services to external suppliers. For instance, Lloyds TSB has outsourced almost half of its programmers in its insurance and telephony division since 2008. Some sensitive areas of LBG’s IT systems, such as risk and security, were also outsourced to external suppliers. In terms of LBG’s IT outsourcing arrangements, the Indian companies TCS, Cognizant and Wipro were three of the bank’s main IT services suppliers.

As LBG’s primary IT service provider, TCS has performed several services for Lloyds, mainly involving Application Design and Maintenance (ADM). During the research trip to Lloyds Bank, four specific services that TCS provided were investigated. These projects were all under the umbrella of the outsourcing relationship between Lloyds Bank and TCS; therefore, they were analysed together as one ‘embedded’ case study (Yin 2014): the four
specific services in this case are sub-units of analysis. A brief description of the four projects is presented below.

**Project 1 – ‘Business Process Automation (BPA) Platform’ Service (L1)**

Within the Application Design Maintenance (ADM) Channels, the Business Process Automation (BPA) Platform provided a set of applications, such as workflow and business process automation to many different business areas of Lloyds Banking Group. The project started in 2011 and its applications covered a broad range of critical customer-facing functionality. The BPA platform offered services to other areas using Pega as well as its own project delivery teams and owned the Pega technical centre of excellence across the Lloyds Banking Group.

In Application Design Maintenance (ADM) Channels, different tasks were allocated to various supplier teams. As one of the service providers for the BPA Platform, the TCS team was accountable for developing the Platform IT change delivery capability, delivering effective software solutions and services. Another three suppliers working on this platform were Cognizant Technology Solutions, Wipro, and Pega Systems. In terms of work distribution, Cognizant offered testing and QA services and Pega was accountable for the support of technical applications within the platform. The development work was shared between TCS and Wipro.

**Project 2 – ‘Quality Assurance (QA) Environments’ Service (L2)**

In this project, a TCS team provided testing environments for Application Design Maintenance (ADM) Channels and supported Cognizant’s testing work. Some small local suppliers (such as Exceed, ECS) were also involved in the interactions, but TCS spent considerable time communicating mainly with Cognizant on this project. This was because the major chunk of testing work was done by Cognizant, and TCS had to understand Cognizant’s testing requirements in order to set up appropriate testing environments for the Cognizant QA team.

**Project 3 – ‘Service-Oriented Architecture (SOA)’ Service (L3)**

The service-oriented architecture (SOA) is a standardized IT architecture designed to support the connection of various Lloyds Bank’s front-end applications and the data that is
stored in the back-end. The SOA platform of Lloyds Banking Group was designed, built and implemented by TCS onshore team at Edinburgh. The work of TCS mainly involved the code development and unit testing of Lloyds’ SOA platform, as well as defect management and bug fixing. In addition to TCS, there were several other supplier teams working for the SOA platform; for instance, infrastructure and back-end hosts were provided by different supplier teams (e.g., Wipro and IBM), and an architect came from Accenture to make the requirements of the SOA services. In terms of the Quality Assurance (QA), the client (Lloyds) and another supplier (Cognizant) were responsible for component integration testing (CIT) and system integration testing (SIT).

**Project 4 – ‘Workflow Automation’ Service (L4)**

Automation systems had been developed and implemented to optimize LBG’s cumbersome front-end application processes. For instance, the credit card application process necessitated customers filling out forms and then back-office workers manually typing in customer information. The automation systems were required to streamline the bank’s back-office processing, so as to increase data accuracy and reduce required administrative resources. Previously, LBG’s workflow automation was mainly provided by IBM. However, as IBM was ending its contract with Lloyds, the automation work was being taken up by TCS. From May 2014 until December 2014, the automation work was delivered simultaneously by IBM and TCS. There was a huge amount of automation work transferred from IBM to TCS during this period. In light of this, communication between IBM and TCS was inevitable.

**6.1.3 Team Composition in the Lloyds Project**

TCS has been engaged with Lloyds Banking Group for several years and established many areas of trusted partnership. TCS’s development and support of LBG’s IT systems took place in a globally distributed environment, involving different locations: two on-site teams at Lloyd’s Red Lion Court Office (IT Department) and an Edinburgh Office, UK. TCS offshore teams were mainly based in India. As an illustration of the TCS on-site team structure, Figure 17 shows the organizational structure of the TCS on-site employees at LBG’s Edinburgh Office.
Figure 17: Organizational Structure of the TCS Team
(On-site Employees at LBG’s Edinburgh Office)

6.2 Task Inter-dependence

‘I also interacted with Cognizant, Wipro and Pega folks.’ – Varma Kishore Gottunukkala (Technical Lead, L1)

As mentioned in the above quote, TCS had to work with three peer suppliers in the L1 project. This resulted in three types of inter-dependencies between TCS and each of the three suppliers. Similarly to the L1 project, TCS also worked with more than one supplier in the other projects. In order to analyse the types of inter-dependence in each project, the sub-sections below identify and present the inter-dependence that TCS encountered in each of the four projects.

6.2.1 Inter-dependence in the ‘BPA Platform’ Project (L1)

Pooled, sequential and reciprocal inter-dependencies were observed in the L1 project. As
described in 7.1.2, in order to develop applications for the BPA Platform, TCS had to use a specific product provided by Pega. The improvements and updates from Pegasystems were handed over to TCS for application development. In light of this, the output of Pega became the input of TCS, so the workflow between Pega and TCS was sequential in its nature (see Figure 18). This relationship is described in the quote below:

‘We are already working on a particular version of the software. The third party supplier (Pegasystems) has come up with a new version of the software. Then there is a dependency with the third party supplier on the advantages and enhancements that are coming old in the new version, so that is a kind of hand-over that you need from the third party supplier.’
– Subhav Mahaveer (Programme Manager, L1)

Once services or software were developed, TCS handed them over to Cognizant for testing. In order to fix the bugs, TCS had to communicate with Cognizant, for instance, to understand the bugs’ information and discuss the defects with Cognizant. Only if the bugs or defects were fixed and approved by Cognizant, could the services go live. The output of TCS became the input of Cognizant, and vice versa, and the work flowed back and forth between TCS and Cognizant over a period of time. In light of this, reciprocal inter-dependence existed between TCS and Cognizant (see Figure 18). The following quotes describe the workflow between TCS and Cognizant:

‘What we do is we complete our development work and hand over our package to them (Cognizant). So they can test it, once they have signed off, we can take it to live.’ – Subhav Mahaveer (Programme Manager, L1)

‘I will have to interact with them and see what the defect they raised is, and some discussion on defects.’ – Varma Kishore Gottunukkala (Technical Lead, L1)

In addition to TCS, another supplier – Wipro – was also responsible for the development of the BPA platform. Similar assignments were performed by TCS and Wipro separately; the applications of the two did not rely on each other, creating integrative inter-dependence between TCS and Wipro. This is revealed in the quotes below,

‘Wipro, in this case, they are also a partner in the development phase, like what we do, they also do the development.’ – Subhav Mahaveer (Programme Manager, L1)

‘All the projects are assigned to various partners and there won’t be discussion between development partners (i.e., suppliers) in ADM.’ – Anbumani Dhayalan (Platform Lead, L1)
6.2.2 Inter-dependence in the ‘QA Environment’ Project (L2)

In the L2 project, TCS had to obtain and understand the QA requirements to establish appropriate environments, and then hand the environments back to Cognizant for testing (see Figure 19). Therefore, the workflow between TCS and Cognizant consisted of the passing of requirements (e.g., specification of the testing environment) from Cognizant to TCS, who in turn handed off the finished services (i.e., testing environments) back to the Cognizant QA team, creating reciprocal inter-dependence between TCS and Cognizant. This is described in the statements below:

‘They come to me and they say, I have 100 applications (from different suppliers), they need these applications to be built or provisioned (i.e., connected for testing). [...] What our job is, is to give them an end-to-end (testing) environment, you know connectivity, just connect everything, give it to them, then, they do the testing.’ – Prasad Chelikani (Environment Delivery Manager, L2)

‘We will make sure whatever the QA is asking us, as they provided requirements basically, we will ensure that they (the environments for testing) are provisioned in an end-to-end fashion.’ – Prasad Chelikani (Environment Delivery Manager, L2)

6.2.3 Inter-dependence in the ‘SOA’ Project (L3)

Sequential and reciprocal inter-dependencies were also found in the L3 project. Within the design and development phases, the SOA services were completed by TCS on its own, while Cognizant performed the quality assurance of the services that TCS developed. TCS had to pass on the source code of SOA services to Cognizant for testing, as described in the following quote:
‘When the development team is satisfied with the code of (SOA services), then they hand over the code to the QA team […] there is one more supplier involved in this QA activity.’ – Kapila Khaded (Portfolio Manager, L3)

‘They do the testing. So until and unless our code is ready and the code is deployed at the specific environment, they cannot perform the testing.’ – Priti Yadav (Developer, L3)

When Cognizant were testing the SOA services, bugs and defects were reported and sent back to TCS for fixing. This process is indicated by the following interview:

‘They (Cognizant) carry out the testing for the code delivered by TCS and they do all kinds of testing, and sometimes they report defects or bugs, you know, any other issues. And then the TCS team is responsible for working on those defects and fixing those defects and again deliver it to the QA team for testing.’ – Kapila Khaded (Portfolio Manager, SOA Services)

The above quote reveals that TCS handed off the SOA service to Cognizant for testing, who in turn reported issues (such as the information of bugs or defects) back to TCS for bug fixing or service improvements. The workflow of the service delivery, testing, and bug fixing process was bidirectional between TCS and Cognizant, resulting in reciprocal inter-dependence between them (see Figure 20).

Apart from the workflow relationship with Cognizant, the service delivery on the SOA platform could be blocked if the infrastructure was not already provided by the back-end suppliers (e.g., IBM, Wipro), as supported by the following quotes:

‘Until we will get the infrastructure, we won’t be performing and we won’t be able to perform any development. Or we won’t be able to deploy. So we are dependent on the infrastructure team.’ – Priti Yadav (Developer, SOA Services)

‘We use some IBM tools actually, to do this. Message Broker and Data Power of the IBM tools that we use to perform this […] Sometimes Wipro is there.’ – Priti Yadav (Developer, SOA Services)

‘Then we have to interact with the infrastructure team because they are providing the infrastructure, whenever anything, any outage is there, or anything is down, or we want the infrastructure to be upgraded, or any other configuration we need from them, so we have to interact with them, the infrastructure team.’ – Priti Yadav (Developer, SOA Services)

As revealed in the above quotes, TCS had to communicate with back-end suppliers to clarify specific functions and services that TCS required, and the back-end suppliers provided the infrastructure back to TCS. This interaction between TCS and back-end suppliers was bidirectional, creating reciprocal inter-dependence between TCS and IBM/Wipro.
In addition to infrastructure services, TCS’s service development also relied on Accenture, who analysed the requirements and decided what services TCS had to do, this is indicated by the following statements:

‘There is an architect, who actually decides what services are required, and how services are required, which back-end host we have to call and everything. So the architect is from a different supplier – they are from Accenture.’ – Priti Yadav (Developer, SOA Services)

‘And we are also dependent on the architect team. If they don’t clear our queries and if they don’t provide us the proper design, we won’t be able to proceed.’ – Priti Yadav (Developer, SOA Services)

As the infrastructure and design requirements preceded the work of the SOA services, the workflow relationships between TCS and Accenture were **sequential** inter-dependence (see Figure 20).

### 6.2.4 Inter-dependence in the ‘Workflow Automation’ Project (L4)

In this project, the development of the workflow automation was shared between IBM and TCS. Both of the suppliers performed independent but similar sub-tasks; thus, no workflows and work hand-over existed between them. Each supplier’s contribution was pooled for the whole project, creating **pooled** inter-dependence between IBM and TCS (see Figure 21). This is described in the following statement:

‘Part of the work is done by IBM, part of the work is done by TCS […] So they developed certain components and certain portions of the project, we developed the rest of the portion of the project; at the end of the day […] there is no co-development between us. All these components are individual components, they don’t talk to each other.’ – Luvakumar Mukka (Portfolio Manager, L4)

In addition, as TCS was taking over IBM’s work in this project, a knowledge transfer process from IBM to TCS was observed in this project. It was necessary to transfer specific
development knowledge from IBM to TCS. During the learning progress, interactions between TCS and IBM would go back and forth between IBM and TCS, creating reciprocal inter-dependence between them (see Figure 21). The following statements suggest the knowledge transition process between IBM and TCS:

‘We have to interact with IBM if there are common components they have developed; they have been in the project for quite a long time, so we may be using some of their components.’ – Luvakumar Mukka (Portfolio Manager, L4)

‘We ask them what is the component, how we develop it, what was your development requirement, so we will interact with them […] We go and ask IBM what other things they have developed, what other things are needed; so using that checklist, we will ask IBM, have you done everything in this’ – Luvakumar Mukka (Portfolio Manager, L4)

Drawing from the above analysis, the types of inter-dependence that TCS encountered in the Lloyds engagements varied from pooled, sequential to reciprocal. In each project, TCS faced various types of inter-dependence. Table 20 depicts the inter-dependence that TCS faced in each of the four projects.

Table 20: Inter-dependencies in the Four Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Inter-dependence</th>
<th>Stakeholder(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Sequential</td>
<td>with Pega</td>
</tr>
<tr>
<td></td>
<td>Pooled</td>
<td>with Wipro</td>
</tr>
<tr>
<td></td>
<td>Reciprocal</td>
<td>with Cognizant</td>
</tr>
<tr>
<td>L2</td>
<td>Reciprocal</td>
<td>with Cognizant</td>
</tr>
<tr>
<td>L3</td>
<td>Reciprocal</td>
<td>with Cognizant</td>
</tr>
<tr>
<td></td>
<td>Sequential</td>
<td>with Accenture</td>
</tr>
<tr>
<td></td>
<td>Sequential</td>
<td>with IBM/Wipro</td>
</tr>
<tr>
<td>L4</td>
<td>Pooled</td>
<td>with IBM (in terms of task delivery)</td>
</tr>
<tr>
<td></td>
<td>Reciprocal</td>
<td>with IBM (in terms of knowledge transition)</td>
</tr>
</tbody>
</table>

6.3 Managerial Practices

TCS’ managerial challenges and their coping practices are grouped into four specific categories (as is described in Section 3.4 Data Processing and Analysis), and they are analysed in the following sub-sections.

6.3.1 Practice I: Managing Inter-dependence

In the case of Lloyds, TCS faced multiple types of task inter-dependence in each of the four projects: pooled, sequential and reciprocal. Appropriate coordination activities were essential to cope with these task inter-dependencies. Furthermore, these inter-related tasks
were delivered by different supplier firms, creating additional challenges for TCS. These coordination challenges, as well as the coping practices of TCS, are analysed and presented in the following paragraphs.

One of the managerial challenges that TCS encountered in the multi-sourcing relationship was integrating with other suppliers’ services. In the case of L2, TCS had to build an environment that connected different applications. This created challenges as TCS had to coordinate with different people from different suppliers. For instance:

‘The purpose of coordinating with the different stakeholders […] I need to know, whether, which connectivity is supposed to be established so that they can talk to each other […] I need to talk to three supplier teams predominantly, that means, three suppliers to get these two applications connected […] We also talk to the teams within the Service Delivery, because I want to connect application A to application B for example.’ – Prasad Chelikani (Delivery Manager, L2)

TCS had to integrate and connect different applications for testing, and this required TCS to communicate with different supplier teams to understand their applications. This was referred to in the following statement:

‘Two systems are interrelated to each other, and one is doing one’s piece of work, they have to be aware of what they are doing as well as what another one is doing, so that does happen.’ – Sunil Kumar (Portfolio Manager, L2)

**Mitigating and resolving conflicts between suppliers** was also observed as a managerial challenge for TCS. As described in the L1 project, although TCS and Wipro worked on their own service development and there was no workflow between the two suppliers, both of them had the same access to Pega’s products. Therefore, it was very likely that when Wipro wanted to use the same components that TCS had used and developed, there was a risk of conflict between them. This challenge is exemplified by the following quotes.

‘When I’m developing a component in a particular technology, I may be using certain components of the technology to develop it, when the other partners are also using the same technology or software, so there are a lot of chances they also want to use the same components that I have used.’ – Subhav Mahaveer (Programme Manager, L1)

‘There is something called rule set, let’s say the file. The way that is structured is there will be one single version of the file, which will be updated by many partners.’ – Anbumani Dhayalan (Platform Lead, L1)

In addition, **risk of work duplication** was suggested as another coordination issue for TCS.
Take the L4 project as an example: as workflow automation services were separately provided by IBM and TCS, common components or functions could be developed by both suppliers, creating the risk of work duplication. This managerial challenge is described by the quote below:

‘There are some common components in this company, if there is something developed, we don’t want to develop another same application that is already developed we can use it.’ – Luvakumar Mukka (Portfolio Manager, L4)

As observed above, TCS came across many challenges when performing inter-dependent tasks with its peer suppliers. A set of coordination practices were adopted by TCS to manage these issues. These practices are analysed in the following sub-sections.

1) Incident and Issues Management

In this multi-supplier environment, it was inevitable that TCS would be exposed to various kinds of unexpected issues. As described in the following statement, conflicts took place when developers from different suppliers were editing and changing the same file, resulting in time and effort needed for discussion and problems solving between different suppliers.

‘And, if there is a conflict (of), then all the partner (i.e., supplier) teams will have to be discussing and resolving the conflict […] Whatever happens on the ground, if there is any other conflict or any escalation needing to be sorted out, then it will come to the senior leadership team and we all will be discussing and then resolving it.’ – Anbumani Dhayalan (Platform Lead, L1)

Many interviewees indicated the importance of inter-supplier knowledge sharing and learning when solving technical issues. In particular, workshops and joint forums were held when (technical) problems emerged. For instance, if TCS came across any queries or technical problems, they could turn to the joint meeting for discussions and resolutions. These joint events consisted of Subject Matter Experts (SMEs) from different supplier firms and the client firm. TCS could report and discuss any issues they had at these joint events. The following statements reveal that these efforts were commonly taken important in the Lloyds project:

‘(If TCS) cannot understand the technical aspects of it (specific applications that need to be tested). We invite (Subject Matter Experts, SMEs) in the form of the workshop and do some brainstorming exercise.’ – Prasad Chelikani (Environment Delivery Manager, L2)
'We have a technical forum. They gather on a common ground and they put forward the views on what is happening on the project which is listened to by other SMEs; others also express their views on what is happening. So, if there are any challenges they bring them to the table, and come up with solutions. And if there is a new approach or a different approach that anyone wants to propose, it's open to ideas. Any idea sharing on that forum, and taking of that happens in a common forum.' – Subhav Mahaveer (Programme Manager, L1)

2) Clarifying Information

Information clarification and communication efforts were observed in the case of Lloyds. Take the L3 project as an example: TCS had to explain the deliverability to other suppliers and/or clarify what function they needed from other suppliers. This is described in the following statements:

'So we do have to interact whenever we have queries, and obviously we do have queries. Because they just decide from their perspective, and we have to tell them whether it is possible or not. Or, how it is possible, or what can be other ways, what can be the efficient way. So this is how we are involved with architects.' – Priti Yadav (Developer, L3)

'We have to get involved with the QA team. Because they are performing testing. We have to tell them properly, what this is all about and what kinds of testing need to be performed.' – Priti Yadav (Developer, L3)

3) Requiring Information

Very often, a supplier firm in a multi-sourcing context needs to obtain task-related information or requirements from other supplier teams, rather than the client firm. Efforts of obtaining requirements and information were also found in the Lloyds’ project. In the L1 project, TCS employees had to develop applications on top of Pegasystems; therefore, it was essential for TCS to gain sufficient information (technical details) to reuse the component that Pega had developed, for instance:

'We interact with them, as we need some response from their application, so in that case, we need some details from them [...] If it is more complex in technical, we need more interaction, more time to understand, more time to get the details (from other suppliers).’ – Varma Kishore Gottumukkala (Technical Lead, L1)

'In order to understand what they have built, we had to do the strategy work project, we had to know what were the environments, what to build and where to build it, what type of components are available for us to reuse' – Subhav Mahaveer (Programme Manager, L1)

This activity was also observed in the L2 project; before providing testing environments for
Cognizant, TCS had to not only obtain QA’s testing requirement but also communicate with different people from front-end, infrastructure and middleware suppliers. For instance:

‘It’s not purely a technical job, but at a high level, we understand what the QA requirement is. What is the testing which is expected from the environments team.’ – Prasad Chelikani (Delivery Manager, L2)

‘We try to understand the architecture, or the work they carry out.’ – Prasad Chelikani (Delivery Manager, L2)

‘We try to spend more time to interact with multi-suppliers than the client […] We spend more time with other suppliers, because we need to extract the deliverables for (our) delivery from these suppliers.’ – Prasad Chelikani (Environment Delivery Manager, L2)

4) Paying Attention to Others’ Work

In the L1 project, TCS and Wipro were using Pegasystems for application development, and the same component of Pegasystems could be used by both of them. TCS had to check and understand what component had been used by Wipro, and what functionality Wipro had developed. This mindfulness of other suppliers’ work played an important role in avoiding conflicts and reducing work duplication between TCS and Wipro. This is evidenced in the flowing statements:

‘We have a team called configuration management team, which also records what are the components used by which (supplier) for what purpose. So if I am going to touch that component, I will reach out to them, they will know, they will tell me this is the project that they have used it for. If you want to use this, you’ll have to do a conflict management and see whether that is going be okay for each other or not.’ – Subhav Mahaveer (Programme Manager, L1)

‘If he is going to develop the same component which I have developed for our functionality and if I am going to do something vice versa, which is the other’s functionality, so there is the dependence of understanding and getting to know what they have developed, what is the functionality.’ – Subhav Mahaveer (Programme Manager, L1)

6.3.2 Practice II: Dealing with Accountability Issues

In addition to the difficulty of performing inter-dependent tasks, TCS also came across a couple of challenges due to limited transparency and less accountability between supplier teams. In particular, performance prevention or work blocks were perceived as significant challenges for TCS. For instance, the speed or quality of TCS service deliveries could be impeded if task-related information was lacking or other suppliers were unable to give a
prompt response to TCS. This is indicated in the quotes below,

‘You are always having, you know, blind spots, wherein you will not be getting the first-hand information […] Therefore, the planning, you know, all the forecasting and estimation are impacted.’ – Anbumani Dhayalan (Platform Lead, L1)

‘When you interact with the multi-suppliers, there is definitely a delay in response.’ – Prasad Chelikani (Environment Delivery Manager, L2)

**Ambiguity in defining supplier responsibilities** was identified as a challenge for supplier firms. For instance, the client firm could not clearly identify which supplier should take responsibility for a specific issue, resulting in additional efforts by TCS to defend and justify themselves. This situation is revealed in the following quote:

‘If any consumer is telling me to fix the infrastructure problem, I have to convince them that, say, this is not in my scope.’ – Priti Yadav (Developer, L3)

In the L4 project, IBM was ending its contract with Lloyds Bank. As it was no longer responsible for the automation work, it was more challenging for TCS to acquire knowledge from IBM. Thus, **lack of contractual obligations** between TCS and IBM became another challenge when TCS was taking over IBM’s work, as evidenced in the quote below:

‘It is very tricky and very difficult to get appropriate knowledge transition, because they (IBM employees) are leaving, they don’t care about it.’ – Lavakumar Mukka (Engagement Manager, L4)

Also observed in the L1 project, some products were essential for TCS to build on; for example, if the product’s bugs could not be fixed due to the lack of contractual obligations, TCS’s work could be delayed and prevented. This situation is described in the following quote:

‘It happened that the other partner has completed their contract and applications for the particular project. So they’re not going to fix the bugs, now who is going to fix the bugs? I’m not contractually obliged to fix it. I’m not developing this thing, I don’t know what we have done with it, so that was a bit of the very critical situation in which we were (facing). However, we needed that component to be fixed, so we can build on top of that. And then we were short of time.’ – Subhav Mahaveer (Programme Manager, L1)

According to the above observation, inter-supplier accountability issues in the multi-supplier environment resulted in great challenges for TCS to perform its services. The interviewees mentioned that TCS adopted a range of coordination practices to deal with the
challenges. These coping practices are presented in the sub-sections below.

5) Developing Mutual Agreements/Expectation

In the case of Lloyds Bank, TCS spent time and effort in establishing collaborative agreements (such as OLAs) with other suppliers in order to clarify the responsibilities of each. For instance, the responsibility of each supplier was jointly defined before the project started:

‘The framework (of governance structure) is proposed by the partners – suppliers […] It (the responsibility of each supplier) is defined by the partners (i.e., suppliers), basically.’ – Anbumani Dhayalan (Platform Lead, L1)

‘Some of these contracts, standards, OLAs, which have been (developed) to understand platform and business, some of them may be very specific, to that particular project, which will not be covered as an overall contract already signed with the bank. So those specifications may go to sub-contract of their team, to get it signed by the parties.’ – Subhav Mahaveer (Programme Manager, L1)

In the L2 project, TCS undertook the testing environment development, while Cognizant was responsible for the testing service. By a clear clarification of each supplier’s responsibilities, the client firm knows which supplier to contact when an issue emerged. For instance:

‘Cognizant is the owner to ensure that delivery happens, for example, some are not right, LBG is not going to come to us, LBG will go up to CTS (Cognizant Technology Solutions) because they are the delivery owners. If they are regarding resourced, CTS, they are going to come to me.’ – Sunil Kumar (Portfolio Manager, L2)

6) Monitoring and Updating

Apart from defining responsibility and specification, regular project reviews were found as an efficient practice to monitor the other supplier’s work progress and identify any issues. This ensured the deliverables of TCS were not influenced negatively by other suppliers. These joint monitoring and review meetings were held regularly in the Lloyds’ case. For example, a clash management call was held on a daily basis to monitor the work status in the L1 project, as evidenced in the following statement:

‘There is something on release management committee. Every day there will be a clash management call, representations (are) from the partners (i.e., suppliers), and they will be
In a similar vein, a weekly call between suppliers was held to track and resolve project issues in the L2 project.

‘We have a governance structure, we have a weekly call. If there are any issues from another partner, we deal with them, it could be verbal, non-verbal, all sort of communications.’ – Sunil Kumar (Portfolio Manager, L2)

Also observed in the L3 project, the project status was monitored and updated by managers from different suppliers on a daily basis; this status call is referred to in the following quotes:

‘From Lloyds’ side there are managers, from our side there are managers, from the architect team, or the service delivery team or the infrastructure team, there are managers. We do have a status call every day. The status call is to make sure that whatever the work is, (to check) whether it’s aligned or not, (whether) it’s on track or not.’ – Priti Yadav (Developer, L3)

‘Managers also do maintain excel sheets, the status sheet that, that really tracks what is the status of the project, is it on track or not on track.’ – Priti Yadav (Developer, L3)

7) Finding out the Responsible Supplier

In the L3 project, TCS and other suppliers engaged in a defect management team, which was composed of different suppliers. This joint event was held to identify which supplier should be responsible for particular defects, and these efforts were able to reduce any figure pointing problems between suppliers. This is described in the following statement.

‘We have a defect management team as well. Once we develop the services and then it goes for testing, so that testing is managed by some other team, that is the defect management team which actually brings all the suppliers together and they actually discuss about the defects, and who needs to fix what and everything.’ – Priti Yadav (Developer, L3)

8) Complying with Pre-designed Agreements

The case finding revealed that pre-designed rules and agreements between supplier teams were abided by TCS when the project started. In order to ensure other suppliers’ deliverables and timelines were not impeded by TCS, TCS also needed to comply with the mutual agreements made between TCS and other suppliers. This is indicated by the
following interviewee:

‘We still hold the responsibility to make sure that we meet the time scales […] I should put it in this way, the components that we’re developing are not reached to the end user. When it reached the end user, the maintenance team becomes more obliged to ensure that any service issues that they tried to fix and the customer have been kept updated with the OLAs on a particular application. In the development phase, our responsibilities lie with the time scale or the schedule or the plans that have been produced for the particular project. Now this plan runs end to end. If you’re going to not fit the time scale, then you’re not only going to affect yourselves, but you’re going to affect all surrounding areas. So our responsibilities become to ensure, that is why we sign a contract, to tell these and these have given me.’ – Subhav Mahaveer (Programme Manager, L1)

6.3.3 Practice III: Facilitating Inter-Supplier Communication

In the case of Lloyds bank, working with other suppliers entailed TCS engaging in inter-supplier cooperation activities, including transferring information/work across companies, or developing mutual awareness of parallel tasks. However, one challenge TCS faced was the knowledge difference between TCS and other suppliers, which impeded a common understanding between them. Interviewees highlighted that working with colleagues within TCS was much easier than cooperating with people from a different supplier. This can be seen from the following statement:

‘It’s different when working with other supplier teams. When working with internal teams, it’s easy to convince them, it’s easy to put our points. Because, they know what we are doing, actually. Because, they know our technology, what is possible and what is not possible. So, we, it’s easy to convince them. But when it’s about other teams, it, they will just stand to their point. No, this is this, this is this. They won’t try to understand our point. So, we really have to go through multiple calls, multiple chats and everything, to convince them, see this is not, this cannot be done, because these, these are the limitations or these are the blockers, so like that.’ – Priti Yadav (Developer, L3)

In addition to knowledge difference between suppliers, diverse communication processes also created a barrier for TCS employees when they were trying to communicate with other suppliers. This issue was commented on by the following interviewee:

‘Since it is a different (supplier) team, we can’t interact (with them) in our own way.’ – Varma Kishore Gottimukkala (Technical Lead, L1)

Another challenge observed in this case was the difficulty in obtaining information from other suppliers. TCS perceived that communication with people from different suppliers
was not as simple or quick as communicating internally. This made information exchange between TCS and its peer suppliers challenging. As described in the L1 project, getting task-related documents from Wipro should follow Lloyds' procedure, and TCS they had few. This situation is described by the following interviewee:

'I’m not saying we are not getting (their response), but, there is some time taking part (to get detail information).’ – Varma Kishore Gottunukkala (Technical Lead, L1)

'It could be going through the bank or maybe the bank will define some process, okay, if you need these details, you, you have to request them in this way.’ – Varma Kishore Gottunukkala (Technical Lead, L1)

In a similar vein, the difficulty of communicating with other suppliers increased the overheads of service delivery, which is revealed in the following quote:

'If a request comes to somebody and then it was an external team you are talking to, but different SLAs and your cycle of approval are longer, and it adds to the costs of the project and hence adds to the overhead of the project.’ – Anbumani Dhayalan (Platform Lead, L1)

'Some challenges we are having, you know, is getting some documents – supporting documents (from other suppliers).’ – Varma Kishore Gottunukkala (Technical Lead, L1)

To break the barriers of working with other supplier teams, many interviewees highlighted the importance of good relationships and spontaneous communication between supplier teams. In light of this, specific efforts were made towards building relationships with other suppliers and setting up efficient inter-supplier communication channels. These are analysed below.

9) Building Relationships Among Multiple Suppliers

Fostering familiarity between team members is indicated as an essential factor in inter-organizational relationships. Interviewees indicated that they had participated in various kinds of social events to meet with people from other supplier teams. For instance, the following quote illustrates the importance of building rapport in inter-supplier negotiations.

'There is a bit of, you know, personal interaction also involved in those negotiations […] There is a bit of personal trust and respect also involved in (those negotiations).’ – Anbumani Dhayalan (Platform Lead, L1)

Also revealed in the following quote, engaging in and organizing these team building and
social events also required time and effort.

‘We try to find more time, to manage, to have good rapport with the multi-suppliers, rather than within the organization. So, I would say, I would put it as 80-20 or 85-15, kind of.’ – Prasad Chelikani (Delivery Manager, L2)

10) Delegating Liaison Contacts/Coordinators

Interviewees mentioned that coordinators or liaison contacts became essential to facilitate interactions between TCS and external teams, so a coordination role was set up when TCS needed to communicate with other suppliers. This is supported by the following statement:

‘I also have to work as an on-site coordinator, where I have to coordinate between clients, multiple suppliers and our offshore team that are sitting in India.’ – Priti Yadav (Developer, L3)

‘Primarily it (the technical forum) runs every week […] all the suppliers of the SMEs on the same platform (engaged in the forum).’ – Subhav Mahaveer (Programme Manager, L1)

11) Engaging in Face-to-Face Discussions

Instead of using IT-enabled communication tools, most of the discussions with other suppliers were carried out in a face-to-face manner. This was not only because all the suppliers were collocated in the same building of Lloyds Bank, but also because transferring documents was not always sufficient to get accurate information. Face-to-face discussions are revealed in the following statements:

‘There are some documents (to get the information), actually, but sometimes it may not help, actually. It requires some discussions.’ – Varma Kishore Gottunukkala (Technical Lead, L1)

‘We typically chat at the desk […] even though there are different partners, we will go to the desk.’ – Anbumani Dhayalan (Platform Leads, L1)

6.3.4 Practice IV: Coping with Supplier Competition

Lloyds Bank’s IT functions were jointly delivered by several supplier firms, so it was inevitable for TCS employees to confront competitive pressure. In the multi-supplier environment, Lloyds Bank could easily judge the capability of TCS by comparing it with that of other suppliers, in terms of performance of task delivery. This is revealed in the following quotes:
'Definitely there is a competition, each one tries to prove what they do, they are doing is the best.' – Subhav Mahaveer (Programme Manager, L1)

'Whoever is able to qualify or fulfil the expectation of skill, projects are awarded.' – Subhav Mahaveer (Programme Manager, L1)

In this competitive environment, in order to safeguard its position and get more assignments, TCS not only spent additional time and attention to prove that it is the best supplier, it also made some client-specific investments.

12) Demonstrating Capability

TCS, as well as other suppliers, spent time and attention to prove that it was the best supplier; for instance, TCS kept an eye on the market in order not to fall behind its competitors.

'Other suppliers try to put you down so that they get the business […] So everyone has to build their credibility.' – Sunil Kumar (Portfolio Manager, L2)

'There are various measures and controls that we put in place to ensure the quality stays up to the market and exceeds customers’ expectations […] For example, we have now delivered the Pega technologies, what is the industry best practice and standard that Pega expect us to have? So we compare what we have done against the industry standard that gives us the result of various standards.' – Subhav Mahaveer (Programme Manager, L1)

13) Supporting Client's Training Programme

Apart from building its own credibility, TCS also created some extra value for Lloyds Bank. In particular, TCS provided training services for the staff that newly joined Lloyds Bank. Such investment is indicated by the following interviewee:

'As a distinction we are doing here is training new employees […] We are trying to deliver extra value to TCS bank and its customer […] To tell them how to work with different partners, different suppliers across different geographic locations and cultures.' – Vijrumbhan Lade (Programme Manager, Academy)

In order to collect information of real cases for training material, TCS spent time and effort to communicate with many other suppliers who were working for Lloyds Bank, in order to understand the services they had developed for Lloyds. For instance:

'Because TCS is not facilitating all the functions in Lloyds, it only works in a certain area, and other functions are from other suppliers. So we go to them (i.e., other suppliers) and
understand what they are doing in terms of applications, what services they perform […] we collect all these details (to prepare training materials).’ – Vijrumbhan Lade (Programme Manager, Academy)

14) Inter-supplier Learning

In some multi-sourcing projects, one supplier could take over a specific service or task which was initially delivered by a different supplier (Chua et al., 2012; Sia et al., 2010), leading to the need for close cooperation between the two suppliers (Wiener and Saunders, 2014). Very often, there is no contractual obligation on the first supplier to train the replacement staff during the transition period. In light of this, the new supplier has to not only focus on its service delivery but also spend additional effort to learn from the former supplier in order to avoid interruptions in the project and service delivery. Such form of supplier cooperation was identified in the Lloyds’ case. Specifically, Lloyds terminated its contract with IBM and had to transition its automation services to TCS. The learning and knowledge transfer activities required time and effort for TCS; such effort is described in the following statement:

‘We will have a plan for knowledge transition, how much time it takes, and how many FTEs it requires […] it is a continuous learning process if you take some component from somebody else, learning from IBM for six weeks.’ – Lavakumar Mukka (Portfolio Manager, L4)

6.5 Conclusion

As observed in the above sections, Lloyds’s tasks were typically divided into several smaller tasks or functions. These tasks were assigned to TCS and other suppliers (such as IBM, Wipro and Cognizant) who worked together in a collaborative manner. Although different suppliers were working separately to complete their primary task/service, the service of each supplier was likely to be the input of another’s service, creating sequential or reciprocal inter-dependence. Occasionally, parallel tasks were pooled together or fit with each other to create an integrated and seamless service for the client, creating pooled inter-dependence. Put simply, TCS had to understand and identify different types of task inter-dependence when working with others.

This chapter also identified and summarised managerial issues or challenges that TCS came
across in this multi-supplier scenario (see Table 21). Project specific issues mainly arise from the factors affecting the suppliers’ task execution and service delivery. These factors include: (I) inter-supplier task dependence, (II) accountability issues, and (III) coordination barriers, while relationship specific issues emerge because of Pactera’s (IV) perceptions of supplier competition in the multi-supplier scenario.

<table>
<thead>
<tr>
<th>Managerial Challenges</th>
<th>(I) Task Inter-dependence</th>
<th>Integrating with other suppliers’ services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mitigating and resolving conflicts between suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Risk of work duplication</td>
</tr>
<tr>
<td>(II) Accountability Issues</td>
<td>Performance prevention or work blocked by other suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambiguity in defining supplier responsibilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of contractual obligation</td>
<td></td>
</tr>
<tr>
<td>(III) Barriers to Supplier Cooperation</td>
<td>Knowledge difference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diverse communication process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficulty obtaining information from other suppliers</td>
<td></td>
</tr>
<tr>
<td>(IV) Perceptions of Supplier Competition</td>
<td>Performance of task delivery</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creating extra value for the client</td>
<td></td>
</tr>
</tbody>
</table>

In order to deal with the issues they met, a considerable amount of effort were made by TCS. As the case reveals, coordination effort mainly derived from the following activities: 1) incident and issues management, 2) clarifying information for other suppliers, 3) requiring information from other suppliers, and 4) paying attention to other suppliers’ work. TCS coordinated with others through a set of activities, and these coordination activities result in a considerable amount of time and effort. Therefore, a supplier should be taken these factors into account when managing alignment-specific issues in multi-sourcing contexts.

As inter-dependence also brought accountability-specific issues, a set of coordination activities were undertaken when TCS dealing with these issues. TCS had to not only identify potential issues but also these emerged issues when working with others. In order to deal with these issues, effort and time were commonly spend in 1) developing mutual agreements, 2) monitoring and updating, 3) finding out the responsible supplier, and 4) complying with pre-designed agreements.

Furthermore, the case findings also noted that other factors also influence supplier’s managerial effort. For example, knowledge difference hindered the efficient coordination between TCS and Cognizant/IBM. Also, in order to response to the highly competitive environment, TCS have to provide extra service more to satisfying Lloyds. In light of this,
effort and time were often made in multi-sourcing settings. In summary, eleven specific managerial activities adopted by TCS were identified and summarised (see Table 22). In the next chapter, the similarities and differences of three cases is presented and analysed.

Table 22: Managerial Practices in the Four Projects

<table>
<thead>
<tr>
<th>Managerial Practices</th>
<th>(I) Coordinating Task Inter-dependence</th>
<th>(II) Dealing with Accountability Issues</th>
<th>(III) Facilitating Supplier Cooperation</th>
<th>(IV) Coping with Supplier Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Incident and issues management</td>
<td>Developing mutual agreements</td>
<td>Increasing familiarity among suppliers</td>
<td>Demonstrating capability</td>
</tr>
<tr>
<td></td>
<td>Clarifying information for other suppliers</td>
<td>Monitoring and updating</td>
<td>Delegating liaison contacts/coordinators</td>
<td>Supporting client’s training programme</td>
</tr>
<tr>
<td></td>
<td>Requiring information from other suppliers</td>
<td>Finding out the responsible supplier</td>
<td>Engaging in face-to-face discussions</td>
<td>Inter-supplier learning</td>
</tr>
<tr>
<td></td>
<td>Paying attention to other suppliers’ work</td>
<td>Complying with pre-designed agreements</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 7 – CROSS-CASE ANALYSIS

Chapters 4, 5 and 6 elaborate how tasks are inter-related across multiple suppliers (i.e., inter-supplier task dependence) and investigate their influences on supplier efforts in the multi-sourcing context. The analysis of this chapter focuses on synthesizing repeated patterns across three cases, in terms of types of inter-dependence and sources of supplier efforts. Drawing upon the findings of previous chapters, section 7.1 discusses the similarities and differences of the twelve sub-cases (i.e., the twelve specific tasks TCS and Pactera performed in the three cases) by grouping them into four categories. In addition, the characteristics of four types of inter-supplier task dependence are discussed in this section. Then, section 7.2 investigates two sources of the suppliers’ efforts during the Planning and Execution phases. The analysis focuses on the suppliers’ accountability-specific and alignment-specific practices in these two phases. On top of these analyses, section 7.3 explains the variations of supplier efforts across different projects from two dimensions: four types of inter-dependence and two phases of multi-sourcing projects.

7.1 Classifying Different Types of Inter-dependence

This section has interpreted and analysed the similarities and differences of the 12 projects in terms of the task inter-dependence, by grouping them into four types.

7.1.1 Pooled Inter-dependence

<table>
<thead>
<tr>
<th>Project</th>
<th>The Investigated Supplier</th>
<th>Inter-dependent Supplier</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS3</td>
<td>Pactera</td>
<td>Wipro</td>
<td></td>
</tr>
<tr>
<td>BA4</td>
<td>TCS</td>
<td>NIIT and FTM</td>
<td></td>
</tr>
<tr>
<td>L4</td>
<td>TCS</td>
<td>IBM (in terms of task delivery)</td>
<td></td>
</tr>
</tbody>
</table>

As showed in Table 23, pooled inter-dependence is observed in the projects of MS3, BA4, and L4. For instance, Lloyds Bank’s work automation was independently developed between TCS and Wipro, the only connection between these two suppliers was the pooling of their outcomes for Lloyds Bank (see Figure 21). In a similar vein, developers from TCS, NIIT and FTM worked on different tasks when updating and developing BA’s website (see in Figure 16). These projects share two common features. Firstly, there were no direct
connections between each supplier’s tasks (either software testing or application development). Secondly, the order of each supplier’s actions did not influence the work of the other. This supports previous findings that pooled inter-dependence involves contributions by loosely coupled agents (Astley & Zajac, 1991). In addition, pooled inter-dependence was observed in the case of MS3, where Pactera and Wipro were testing the compatibility of MS Windows in Dutch and English markets. Although the MS3 project shared common characteristics with L4 and BA4 projects, Pactera had to check if there were any bugs that had been reported by Wipro, so as to reduce work duplications (Hoegl et al., 2004).

To conclude, pooled inter-dependence in multi-sourcing represents a situation where each supplier renders a discrete contribution to the whole project but there is no direct interactions between supplier firms. Pooled inter-dependence is often treated as ‘independent’ in prior studies (e.g. Kumar et al., 2009; Van de Ven et al., 1976), as analysed in the L4 and BA4 projects. However, the case of MS3 expands our understanding of pooled inter-dependence and suggests that suppliers still have to keep aware of other suppliers’ work (Kumar et al., 2009), although there is no direct interaction between them.

7.1.2 Integrative Inter-dependence

As an addition to classical types of inter-dependence, integrative inter-dependence is identified in the L1 and MS2 projects (see Table 24). These projects represent a situation in which parallel tasks are separately delivered by different suppliers, but each supplier’s work needs to be fitted or integrated together. As observed in the case of MS2, the overall testing work of Microsoft Lync was shared between Pactera and Chinasoft, and each of them was responsible for a different component (see Figure 9). Similar to the projects MS3, BA4 and L4, there were no sequential operations and direct workflows between parallel tasks (Van de Ven et al., 1976) in the MS2 project. Nevertheless, this case suggests a significant difference between pooled inter-dependence (see projects MS3, BA4 and L4) and integrative inter-dependence (see the MS2 project): tasks are simply put together as a linear summation/addition in the cases of projects MS3, BA4 and L4, while integrating different suppliers’ tasks in the MS2 project requires supplier firms to develop a mutual awareness of each other.
Table 24: Projects with Integrative Inter-dependence Relationship

<table>
<thead>
<tr>
<th>Project</th>
<th>The Investigated Supplier</th>
<th>Inter-dependent Supplier</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS2</td>
<td>Pactera</td>
<td>Chinasoft</td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>TCS</td>
<td>Wipro</td>
<td></td>
</tr>
</tbody>
</table>

Integrative inter-dependence was also found in the case of L1. As shown in Figure 18, TCS and Wipro simultaneously developed Lloyds Bank’s BPA platform, but the applications developed by the two suppliers were not relying on each other. However, both of the suppliers relied on the same resource (i.e., Pegasystems) for their development. Therefore, TCS and Wipro had to be mindful of which components they were using and developing. Although the L1 project did not require ‘fitting’ or ‘integrating’ activities (Kumar et al., 2009), it was essential to develop mutual awareness (Van de Ven et al., 1976) to reduce resource conflicts and work duplications between TCS and Wipro.

7.1.3 Sequential Inter-dependence

Sequential inter-dependence is observed in the projects BA1, BA2, BA3 and L3 (see Table 25). Take L3 as an example: Accenture analysed the requirements and decided what SOA services they needed TCS to provide (see Figure 20). Therefore, the development of Lloyds Bank’s SOA services (by TCS) relied on requirement analysis (by Accenture). Also observed in the BA1 project, the requirements of BA’s Know Me programme came from Opera’s customer data analysis (see Figure 13). In a similar vein, before Cognizant completed the data migration from BA’s existing systems to new platforms, TCS could not develop SME loyalty services on BA’s new platform (see Figure 14). Another example is observed in the BA3 project, the development of the travel programme (by TCS) not only relied on the requirements from front-end application users but was also driven by specific middleware and hardware services from multiple suppliers (see Figure 15).
These projects are similar because of the following two reasons. First, each supplier’s task was directly connected and there were direct interactions between suppliers: the outcomes of one supplier became the inputs of another supplier, or the actions of one supplier influenced the actions of another supplier. Second, there were temporal lapses, when the preceding supplier handed over its work to the succeeding supplier. These findings are consistent with previous studies (Malone & Crowston, 1994; Thompson, 1967) that temporal elements and direct connections are the key characteristics of sequential inter-dependence.

7.1.4 Reciprocal Inter-dependence

Reciprocal inter-dependence is commonly observed in all three cases (see Table 26). For instance, when a tester from Pactera found a bug of Microsoft Office, he/she would report the bug’s details to the Chinasoft IPEs. Once the bug was fixed and sent back by Chinasoft, Pactera could verify the fixed bug and continue further testing (see project MS1). In terms of BA’s multi-sourcing projects, TCS needed to send specific requirements to E-dialog (see the BA1 project), Comarch (see the BA2 project) and Amadeus (see the BA3 project), and then E-dialog, Comarch and Amadeus provided customized products or services back to TCS (see Figure 13, Figure 14 and Figure 15). In a similar vein, in Lloyds Bank’s multi-sourcing projects, the outputs of TCS (such as specifications, requirements and queries) became inputs for other suppliers and vice versa: TCS sent requirements or queries to Cognizant (see the L1 and L3 projects), Wipro (see the L3 project) and IBM (see the L3 and L4 projects), who, in turn, passed specific services and solutions to TCS (see Figure 18, Figure 20 and Figure 21). These cases represent a situation where a supplier passes its work or information to another supplier, and then the same supplier handed off its work back.

<table>
<thead>
<tr>
<th>Project</th>
<th>The Investigated Supplier</th>
<th>Inter-dependent Supplier</th>
<th>Illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS1</td>
<td>Pactera</td>
<td>Chinasoft</td>
<td></td>
</tr>
<tr>
<td>BA1</td>
<td>TCS</td>
<td>E-dialog</td>
<td></td>
</tr>
<tr>
<td>BA2</td>
<td>TCS</td>
<td>Comarch</td>
<td></td>
</tr>
<tr>
<td>BA3</td>
<td>TCS</td>
<td>Amadeus</td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>TCS</td>
<td>Cognizant</td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td>TCS</td>
<td>Cognizant; Wipro/IBM</td>
<td></td>
</tr>
</tbody>
</table>
These projects shared a similarity with those projects analysed in Section 7.1.3: the activities of different suppliers were directly linked and they involved ‘transactional hand-offs’ (Grandori, 1997; Kumar et al., 2009) between suppliers. However, the unique aspect of these cases is the fact that suppliers were mutually dependent on the outputs or actions of other suppliers, and the information or product transfer between suppliers was two-way (Grandori, 1997) or bidirectional (Kumar et al., 2009).

### 7.1.5 Additional Analysis

It is acknowledged that a multi-sourcing configuration creates inter-dependence between suppliers (Bapna et al., 2010; Wiener & Saunders, 2014). However, the evidence in this research suggests that different types of inter-dependence co-exist in a multi-sourcing project. Furthermore, a supplier firm may encounter multiple types of inter-dependence with the same supplier in the same project. An example can been seen in the L4 project, where the relationship between TCS and IBM can be labelled as pooled inter-dependence when they were providing workflow automation services for Lloyds Bank, while reciprocal inter-dependence also existed during the period of work transition from IBM to TCS (see Figure 21). Previous studies suggest that the nature of the task and the choices of technology should be considered when analysing task inter-dependence in a network relationship (Alter et al., 1993; Lawrence et al., 1967). As organizations may perform many tasks simultaneously (Staudenmayer, 1997), one supplier in the multi-sourcing context is likely to provide a variety of services or products for the same client. In light of this, the nature of multi-sourced tasks could influence task structure between suppliers. This explains why suppliers may encounter multiple types of task inter-dependence in the same multi-sourcing projects.

### 7.2 Sources of Supplier Efforts in Different Phases

As evidenced in all three multi-sourcing engagements, suppliers spent time and effort when they were interacting and communicating with the client, other suppliers and internal teams. Although these practices lead to the suppliers’ overall efforts in the multi-sourcing contexts, the focus of this analysis is set on the inter-supplier coordination practices. Previous studies
have suggested that the level of managerial efforts (for instance, ‘man-hours’) varies across project phases (Daft, 2012; Hutchins, 1995; Pinto & Prescott, 1988), in particular, coordination often evolves and changes over time (Adler, 1995; Hoegl & Weinkauf, 2005; Sabherwal, 2003). Applying the findings of these studies to the multi-sourcing context, suppliers’ efforts may also take different forms over time.

Task inter-dependence between entities could generate task conflicts (Kumar & Dissel, 1996) and coordination demands (Grandori, 1997). Applying this finding to the multi-sourcing context, inter-dependent tasks between multiple suppliers need to be coordinated by a variety of managerial practices. Based on the temporal bracketing proposed above, the sources of supplier efforts (i.e., the suppliers’ coordination practices) in the Planning and Execution phases will be analysed in the following two sections.

In the Planning phase, the project should be planned and coordinated in detail so that it is ready for execution (Westland, 2007). Suppliers have to clearly outline tasks, dependencies and timeframes during this phase. Furthermore, identifying potential problems of the project is also essential to a successful completion. In accordance with these findings, the data of this research reveal that supplier efforts in this phase stem mainly from two sets of practices: negotiating and developing mutual agreements as well as adjusting plans and schedules (see Table 27).

<table>
<thead>
<tr>
<th>Coordination Practices</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aligning project plan with other suppliers</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Mapping out inter-dependence</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Developing mutual agreements</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>Information sharing between suppliers</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
</tbody>
</table>

Table 27: Sources of Suppliers’ Efforts in the Planning Phase

<table>
<thead>
<tr>
<th>Coordination Practices</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being mindful of suppliers’ work status</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>Requiring information from other suppliers</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>Clarifying information for other suppliers</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>Problem solving</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>Re-design and re-estimation</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>Complying with pre-designed rules</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>Monitoring and updating</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
</tbody>
</table>

Table 28: Sources of Suppliers’ Efforts in the Execution Phase
Moving from the Planning phase to the Execution phase, supplier firms perform their tasks according to the plans and agreements. The Execution phase is typically the longest phase of the project in terms of duration (Westland, 2007). During this phase, supplier firms participate in a variety of activities to ensure the stability of work progress. Although the focus of the suppliers’ managerial practices shifts to internal task development at this phase, maintaining interactions (Feldman & Pentland, 2003; Feldman & Rafaeli, 2002) and relationships (Hoegl & Weinkauf, 2005) between multiple suppliers are still important. Therefore, the suppliers’ efforts may arise from the practices of managing work hand-offs (information exchange and clarification), keeping mutual awareness (routinized actions) and resolving unexpected issues (change management and re-adjustment), shown in Table 28.

Drawing upon the analysis of the suppliers’ activities (i.e., sources of supplier efforts) in the Planning and Execution phases, it is noted that the suppliers’ efforts stem primarily from two sets of managerial practices: 1) dealing with accountability issues (i.e., accountability-specific efforts) and 2) integrating and coordinating actions, processes and services with other suppliers (i.e., alignment-specific efforts). Each of them focuses on a certain condition of inter-supplier task coordination. Both alignment-specific and accountability-specific efforts varied during Planning and Execution phases, which will be discussed in section 7.3.

7.3 Explaining Variations of Suppliers’ Efforts

Having introduced sources of suppliers’ efforts (i.e., suppliers’ coordination practices) in different phases, the next step is to analyse the variations of suppliers’ efforts across different projects. As analysed in section 7.1, the tasks in multi-sourcing engagements can be inter-dependent in four different ways. Task inter-dependence determines the coordination costs (Adler, 1995; Malone et al., 1999; Van de Ven et al., 1976) because it generates the potential of task conflicts (Kumar & Dissel, 1996) and coordination demands (Grandori, 1997). In addition, as each type of task inter-dependence fits with a particular set of coordination mechanisms (Gulati & Singh, 1998; Thompson, 1967), different types of inter-dependence in multi-sourcing result in variations of inter-supplier coordination (see Table 29). In light of this, this section uses four types of inter-dependence as an analytical lens to explain the differences of suppliers’ efforts in multi-sourcing contexts.
### Table 29: Coordination Practices in Different Projects

<table>
<thead>
<tr>
<th>Phases</th>
<th>Category</th>
<th>Coordination Practices</th>
<th>Inter-dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pooled</td>
</tr>
<tr>
<td>Planning Phase</td>
<td>Alignment-specific</td>
<td>Scheduling and planning in line with other suppliers</td>
<td>MS1, BA1, BA3, L2</td>
</tr>
<tr>
<td></td>
<td>Managerial Practices</td>
<td>* Joint Decision</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>* Information Sharing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accountability-specific</td>
<td>Developing mutual agreements</td>
<td>MS1, BA1, BA3, L2</td>
</tr>
<tr>
<td></td>
<td>Managerial Practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Execution Phase</td>
<td>Alignment-specific</td>
<td>Being mindful on other suppliers’ work status</td>
<td>MS3, L4</td>
</tr>
<tr>
<td></td>
<td>Managerial Practices</td>
<td>Managing work hand-offs</td>
<td>MS1, L1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Requiring information from other suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Clarifying information for other suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Problem solving activities</td>
<td>MS2, L1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Workshops and joint forums</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>* Adjust to the changes from other suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accountability-specific</td>
<td>Monitoring and updating</td>
<td>MS2</td>
</tr>
<tr>
<td></td>
<td>Managerial Practices</td>
<td>Troubleshooting activities</td>
<td>MS1, BA2, BA3, L1, L3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Finding out responsible supplier</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>* Reminding other suppliers</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>* Re-developing others’ work</td>
<td></td>
</tr>
</tbody>
</table>
7.3.1 Enacting Inter-supplier Accountability in the Planning Phase

1) Establishing Mutual Agreements

Because of inter-supplier task inter-dependence, limited transparency creates accountability issues (Bapna et al., 2010; Wiener & Saunders, 2014); for instance, ambiguity in defining supplier responsibilities is observed as a common challenge in all the three cases. This is supported by the following quote:

‘But it (the contract) is not really in enough detail to say exactly what we are expected to do.’
– Yang Yu (Senior Project Manager, MS1)

In addition, performance prevention or work blocks by other suppliers also emerged as a prevalent issue in the three multi-sourcing engagements. For example:

‘When you interact with the multi-suppliers, there is definitely a delay in response.’ – Prasad Chelikani (Environment Delivery Manager, L2)

‘When we finished, but (the project) can’t go live, because they haven’t completed what they should do.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

In order to increase inter-supplier accountability, Pactera and TCS developed collaborative agreements (e.g., OLAs) and supplemented contract terms. For example:

‘(At) the beginning of the project, we (PMs from Pactera, Chinasoft and Microsoft) will discuss the KPIs, and (decide) how we are going to monitor the health of the project [...] we do that effort jointly.’ – Yang Yu (Senior Programme Manager, MS1)

As such, Pactera spend its time and efforts on setting up the ‘time to fix the problem’ (Orr, 1996), creating accountability between Pactera and Chinasoft. In a similar vein, TCS and E-dialog discussed the point and time of work hand-offs, and this agreement was supplemented to the contract and signed with the client firm. The effort of developing mutual agreements is also identified in the case of TCS (Lloyds); for instance, the responsibilities and expectations of each supplier were clearly defined before the project started, by proposing a framework of governance structure as well as developing contracts, standards, and OLAs between multiple suppliers.

Differently, in the case of BA, TCS spent its efforts to identify task inter-dependence with the other suppliers. This helped TCS to understand the workflow relationships with other
involved suppliers, so that they could indicate their dependence on each other’s work when they were developing mutual agreement. Suppliers need to identify inter-faces and inter-dependencies with others, initiating an amount of coordination efforts.

As shown in Table 29, clarifying what work suppliers have to do and when to complete that work are commonly observed in the projects with sequential or reciprocal inter-dependence. This is because formal agreements define each other’s responsibilities (e.g. Handley & Benton, 2013; Rustagi, King, & Kirsch, 2008; Sabherwal, 2003); therefore, they serve as an orienting device to regulate each other’s work (Okhuysen & Bechky, 2009) when each supplier is performing their work during the Execution phase. However, the activity of negotiating and establishing inter-supplier agreements is not observed in the projects with pooled or integrative inter-dependence. As pooled or integrative inter-dependence does not require any sequential ordering of activities (Kumar & Dissel, 1996), there are minimal conflicts between the two inter-dependent tasks (Thompson, 1967; Grandori, 1997). In pooled or integrative inter-dependent situations, direct contact and communication are limited between the two inter-dependent tasks (Daft, 2012), creating minimal potential for suppliers to come across work delays or late responses. Therefore, it is not necessary for suppliers to clarify other suppliers’ tasks or to regulate other suppliers’ activities in these projects.

7.3.2 Enacting Inter-supplier Alignment in the Planning Phase

2) Planning and Scheduling in Accordance with Other Suppliers

Formal plans and schedules determine the sequence of activities or actions between different teams (Ballard & Seibold, 2003; Faraj & Xiao, 2006). Although formal plans and schedules are commonly adopted in outsourcing projects (e.g. Gopal et al., 2011), suppliers in multi-sourcing contexts can scarcely design their plans and make their schedules solely by themselves. For instance:

‘Process would be integrated with Microsoft, and even Chinasoft side.’ – Yang Yu (Senior Project Manager, MS1)

‘Two systems are interrelated to each other, and one is doing one’s piece of work, they have to be aware of what they are doing as well as what another one is doing, so that does happen.’ – Sunil Kumar (Portfolio Manager, L2)
At the initial stage, before we even start the project, we need to understand if they’re binding to our time and if we’re binding to their timeline [...] it could take some time for us [...] the project manager interacts very closely with E-dialog to understand their timeline.’

– Ponvizhi Ramasamy (Program Manager, BA1)

Because of the task inter-dependence, it is necessary for suppliers to design their development process to align with other suppliers’ processes or products. Suppliers need to design their project plans being mindful of others’ timelines and deliverables. Such efforts are reported in the case of BA1; for instance, testing plans and development requirements were shared between TCS and E-dialog during the early phase, creating a common perspectives and clear understandings of each supplier’s requests and deliverables. In a similar vein, TCS had to consult with infrastructure suppliers to understand their delivery capability (the BA3 and BA2 projects) or product details (the L2 project).

In addition to fitting with other suppliers’ timelines, suppliers also engaged in joint actions to develop their plans and schedules. As observed in the case of Microsoft, managers from Chinasoft and Pactera had to work jointly to make testing schedules, so that the timeline of one supplier could be well aligned with the other. Such joint decision-making is referred to below:

‘Chinasoft and Pactera need to work together to figure out what we need to do for the next step [...] We usually talked about testing schedule, test scope, block issues, and maybe potential risk or something.’ – Haifang Wang (Programme Manager, MS1)

Similarly, information sharing between inter-related suppliers is also found in the BA case, for instance:

‘The test plans are shared quite well in advance [...] Before we start testing, we share our test scenario, test cases between both of us, so we understand if there is any gap, they can pick up any test cases that they have missed out, and vice versa.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

Information sharing and joint actions are commonly found in the projects MS1, BA1, BA3, and L2. This is because the tasks with sequential and reciprocal inter-dependence between suppliers create a significant amount of uncertainties, in terms of other suppliers’ timelines, services performance and changes. Uncertainty could be negatively associated with project performance (Jun, Qiuzhen, & Qingguo, 2011). In order to achieve a higher level of certainty
and clarity, connected activities have to be well timed (Hoegl & Weinkauf, 2005; Okhuysen & Bechky, 2009). This explains why Pactera and TCS made their plans and schedules in accordance with the other suppliers’ work progress and timelines.

In contrast to the above projects, practices such as scheduling and planning are not found in the projects with pooled or integrative inter-dependence (see Table 29). As analysed in section 7.1, tasks with pooled or integrative inter-dependence can be comprehensively instructed in advance and parallel tasks do not rely on each other (Kumar & Dissel, 1996), creating fewer uncertainties.

### 7.3.3 Enacting Inter-supplier Accountability in the Execution Phase

#### 3) Monitoring and Updating

It is noted that TCS and Pactera were committed to the mutual rules and agreements that were designed in the Planning phase. This is because routine provides a template for task completion and work hand-off (Okhuysen & Bechky, 2009). In particular, monitoring and updating (such as project status calls, stand-up meetings and clash management calls) are prevalently identified in three cases. In the Lloyds’ case, for instance, the project status was updated by TCS on a daily basis.

> ‘Every day there will be a clash management call, representations (are) from the partners (i.e., suppliers), and they will be validating the contents and hence govern the operations.’ – Anbumani Dhayalan (Platform Lead, L1)

> ‘Managers also do maintain excel sheets, the status sheet that, that really tracks what is the status of the project, is it on track or not on track’ – Priti Yadav (Developer, L3)

Also found in the case of Microsoft, testers from Pactera had to prepare and update their work progress frequently.

> ‘Each guy should talk about what he did today, what issues you have today, such as these. Different people responsible for different tasks, so you just should talk about your work, your issues […] For each meeting we should go through all the items we put on to the agenda […] I’ve mentioned we have two guys in Pactera […] I will collect both of our data together, and then put to Notebook.’ – Huiyan Zhao (Engineer, MS2)

In a similar vein, joint governance meetings were held every week in the case of BA.

> ‘We will ensure that operational obligations are met […] something like you report issues on
Suppliers’ efforts could also arise from engaging in these regular meetings. Although the frequency of the reviews and meetings varies from a daily basis to a monthly basis, these monitoring and updating practices enact visibility and verification between inter-dependent parties (Beulen, 2010; Bragg, 2006; Willcocks & Craig, 2009), keeping teams accountable to each other (Okhuysen & Bechky, 2009).

In contrast to the above projects, there is no evidence that TCS and Pactera spent monitoring and updating efforts in the projects with pooled inter-dependence (see Table 29). This is because the coordination of pooled inter-dependence can be sufficiently achieved through routinized actions (Skipper, Craighead, Byrd, & Kelly Rainer, 2008); for example, committing to the rules and procedures defined in the Planning phase.

'(We) have to check in advance to see if this kind of issue has been filed by (Wipro), regardless of languages, to avoid duplicates.’ – Maikel Lied (Lead, MS3)

4) Troubleshooting Activities

Although suppliers spend efforts in clarifying task inter-dependence and establishing mutual agreements during the Planning phase, some accountability issues arise during the Execution phase, such as the lack of contractual obligations, and the poor quality of others’ products/services. Typically, it is challenging to identify which supplier is shirking its responsibility due to task complexity (Bapna et al., 2010). For instance:

'It’s very easy to […] just wash your hands by saying that there is nothing wrong with my part, it’s probably yours.’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

Suppliers have to work out where the issue lies when a problem emerges. Therefore, the effort of finding out the responsible supplier is observed in the cases of TCS (BA account) and TCS (Lloyds account). For example, a front-end application might rely on a network service and server hosting, and if the application performs under expectations, it could be difficult to identify which supplier should be blamed, resulting in figure pointing. This creates the necessity for supplier firms to discuss and analyse where the responsibility lies and these efforts are described in the following statements:
'So we have a joint event, you know, even TCS and Auditor come together several times […] to try to (figure out) where the issue is and decide which team (should be responsible for the issue).’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

‘We have a defect management team as well…which actually brings all the suppliers together and they actually discuss the defects, and who needs to fix what and everything.’ – Priti Yadav (Developer, L3)

Other accountability-specific issues are also reported in the case of Pactera (Microsoft account). As analysed in Chapter 4, Pactera’s testing work was blocked by some bugs, or some strings were not translated for testing. Different to the above projects, these issues can be addressed without the joint actions of multiple suppliers. Testers from Pactera could directly contact and remind their colleagues at Chinasoft if the bugs were not fixed in time (see the MS1 project). For instance:

‘Usually there will be some (testing) cases blocked by some kind of bugs, and our engineer will raise a flag to me and, if it is very urgent, we need to let the (Chinasoft) IPEs know to fix the bugs as soon as possible.’ – Haifang Wang (Project Manager, MS1)

Although this activity (i.e., reminding and urging Chinasoft to address the bugs) is not studied in other cases, direct contact with a counterpart helps a supplier firm to mitigate the risk of work delays and hold-ups by other suppliers.

**7.3.4 Enacting Inter-supplier Alignment in the Execution Phase**

5) Managing Work Hand-offs

Work hand-offs are inevitable when one task is reliant on others (Kumar et al., 2009), especially in projects with sequential or reciprocal inter-dependence. Very often, suppliers in a multi-sourcing engagement need to acquire task-related information (such as specifications or technical details) from other suppliers. This activity – information acquisition – is commonly observed in the projects MS1, L1 and B3. In the case of MS1, Pactera had to capture the testing cases (i.e., requirements) from Chinasoft, necessitating communication between the Pactera testers and Chinasoft IPEs. For example:

‘Some languages have been translated but some strings are not, so sometimes we will raise a question to Chinasoft IPEs.’ – Jing Zhan (Engineer, MS1)

Also observed in the L1 project, TCS had to gain sufficient technical details of a specific
component from Pega, because the development work of TCS was built on Pegasystems. This situation is described in the following quote:

‘We interact with them, as we need some response from their application, so in that case, we need some details from them […] If it is more complex in technical, we need more interaction, more time to understand, more time to get the details (from other suppliers).’ – Varma Kishore Gottunukkala (Technical Lead, L1)

In a similar vein, in order to connect separate applications developed by different suppliers, TCS had to collect information from all relevant front-end, infrastructure and middleware suppliers, for example:

‘(We are) sitting with Amadeus again to see if they are going to be able to deliver all the data components which are required for (our work).’ – KrishnaMurty Bhamidipati (Programme Manager, BA3)

As the above examples reveal, information acquisition efforts occur when a supplier acquires and receives task-related information from the preceding supplier.

In contrast, suppliers may take part in communication and clarification practices when they hand over their work to the next supplier (see projects MS1, L3 and B1). Rather than acquiring information, Pactera had to clarify the testing procedure and bug details for Chinasoft, as the Chinasoft IPEs did not understand how the bug was found by Pactera. For instance:

‘If they (Chinasoft IPEs) really don’t understand how the test is running, how they got the bugs, then I need to (explain).’ – Lisha Ma (Engineer, MS1)

In a similar vein, TCS had to clarify what kind of testing needed to be done and what functions TCS could offer for other suppliers, as evidenced in the quote below:

‘We have to get involved with the QA team. Because they are performing testing. We have to tell them properly, what this is all about and what kinds of testing need to be performed.’ – Priti Yadav (Developer, L3)

‘During the requirement (analysis phase), we interact to understand what would be the scope for E-dialog and what would be asked for.’ – Ponvizhi Ramasamy (Programme Manager, BA1)

As the above examples show, work hand-offs between suppliers also create significant communication and clarification efforts (Kumar et al., 2009).
In summary, suppliers’ efforts could vary when they are managing work hand-off. As analysed in section 7.1, a supplier can be positioned as either the preceding supplier or the succeeding supplier, resulting in variation in communication efforts. Although with this difference, both of the practices (information acquisition and information clarification) are inevitable when inter-related tasks are handed over between suppliers (Kumar et al., 2009), as tasks can be performed only when information is efficiently exchanged between different teams (Souder & Moenaert, 1992).

6) Keeping Mutual Awareness

In addition to managing work hand-offs, suppliers’ efforts can also arise from practices such as keeping mutual awareness of parallel tasks (see Table 29). For instance, the same Pega components were used and deployed by TCS and Wipro; both suppliers had to check the status of specific Pega component before editing and updating the component:

‘When I’m developing a component in a particular technology, I may be using certain components of the technology to develop it, when the other partners are also using the same technology or software, so there are a lot of chances if they also want to use the same components that I have used.’ – Subhav Mahaveer (Programme Manager, L1)

In a similar vein, testers from Pactera and Chinasoft had to be mindful of whether the outcomes of their work could fit with each other, because any changes of the source code could create conflicts (the MS2 project) or work duplications (the MS3 project).

‘In the document, you (want to) insert a picture, I also want to insert a picture, we should have some talks and choose (which picture can be inserted). Before I submit my changes, I should resolve all the conflicts.’ – Huiyan Zhao (Engineer, MS2)

‘Usually, whenever they find an issue, most of time we can find it as well, because they don’t have the time to update the source code or any bug fix. We have to check the database to see if similar issues have been filed, if it is the same issue we do not file it because it is a duplicate.’ – Maikel Lied (Lead, MS3)

Although the efforts of keeping mutual awareness are observed in the above projects, it is noted that this alignment-specific efforts vary in different projects. Specifically, in the projects L4, B4, and MS3, Pactera and TCS only paid attention to how its work could be affected by others; for instance, they checked one another’s work for duplication. In the MS2 and L1 projects, suppliers not only checked the other suppliers’ work progress (for instance, checking the version of the source code and testing the correct version) but also managed
potential conflicts (such as informing and discussion with other suppliers before editing the same source code and uploading changes). This is because the parallel tasks were only simply ‘pooled’ (Thompson, 1967) together in the projects of MS3, BA4 and L4, while parallel tasks needed to be ‘fitted’ or ‘integrated’ (Kumar et al., 2009; Malone et al., 1999) in the L1 and MS2 projects.

7) Problem solving Activities

Although multiple suppliers make their initial plans and schedules at the beginning of the project, unexpected issues and changes are inevitable in software development work (Amrit & van Hillegersberg, 2010; Carmel & Agarwal, 2001; Hoegl et al., 2004). As project planning cannot be completely determined at the Planning phase (Hoegl & Weinkauf, 2005), emerging issues commonly appear in multi-sourcing engagements. For instance:

‘If there is an issue, you need to talk to someone who is external, and then get help, […] incident management that will constitute around 60% of the effort.’ – Ayyappan Mohandoss (Head of Support)

‘It sometimes, has got conflicting interests (among multiple suppliers). But then you have to just manage.’ – Abhishek Mukherjee (Technical Architect, BA3)

However, routinized actions are not sufficient to address these unpredictable incidents (Nelson & Winter, 2009). In order to address these emerging problems, improvised coordination becomes essential (Kotlarsky et al., 2014) during this phase. For example, TCS turned to Oracle for discussions to deal with technical issues:

‘We found plenty of problems with Oracle. And, because BA is a platinum account member with Oracle, we had regular sessions with their (Oracle) US team.’ – Abhishek Mukherjee (Technical Architect, BA3)

In a similar vein, subject matter experts (SMEs) or a defect management team from different suppliers participated in workshops and joint forums when technical problems or conflicts emerged, for instance:

‘And if there is a conflict (between suppliers), then all the partner (i.e., supplier) teams will have to be discussing and resolving the conflict.’ – Anbumani Dhayalan (Platform Lead, L1)

‘(If TCS) cannot understand the technical aspects of it (specific applications that need to be tested), we invite (Subject Matter Experts, SMEs) in the form of the workshop and do some brainstorming exercise.’ – Prasad Chilikan (Environment Delivery Manager, L2)
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'We do have a status call every day. The status call is to make sure that whatever the work is, whether it’s aligned or not, (whether) it’s on track or not on track.’ – Priti Yadav (Developer, L3)

As can be seen from these projects, TCS and Pactera adopted similar practices to address emergent issues in the *Execution phase*, regardless of what type of task inter-dependence they confronted. Engaging in these joint discussions helps suppliers to negotiate the issues when they emerge, as joint meetings provide a communication platform to share ideas (Sherman & Keller, 2011).

In addition to solving technical issues and blocks, TCS needed to dynamically *adjust to the changes from other suppliers* during the *Execution phase*. Revising initial plans and schedules under time pressures and re-adjusting prior commitments to other suppliers were identified in the case of BA. For example, TCS would sit with other suppliers again to discuss and adjust their plans and schedules if any changes occurred. For instance:

‘When we have multiple change requests which are coming in, and that require a face-to-face interaction, so we bring all the parties in (the discussion).’ – Ganesh Kannan, (Developer, BA2)

‘So every time you bring in a new process, our delivery timelines might be affected.’ – Abhishek Mukherjee (Technical Architect, BA3)

Due to the task inter-dependence, changes that occur in one team may influence the whole project (Hoegl et al., 2004), necessitating the adjustment of initial plans to new circumstances (Kazanjian et al., 2000). This offers opportunities for negotiations and adaptations between suppliers.

7.4 Conclusion

In this chapter, variations of task inter-dependence and suppliers’ efforts in the multi-sourcing context are presented and discussed. Despite the fact that multi-sourcing is characterized by task inter-dependence between multiple suppliers, there are significant differences across different cases. Accordingly, this chapter compares four types of inter-dependence that supplier firms encountered in three IS multi-sourcing engagements. Sequential and reciprocal inter-dependencies are frequently observed in the three multi-sourcing engagements; however, pooled and integrative inter-dependencies are also
observed in this research. The similarities and differences of these four types of inter-dependence are interpreted and analysed in depth (see section 7.1).

Accountability is usually enacted through formal rules and expectations (Gittell, 2000; Orr, 1996). In order to create accountability between multiple suppliers, coordination efforts arise when suppliers try to understand and clarify the delivery time, work procedure, and service quality of each other. By making responsibilities visible, parties become accountable for their own contribution, while also making other parties accountable for theirs (Okhuysen & Bechky, 2009). Therefore, information sharing and joint decision-making become inevitable when suppliers develop mutual agreements during the Planning phase. Once the formal agreements are established, coordination efforts will be made to comply with these rules and agreements during the Execution phase. Suppliers undertake a variety of actions to deal with accountability issues, such as regular meetings to update and monitor each supplier’s progress and make each supplier’s status visible as well as joint actions. This is because accountability is mainly accomplished through monitoring and noticing of others’ behaviour (Okhuysen & Bechky, 2009) during the execution stage. In summary, suppliers’ accountability-specific activities evolve over time: the focus moves from ascertaining responsibility (Ancona & Caldwell, 1992) in the Planning phase to ensuring status visibility (Kellogg et al., 2006) in the Execution phase.

In order to establish inter-supplier alignment in the Planning phase, ‘sharing forecasts and schedules’ (Handley & Benton, 2013 p. 115) emerged as a common activity. Accurate expectations of others’ actions and timeframes, information gathering and sharing activities allow different teams to fit their own work into the whole (Rico, Sanchez-Manzanares, Gil, & Gibson, 2008; Simon, 1965). In addition, activities such as communication and clarification (Kumar et al., 2009) become particularly necessary because suppliers have to understand others’ work (Hutchins, 1995). While in the Execution Phase, inter-supplier alignment can be built through routinized actions. These routinized actions, such as managing work hand-offs and keeping mutual awareness, enact a way for inter-dependent parties to observe work progress (Okhuysen & Bechky, 2009). Inter-supplier alignment is enhanced through these routines as they create connections among interacting parties (Feldman & Rafaeli, 2002). As the inter-supplier alignment cannot be perfectly determined at the outset of multi-sourcing projects, suppliers need to adjust their initial plans and schedules to ensure that they adapt
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to new circumstances. Importantly, suppliers could also get involved in a variety of joint actions and events, as these ‘aligning actions’ (Orbuch, 1997 p. 463) play a complementary role in achieving inter-supplier alignment. In summary, suppliers’ alignment-specific activities evolve over time: the focus moves from reducing uncertainty in the Planning phase to making adaptations in the Execution phase.

Drawing from the findings of cross-case analysis, Table 30 (see the next page) depicts suppliers’ efforts across and their variations in different inter-dependence scenarios. However, this static analysis is not able to illustrate the dynamic nature of suppliers’ efforts in the multi-sourcing context. In light of this, a dynamic framework is proposed in the next chapter, which will serve as a complement to Table 30.
Table 30: Coordination Efforts and its Variations

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<th>Inter-dependence</th>
<th>Suppliers’ Coordination Practices in Multi-sourcing</th>
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<td>Planning Phase</td>
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<td>Pooled</td>
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<td>Integrative</td>
<td>Clarifying and establishing work procedures and rules</td>
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<td>Sequential</td>
<td>Scheduling and planning in line with other suppliers</td>
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CHAPTER 8 – STEPS FOR FURTHER DEVELOPMENT

Prior literature has examined a variety of coordination mechanisms through a static and variance approach (Okhuysen & Bechky, 2009). However, these studies provide little guidance on how coordination concretely happens (Avdiji, Missionier, & Mastrogiacomo, 2015; Jarzabkowski et al., 2012), in particular, what and how actions are undertaken when suppliers coordinate their tasks with each other (Chandra & van Hillegersberg, 2015). In light of this, section 8.1 has distinguished temporal phases of a multi-sourcing engagement from the suppliers’ perspective. In order to further interpret suppliers’ coordination and their associated efforts in multi-supplier relationships, section 8.3 has borrowed the concepts of a trading zone (which is introduced in section 8.2) to interpret the evidence found in this research.

Focusing on the enactment of inter-supplier accountability and alignment, this chapter traces suppliers’ coordination processes in multi-sourcing contexts. Importantly, the formation and evolution of the three coordination efforts are also analysed in this chapter. Also, this chapter discusses the idea that the three coordination efforts could have an integrated influence on inter-supplier accountability and alignment.

8.1 Sources of Supplier Efforts in Different Phases

As evidenced in all three multi-sourcing engagements, suppliers spent time and effort when they were interacting and communicating with the client, other suppliers and internal teams. Although these practices lead to the suppliers’ overall efforts in the multi-sourcing contexts, the focus of this analysis is set on the inter-supplier coordination practices. Previous studies have suggested that the level of managerial efforts (for instance, ‘man-hours’) varies across project phases (Daft, 2012; Hutchins, 1995; Pinto & Prescott, 1988), in particular, coordination often evolves and changes over time (Adler, 1995; Hoegl & Weinkauf, 2005; Sabherwal, 2003). Applying the findings of these studies to the multi-sourcing context, suppliers’ efforts may also take different forms over time. Before analysing supplier efforts in different multi-sourcing phases, section 7.2.1 distinguishes the temporal phases of multi-sourcing from the suppliers’ perspective.
### 8.1.1 Temporal Phases in the Multi-sourcing Engagement

Previous literature suggests that there are several phases as a project proceeds (Hoegl & Weinkauf, 2005). In particular, scholars distinguish three to seven phases in outsourcing projects (Cullen et al., 2005; Dibbern et al., 2008; Oshri et al., 2015). Although there is not a consensus conclusion, a project normally involves *Initiation, Planning, Execution* and *Closure* phases. These four phases are supported by the data of this research; however, the concepts of these phases need to be adjusted when analysing the multi-sourcing project from the suppliers’ perspective. More specifically, in addition to contractual negotiations with the client, suppliers need to estimate and invest both financial and human resources for the multi-sourcing project during the *Project Initiation* phase. Then, in the *Project Planning* phase, scheduling and planning for specific tasks becomes the suppliers’ primary target, including scope management and risk management (Westland, 2007). Moving to the *Project Execution* phase, the suppliers’ primary purpose is performing and completing the services or products assigned by the client. In addition to completing deliverables (i.e., internal development), suppliers spend time and effort in coordinating inter-dependent tasks (i.e., coordination practices). For instance, task-related information (such as specifications, feedback and requirements) needs to be acquired from other supplier firms. In terms of the final phase, *Project Closing* phase, the suppliers’ efforts focus on handing over the services to the client, finalizing all project practices and releasing employees to work on other assignments. As the coordination and communication practices between suppliers mainly occur within the *Planning* and *Execution* phases, this research seeks to analyse suppliers’ efforts during these two phases.

The *Planning* and *Execution* phases are distinguished by the different nature of task characteristic (Adams & Barnd, 2008). Specifically, the *Planning* phase is characterized by negotiating and establishing each supplier’s actions and plans to attain a coordination objective, while the *Execution* phase is characterized by coordinating information, process and resources among multiple suppliers to perform each supplier’s own tasks.

Task inter-dependence between entities could generate task conflicts (Kumar & Dissel, 1996) and coordination demands (Grandori, 1997). Applying this finding to the multi-sourcing context, inter-dependent tasks between multiple suppliers need to be coordinated by a variety of managerial practices. Based on the temporal bracketing proposed above, the
sources of supplier efforts (i.e., the suppliers’ coordination practices) in the Planning and Execution phases will be analysed in the following two sections.

**8.1.2 Sources of Supplier Efforts in Different Phases**

In the Planning phase, the project should be planned and coordinated in detail so that it is ready for execution (Westland, 2007). Suppliers have to clearly outline tasks, dependencies and timeframes during this phase. Furthermore, identifying potential problems of the project is also essential to a successful completion. In accordance with these findings, the data of this research reveal that supplier efforts in this phase stem mainly from two sets of practices: negotiating and developing mutual agreements as well as adjusting plans and schedules (see Table 27).

<table>
<thead>
<tr>
<th>Coordination Practices</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aligning project plan with other suppliers</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Mapping out inter-dependence</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Developing mutual agreements</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Information sharing between suppliers</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
</tbody>
</table>

Table 31: Sources of Suppliers’ Efforts in the Planning Phase

<table>
<thead>
<tr>
<th>Coordination Practices</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being mindful of suppliers’ work status</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Requiring information from other suppliers</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Clarifying information for other suppliers</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Problem solving</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Re-design and re-estimation</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Complying with pre-designed rules</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
<tr>
<td>Monitoring and updating</td>
<td>●●●</td>
<td>●●●</td>
<td>●●●</td>
</tr>
</tbody>
</table>

Table 32: Sources of Suppliers’ Efforts in the Execution Phase

Moving from the Planning phase to the Execution phase, supplier firms perform their tasks according to the plans and agreements. The Execution phase is typically the longest phase of the project in terms of duration (Westland, 2007). During this phase, supplier firms participate in a variety of activities to ensure the stability of work progress. Although the focus of the suppliers’ managerial practices shifts to internal task development at this phase, maintaining interactions (Feldman & Pentland, 2003; Feldman & Rafaeli, 2002) and
relationships (Hoegl & Weinkauf, 2005) between multiple suppliers are still important. Therefore, the suppliers’ efforts may arise from the practices of managing work hand-offs (information exchange and clarification), keeping mutual awareness (routinized actions) and resolving unexpected issues (change management and re-adjustment), shown in Table 28.

Drawing upon the analysis of the suppliers’ activities (i.e., sources of supplier efforts) in the Planning and Execution phases, it is noted that the suppliers’ efforts stem primarily from two sets of managerial practices: 1) dealing with accountability issues (i.e., accountability-specific efforts) and 2) integrating and coordinating actions, processes and services with other suppliers (i.e., alignment-specific efforts). Each of them focuses on a certain condition of inter-supplier task coordination. Both alignment-specific and accountability-specific efforts varied during Planning and Execution phases, which will be discussed below.

1) Accountability-specific Practices

Accountability is usually enacted through formal rules and expectations (Gittell, 2000; Orr, 1996). In order to create accountability between multiple suppliers, coordination efforts arise when suppliers try to understand and clarify the delivery time, work procedure, and service quality of each other. By making responsibilities visible, parties become accountable for their own contribution, while also making other parties accountable for theirs (Okhuysen & Bechky, 2009). Therefore, information sharing and joint decision-making become inevitable when suppliers develop mutual agreements during the Planning phase. Once the formal agreements are established, coordination efforts will be made to comply with these rules and agreements during the Execution phase. Suppliers undertake a variety of actions to deal with accountability issues, such as regular meetings to update and monitor each supplier’s progress and make each supplier’s status visible as well as joint actions. This is because accountability is mainly accomplished through monitoring and noticing of others’ behaviour (Okhuysen & Becky, 2009) during the execution stage. In summary, suppliers’ accountability-specific activities evolve over time: the focus moves from ascertaining responsibility (Ancona & Caldwell, 1992) in the Planning phase to ensuring status visibility (Kellogg et al., 2006) in the Execution phase.

2) Alignment-specific Practices

In order to establish inter-supplier alignment in the Planning phase, ‘sharing forecasts and
schedules’ (Handley & Benton, 2013 p. 115) emerged as a common activity. Accurate expectations of others’ actions and timeframes, information gathering and sharing activities allow different teams to fit their own work into the whole (Rico, Sanchez-Manzanares, Gil, & Gibson, 2008; Simon, 1965). In addition, activities such as communication and clarification (Kumar et al., 2009) become particularly necessary because suppliers have to understand others’ work (Hutchins, 1995). While in the Execution Phase, inter-supplier alignment can be built through routinized actions. These routinized actions, such as managing work hand-offs and keeping mutual awareness, enact a way for inter-dependent parties to observe work progress (Okhuysen & Bechky, 2009). Inter-supplier alignment is enhanced through these routines as they create connections among interacting parties (Feldman & Rafaeli, 2002). As the inter-supplier alignment cannot be perfectly determined at the outset of multi-sourcing projects, suppliers need to adjust their initial plans and schedules to ensure that they adapt to new circumstances. Importantly, suppliers could also get involved in a variety of joint actions and events, as these ‘aligning actions’ (Orbuch, 1997 p. 463) play a complementary role in achieving inter-supplier alignment. In summary, suppliers’ alignment-specific activities evolve over time: the focus moves from reducing uncertainty in the Planning phase to making adaptations in the Execution phase.

8.2 Additional Theoretical Foundation: Enacting a Trading Zone

In this section, the concept of a trading zone is adopted to frame the dynamic of suppliers’ coordination processes. Originating from anthropological studies, the term trading zone was introduced by Galison (1997) to explain how different parties are able to exchange information, regardless of different languages and culture. A trading zone can be understood as a coordination structure (Kellogg et al., 2006) that facilitates inter-discipline coordination. Drawing upon Galison (1997) and Kellogg et al. (2006), the metaphor of a trading zone is used as the theoretical lens with which to understand suppliers’ coordination processes that occur regularly in multi-sourcing projects. The enactment of a trading zone is a continuous achievement that depends on members’ accommodations and resistances (Pickering, Renner, & Fine, 1996) when they interact with one another.

Enacting a trading zone in multi-sourcing settings is highly dependent on the situated coordination practices among multiple suppliers. As various coordination actions are
undertaken by suppliers to enact a trading zone, such trading zone is recurrently enacted through suppliers’ ongoing activities to meet different coordination requirements. Recently, such coordination requirements are referred to as integrative conditions for coordination (Okhuysen & Bechky, 2009). From this perspective, accomplishing conditions for inter-supplier coordination can be understood as the dynamic enactment of a trading zone in multi-sourcing settings. As the ‘trading zone’ is ‘always in the making’ (Kellogg et al., 2006 p. 39), inter-supplier coordination is a contingent, emergent and dynamic process that cannot be completely designed and prescribed in advance. In summary, rather than a static property of social systems (Giddens, 1984; Rose, 1999), enacting conditions for coordination is a continuous accomplishment (Okhuysen & Bechky, 2009), emerging from actors’ ongoing engagement in project activities.

8.3 Re-visiting the Findings from a Process Perspective

Figure 22: An Evolutionary Model of Suppliers’ Coordination Efforts

The primary objective of this research is to provide further insights into the coordinating processes in multi-supplier relationships, in particular, why suppliers’ coordination actions take place in multi-supplier settings and how they influence the formation and evolution of suppliers’ coordination efforts. For this purpose, this research treats inter-supplier coordinating as a dynamic process and aims to propose a process framework. Based on the
case findings, an evolutionary model of coordination efforts is developed, as depicted in Figure 22.

As the model suggests, inter-supplier coordination is a cumulative process in which suppliers’ coordination efforts are grouped into information synchronizing, collective interacting and responsive adapting that are reconfigured iteratively during the course of a multi-sourcing project. The proposed model takes into account three essential elements (Henfridsson & Yoo, 2013; Huber, Fischer, Dibbern, & Hirschheim, 2013): 1) occasions or issues that start the process of inter-supplier coordination, 2) the process of managing accountability-specific and alignment-specific issues, i.e., enactment process of inter-supplier accountability and alignment, and 3) emergence and evolution of coordination. Given that this evolutionary model is inductively derived from the case findings, it is necessary to present how the existing literature corroborates the model and how the model enriches our present understanding of coordination efforts in multi-sourcing settings.

8.3.1 Issues Associated with Task Inter-dependence

Typically, a concept of trigger is established in process studies, serving as a starter of a particular process (Langley, 1999). The case analysis shows that suppliers’ coordinating process is triggered by a variety of coordination problems, such as uncertainty (of others’ performance and process), task conflicts and work hand-offs. These issues are exacerbated by the inter-dependence between different teams and frequent changes (Hoegl et al., 2004); this is because task inter-dependence raises the difficulty of metering and controlling others’ behaviours (Gomes & Joglekar, 2008) and integrating work with each other (Bhattacharya et al., 2012). For instance, once a tester from Pactera found a bug in Microsoft Office, he/she had to report this bug to Chinasoft IPE for bug fixing. However, transferring the bug information from the testers of Pactera to Chinasoft IPEs was not an easy process. This was mainly because the Chinasoft IPEs might not be using the same testing environment and testing approach, so the testers of Pactera needed to provide more information and clarification to Chinasoft IPEs. In addition, performance prevention or work blocks by other suppliers also emerged as a prevalent issue in the three multi-sourcing engagements. Furthermore, in the L1 project, although TCS and Wipro worked on their own service development and there was no workflow between the two suppliers, both of them had the
same access to Pega’s products. Therefore, it was very likely that when Wipro wanted to use
the same components that TCS had used and developed, there was a risk of conflict between
them.

As reported in Sections 4.3, 5.3 and 6.3, various types of task inter-dependence create a set of
managerial challenges for work alignment and accountability between suppliers. Given that
task inter-dependence creates the requirements for coordination (Handley & Benton, 2013;
Strode et al., 2012), it is positioned as the determinant of suppliers’ coordinating processes in
multi-sourcing contexts.

8.3.2 Enactment of Accountability and Alignment

The coordination of suppliers denotes a continuous process by which suppliers undertake
coordination actions in order to: 1) deal with accountability issues and 2) integrate and align
actions, processes and services with other suppliers. Therefore, this research confirms that
inter-supplier coordination can be recurrently enacted through fulfilling two underlying
conditions: accountability and alignment. The sections below explain how work
accountability and alignment between suppliers are enacted during these stages.

1) Enactment of Inter-supplier Accountability

The findings of this research confirm the importance of enacting inter-supplier
accountability in multi-sourcing settings. Previous studies have recognized accountability
issues in multi-sourcing relationships (Bapna et al., 2010; Wiener & Saunders, 2014). This
research confirms that accountability issues, such as performance preventions and work
hold-ups, as well as ambiguity in suppliers’ responsibilities, were major coordination
challenges faced by supplier firms (see Sections 4.3, 5.3 and 6.3). Consistent with Rustagi et
al. (2008) and Handley and Benton (2013), this research confirms that the mitigation of work
hold-ups or delays relies on formal specified expectations (e.g., rules, standards and
procedures) between multiple suppliers. Therefore, it is necessary for suppliers to establish
accountability so that they are able to comply with these collaborative agreements and/or
mutual rules (Govindarajan & Fisher, 1990; Kirsch, 1996; Ouchi, 1979). Processes of
negotiating agreements between multiple suppliers and jointly monitoring work progress
were frequently observed the three cases. For example, in the BA1 project, a project manager
from TCS monitored the progress and delivery of E-dialog. This extends previous findings
that contractual and monitoring mechanisms are complementary in their effect on attaining coordination (Choudhury & Sabherwal, 2003; Das & Teng, 1996) in supplier-to-supplier relationships.

2) Enactment of Inter-supplier Alignment

The findings of this research demonstrate that, for effective multi-sourcing, it is necessary to have the integration of information and processes across organizational boundaries (Clemons et al., 1993; Crowston, 1997). These findings are consistent with previous arguments that task inter-dependence does not by itself result in coordination challenges. Instead, challenges arise because of the uncertainty of inter-dependent tasks (March & Simon, 1958). Coordination efforts occur not only towing to coordinating work hand-offs but also because of integrating each parallel work (Kumar et al., 2009) between suppliers. For instance, task inter-dependence results in the difficulty of alignment between suppliers, in terms of timelines, processes, and deliverables. Accordingly, information acquisition and exchange became essential for each supplier’s task execution. For example, in the L1 project, TCS and Wipro were using Pegasystems for application development, and the same component of Pegasystems could be used by both of them. TCS had to check and understand what component had been used by Wipro, and what functionality Wipro had developed. This mindfulness of other suppliers’ work played an important role in avoiding conflicts and reducing work duplication between TCS and Wipro. This extends current knowledge on inter-organizational coordination in supplier-to-supplier settings.

8.3.3 Emergence and Evolution of Coordination Efforts

Central to the framework is the idea that the enactment of accountability and alignment is accompanied with a set of coordination efforts. Although the notion of coordination efforts is not well-developed in the existing literature, a similar concept – coordination costs – has been used to study the efforts, time and resources organizations spend to coordinate the process, actions and information within and across organizations (Celly & Frazier, 1996; Dibbern et al., 2008; Handley & Benton, 2013). In this thesis, coordination effort is referred to as the time, attempts and resources that suppliers spend to coordinate the processes, actions and information within and across supplier firms.

As shown in Figure 22, a variety of coordination activities belonging to three broad types are
identified in this research. As coordination efforts occur when suppliers are engaging in these practices, they are labelled as collective interacting, information synchronizing and responsive adapting in this research. Coordination efforts are not definite endeavours that are done once and for all; this is because coordination issues may evolve and change constantly in outsourcing engagements, creating various coordination activities (Sabherwal, 2003). In this sense, coordination efforts could repeatedly occur and evolve when suppliers execute their tasks in a multi-sourcing project. The sections below discuss the emergence and evolution of three specific coordination efforts.

1) Information Synchronizing

The first coordination effort is information synchronizing; it arises when suppliers are gathering and updating information of each supplier’s deliverables, schedules, work progress and other task-related information. As exchanging and sharing task-related information can reduce inter-team uncertainty (Srikanth & Puranam, 2011), information synchronizing efforts are made by suppliers, for the purpose of anticipating task states and responding to others’ actions (Rico et al., 2008). An example of information synchronizing during the Planning phase would be sharing schedules and plans between suppliers. Such efforts are reported in the case of BA1; for instance, testing plans and development requirements were shared between TCS and E-dialog during the early phase, creating a common perspectives and clear understandings of each supplier’s requests and deliverables.

Although suppliers perform their own tasks in parallel, the inter-dependent tasks require them to stay informed about what work is being done by others and when it will be completed. As such, information synchronizing efforts occur when suppliers try to anticipate and understand what actions others may take (Okhuysen, 2005), as well as to create a sense of predictability for the different tasks (Okhuysen & Bechky, 2009).

During the Execution phase, suppliers also spend information synchronizing efforts to facilitate task visibility among different suppliers, thereby enabling work alignments between suppliers. An example of this is the bug reporting procedure followed by Pactera and Chinasoft; each bug was coded with a specific number based on the same principle.

In addition, regular governance meetings and review sessions were held as routinized actions in the TCS-BA arrangement. For example, in the BA1 project, a project manager from
TCS monitored the progress and delivery of E-dialog.

Such informing and updating activities enact visibility and verification between inter-dependent parties (Beulen et al., 2006; Bragg, 2006; Willcocks et al., 2009), keeping teams accountable to each other (Okhuysen & Bechky, 2009).

Because of the constraints on real-time face-to-face communications between different suppliers, information synchronizing efforts occur when suppliers are sharing and updating task-related information through multiple digital technologies (Srikanth & Puranam, 2011), including shared databases (Kotlarsky et al., 2008), data spreadsheets (Mark 2003), and on-line project management tools (Kellogg et al., 2006). An example can be seen in the MS3 project: engineers from Pactera and Wipro update information of identified bugs into a shared database.

The efforts of information synchronizing makes the work progress of the different teams transparent and helps the different teams to keep a mutual awareness of each other (Kellogg et al., 2006; Reagans et al., 2005).

2) Collective Interacting

Another coordination effort that emerged from the case analysis is collective interacting, which arises when suppliers negotiate and discuss directly with other suppliers for a joint purpose, such as solving specific problems (e.g., technical blocks) and making joint decisions (e.g., mutual agreements and plans). Take the BA project as an example, (technical) issues cannot be addressed within the TCS team, creating the necessity of communicating and negotiating with other supplier teams.

Explicit communication is well recognized in the studies of coordination (Srikanth & Puranam, 2011) and it occurs when different organizations or teams (usually separated by location, hierarchy or function) explicitly discuss and negotiate with each other (Levina & Vaast, 2005).

Inevitably, efforts of collective interacting occur during the Planning phase. This is because responsibilities (Ancona & Caldwell, 1992), schedules and maps (Bechky & Okhuysen, 2011) and procedure trajectories (Symon, Long, & Ellis, 1996) across multi-teams play a critical role in establishing inter-supplier accountability and need to be shaped at the beginning.
phase (Kazanjian et al., 2000). Also suggested in previous literature, formal structures are established mainly through inter-team negotiation and discussion. Accordingly, in order to develop inter-supplier agreements (such as OLAs), collective interacting efforts are made by suppliers to reach mutual agreements (Ring & Van de Ven, 1994), thereby creating accountability between different suppliers before the project begins. For instance, managers from Pactera and Chinasoft negotiated the time for bug-fixing and proposed a framework of governance structure. Such efforts were made so that suppliers could reach an agreement on obligations and rules for future actions.

Contrary to previous findings that suggest explicit inter-team communication is more intensive in the beginning phase (Espinosa et al., 2002), collective interacting efforts also occur during the Execution phase. More specifically, collective interacting is called upon when information synchronizing is not adequate to manage work hand-offs (Kumar et al., 2009) and unexpected changes (Hoegl & Weinkauf, 2005) as projects proceed. For instance, if the Chinasoft IPEs cannot fix an identified bug in due time and impede Pactera’s work progress, testers from Pactera contact their managers to remind Chinasoft. Another example is the frequent discussions between TCS and Oracle in the BA case.

As emerging issues arise, different teams have to communicate with each other (March & Simon, 1958; Srikanth & Puranam, 2011) to maintain project progress (Paasivaara & Lassenius, 2003; Strode et al., 2012). In addition to an emergent dialogue between suppliers, explicit inter-team communication also takes place in a formal and regular way (Espinosa et al., 2002; Strode et al., 2012). In particular, specific coordinators participate in pre-planned formal meetings. An example can be seen in the Lloyds case, subject matter experts (SMEs) from different suppliers sat together to discuss and address the queries or technical problems they met.

In brief, collective interacting efforts occur because they offer opportunities for suppliers to clarify and discuss their issues (Strode et al., 2012; Tushman, 1977) during the Execution phase.

3) Responsive Adapting

The third coordination effort is responsive adapting, referring to the actions that suppliers undertake to make corrections or adjustments to align with each other. As inter-dependent
tasks are performed by multiple suppliers, the uncertainty of each other’s task and progress entails them to be aware of and understand how their work can be integrated with each other (Okhuysen & Becky, 2009; Wittenbaum & Stasser 1996). Typically, responsive adapting efforts occur when a supplier team takes actions to fit plans and schedules with other suppliers during the Planning phase. For example, through analysing what E-dialog personnel had to do and when they needed to complete their development, TCS could design their testing plan in line with E-dialog’s development process.

During the Execution phase, misunderstandings, conflicts and changes among different parties are inevitable (Hoegl & Weinkauf, 2005), bringing new accountability and alignment issues. Therefore, efforts of responsive adapting occur when suppliers are making internal adjustments in response to those emerging issues. For instance, TCS usually modified and adjusted initial plans because of delays and hold-ups caused by other suppliers.

These findings demonstrate that the efforts associated with fine-tuning development progress (Hoegl & Weinkauf, 2005), revising previous plans and rules (Arino & De La Torre, 1998), as well as re-arranging resource allocations are often necessary in order to provide suppliers with opportunities to enact work alignment.

In addition, responsive adapting efforts also occur when commitments and rules are carried into effect, such as adhering to pre-defined rules and procedures. An example is the work procedure followed by Pactera and Chinasoft. Before changing and updating the source code, engineers from Pactera had to check and resolve any potential conflicts.

Such efforts take place because different teams have to make their individual contributions harmoniously without conflicts and misunderstandings (Hoegl & Weinkauf, 2005).

4) Relationships Among Coordination Efforts

Although different coordination activities are undertaken to manage inter-dependence, none of them could exert a deterministic influence on coordination (Espinosa et al., 2002; Okhuysen & Bechky, 2009). Instead, different coordination activities complement each other. In line with Dietrich (2007), suppliers seldom rely on a single practice to ensure accountability and alignment. Accordingly, information synchronizing, collective interacting and responsive adapting cannot contribute to coordination in isolation.
Typically, these three efforts operate as complementarities for each other and make joint efforts on the suppliers’ coordination processes. An illustration of the relationships between these three can be seen in the inter-supplier agreements development process. Information synchronizing efforts occur because the uncertainty of further actions and other suppliers’ behaviours can be reduced through information exchange (Hoegl et al., 2004; Mark, 2002; Mohrman, Cohen, & Morhman Jr, 1995). Meanwhile, the efforts of collective integrating are made in order to negotiate and discuss expectations and agreements (i.e., time and quality of delivery) among suppliers. Based on these efforts, suppliers make and/or adjust their individual schedules and processes to align with others. Accordingly, responsive adapting efforts are supported through information synchronizing and collective integrating.

Once suppliers reach an agreement on the obligations and rules, inter-supplier accountability is attained for task execution. Information synchronizing helps suppliers be mindful of others’ activities (Hutchins, 1995) and to acknowledge the issues impeding their task execution (Strode et al., 2012). Such mutual awareness provides opportunities for negotiations and compromises (Hoegl et al., 2004) between different suppliers. Very often, collective interacting becomes necessary when suppliers jointly resolve complex problems and discuss possible solutions (Barczak & Wileman, 1991; Sethi, 2000). For instance, accountability between TCS and other suppliers was not monitored solely through updating and informing each other’s work progress. Rather, TCS went to workshops or joint meetings to discuss the defects and decide where the responsibility lay, as issues emerged.

During the coordination process, emerging issues are inevitable and occur continuously. Coordination efforts become critical to re-establish the accountability and alignment and ensure task execution continues. As the work is inter-dependent, emerging issues create obstacles for people to perform their task. Based on the efforts of information synchronizing, changes and other unexpected issues can be identified and informed. Emerging issues entail suppliers to take actions in response to revised circumstances (Hoegl & Weinkauf, 2005; Hoegl et al., 2004), either internally (resulting in collective interacting efforts) or in concert with others (resulting in responsive adapting efforts).
8.4 Conclusion

In summary, different coordination efforts are continuously made by suppliers to facilitate and govern the interaction between multiple suppliers. Usually, suppliers make a set of coordination efforts to enact accountability and alignment in the earlier stage. As a project unfolds, emerging issues create the need for re-establishing inter-supplier accountability and alignment. Thus, coordination efforts occur and evolve over time during the lifetime of a multi-sourcing project. Table 31 (see the next page) summarizes the variations of coordination issues and corresponding coordination efforts in four inter-supplier relationships.

Based on the case findings of twelve specific multi-sourcing projects, this chapter offers a dynamic model, capturing the formation and evolution of suppliers’ coordination efforts (see Figure 22). As the model stipulates, coordination between suppliers is a cumulative process in which a supplier’s coordination efforts are decomposed into information synchronizing, collective interacting and responsive adapting; these three coordination efforts (working together and separately) assist in the enactment of accountability and alignment between suppliers. Importantly, as coordination challenges occur constantly in outsourcing engagements (Sabherwal, 2003), coordination activities evolve over time. Specifically, the purpose of the suppliers’ coordination activities moves from ascertaining responsibility and reducing uncertainty in the Planning phase to ensuring status visibility and making adaptations in the Execution phase. Accordingly, coordination efforts occur continuously, and are subject to endogenous changes owing to the multitude of variations during the coordination process (Feldman, 2000; Hoegl, 2004). To conclude, the dynamic model proposed in Chapter 8 (see Figure 22) informs us of what activities are performed by suppliers to enact inter-supplier accountability and alignment. In the next chapter, theoretical contributions, practical implications, limitations of this study and directions for further studies are discussed.
Table 33: Task Inter-dependence, Coordination Issues and Coordination Efforts

<table>
<thead>
<tr>
<th>Task Inter-dependence</th>
<th>Coordination Issues</th>
<th>Coordination Efforts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alignment-Specific</td>
<td>Accountability-specific</td>
</tr>
<tr>
<td>Pooled</td>
<td>Work duplication</td>
<td></td>
</tr>
<tr>
<td>Integrative</td>
<td>Work conflict</td>
<td></td>
</tr>
<tr>
<td>Sequential</td>
<td>Alignment of processes and schedules among suppliers Service availability of others Work hand-overs from others</td>
<td>Potential work delays by others Performance prevented or work blocked by others Ambiguity in defining suppliers’ responsibility Finger pointing problems</td>
</tr>
<tr>
<td>Reciprocal</td>
<td>Alignment of process and schedules among suppliers Service availability of others Work hand-over to others Work hand-over from others</td>
<td>Potential work delays by others Performance prevented or work blocked by others Ambiguity in defining suppliers’ responsibility Finger pointing problems</td>
</tr>
</tbody>
</table>
CHAPTER 9 – CONTRIBUTIONS AND LIMITATIONS

Chapters 7 and 8 analyse what and for what reasons coordination efforts merge, whether and how particular coordination activities vary across twelve multi-sourcing projects. Specifically, the previous two chapters discuss that: 1) suppliers could come across four different types of task dependence when they are engaging in a multi-supplier project, 2) task inter-dependence between multiple suppliers influence the sources of inter-supplier coordination, creating various implications for suppliers’ coordination efforts, and 3) coordination efforts continuously occur when suppliers are managing two types of coordination challenges: alignment and accountability issues. Bearing these findings in mind, the following sections provide the theoretical contributions, managerial implications, research limitations and directions for further research of this research.

9.1 Theoretical Contributions

This research offers several theoretical contributions that add to and advance the existing understanding of task inter-dependence and coordination in multi-sourcing settings. These contributions are presented and discussed below.

9.1.1 Contribution to Multi-sourcing Studies

Despite the popularity of multi-sourcing in practice, the current knowledge on dyadic client-supplier outsourcing relationships is not sufficient to address novel challenges in multi-sourcing settings (Bapna et al., 2010). This research adds to the existing knowledge of outsourcing; in particular, this research contributes to the nascent studies of IT multi-sourcing in three ways.

1) The Suppliers’ Perspective of Multi-sourcing

This research is among the first to study multi-sourcing engagements from the suppliers’ perspective, focusing on the challenges created by task inter-dependence. Prior studies on multi-sourcing have analysed features of multi-sourcing and discussed managerial challenges for client firms, such as clients’ management overheads, decreased client-supplier commitment, limited transparency, accountability issues, and difficulties in motivating supplier cooperation and adopting relational governance. Although a variety of challenges
are identified in existing literature, few attempts have been made to investigate and discuss the challenges faced by suppliers.

In fact, multi-sourcing arrangements also bring great challenges for service providers. In contrast to single-sourcing – a relationship in which the work and accountability of a supplier is clearly defined, multi-sourcing requires multiple suppliers to work together and deliver an integrated end-to-end service. However, inter-dependence among outsourced tasks exacerbates the issue of observability and verification of task quality (Wiener & Saunders, 2014). As the tasks are inseparable from each other, a supplier’s work progress could get stuck if other suppliers are shirking their responsibilities or performing under expectations (Bapna et al., 2010). This ambiguity in accountability makes the coordination and cooperation between suppliers a great challenge (Bhattacharyya & Atri, 2006).

In short, this research responds to earlier calls for more studies on supplier-to-supplier issues (Wiener & Sauders, 2014). Although prior studies assert that multi-sourcing creates governance and coordination challenges for client firms (Bapna et al., 2010), this research demonstrates that suppliers also need to spend a significant amount of coordination effort when they are working with others in multi-sourcing settings. Combining previous findings and this research, the main challenges of multi-sourcing are summarized and classified into four quadrants (see Table 34).

<table>
<thead>
<tr>
<th>Table 34: Challenges of Multi-sourcing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task-specific</strong></td>
</tr>
<tr>
<td>Client Perspective</td>
</tr>
<tr>
<td>Task Inter-dependence requires additional efforts for service integration and management (Marius et al., 2015)</td>
</tr>
<tr>
<td>Task inter-dependence complicates the assessment of suppliers’ individual performance and total performance (Bapna et al., 2010; Nagle &amp; Maughan, 2008)</td>
</tr>
<tr>
<td>Inter-dependences requires cooperation and mutual support between suppliers (+)</td>
</tr>
<tr>
<td>Inter-dependence results in limited accountability issues (+)</td>
</tr>
</tbody>
</table>

Note: (+) studied in this research
2) Distinguishing Inter-supplier Relationships

Multi-sourcing is not a one-size-fits-all configuration, as it creates different types of inter-supplier task inter-dependence. Although several papers have identified the task inter-dependence in multi-sourcing (Bapna et al., 2010; Wiener & Saunders, 2014), it is surprising that few works on multi-sourcing take into account the variation of task inter-dependence between suppliers. Although sequential and reciprocal inter-dependences are identified as two common types of inter-dependence in multi-sourcing projects (Wiener & Saunders, 2014), this research finds that two additional types of inter-dependence – pooled and integrative – could also emerge in multi-supplier relationships.

Specifically, with sequential inter-dependence, each supplier incrementally contributes to the client’s overall work in a temporal manner and the succeeding task relies on the preceding task (Malon & Crowston, 1994). Although similar to sequential inter-dependence, reciprocal inter-dependence represents a situation where the information of services moves through an input-output-input process (Lemak & Reed, 2000); therefore, the interaction between suppliers is normally bidirectional (Kumar et al., 2009; Grandori 1997). For pooled and integrative inter-dependencies, suppliers have to keep awareness of others’ work. However, while a supplier only needs to be mindful of the status and changes of each other’s work in the scenarios of pooled inter-dependence, while suppliers have to pay attention to how its work can affect the entire work and make responsive actions in the cases of integrative inter-dependence. Therefore, the requirement of integrating parallel tasks makes integrative inter-dependence fundamentally different from pooled inter-dependence (Kumar et al., 2009; Malone et al., 1999).

As elaborated in Section 7.1, a supplier could encounter four types of task inter-dependence in the multi-sourcing context, resulting in four different inter-supplier relationships (see Table 33).
Table 35: Four Multi-sourcing Configurations

<table>
<thead>
<tr>
<th>Multi-sourcing Configurations</th>
<th>Pooled</th>
<th>Sequential</th>
<th>Integrative</th>
<th>Reciprocal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphical Illustration</td>
<td><img src="image" alt="Pooled Illustration" /></td>
<td><img src="image" alt="Sequential Illustration" /></td>
<td><img src="image" alt="Integrative Illustration" /></td>
<td><img src="image" alt="Reciprocal Illustration" /></td>
</tr>
<tr>
<td>Examples</td>
<td>MS3, BA4 and L4</td>
<td>BA1, BA2, BA3, L2, L3 and MS4</td>
<td>MS2 and L1</td>
<td>MS1, A1, BA2, BA3, L1, L3 and L4</td>
</tr>
</tbody>
</table>

3) **Decomposing Coordination Efforts**

This research makes the first attempt to explain coordination efforts in multi-sourcing settings. Typically, organizations spend effort and time to coordinate inter-dependent tasks across organizational and geographical boundaries (Ceci & Prencipe, 2013; Handley & Benton, 2013; Larsen et al., 2013). Several studies have investigated the costs or efforts which occur in outsourcing and offshoring arrangements, such as specification/design costs, knowledge transfer costs, communication costs and monitoring costs (Barthelemy, 2001; Dibbern et al., 2008; Kelley & Jude, 2005; Overby, 2003; Sanders et al., 2007; Stringfellow et al., 2008).

However, the focus of these studies is on cost estimation issues in the client’s decision-making process. It can hardly explain what coordination efforts may emerge and evolve in multi-sourcing settings. Actually, although supplies are working separately in parallel to deliver their primary task/services, there are interactions between both inputs and outputs of various suppliers (Bapna et al., 2010). Therefore, each supplier has to be aware of the changes or the status of other parallel activities. Furthermore, the outcomes of these differentiated tasks need to be brought together to create an integrated and seamless service for the client (Daly & Brito, 2012; Sharma, 2011). In particular, as multiple suppliers work on diverse processes, effective process integration could become an important prerequisite to execute complex tasks (Espinosa et al., 2007). As a higher degree of distributed work requires more effort for coordination and integration (Hui, Davis-Blake, & Broschak, 2008), the integration of parallel work in multi-sourcing requires coordination efforts (Kumar et al., 2009), including the coordination of people, processes and tools/technology between suppliers (Brooke & Rawlinson, 2011).

Against this backdrop, this research investigates the attempts that suppliers invest to ensure...
unity of suppliers, processes, actions and information. This research contributes to outsourcing literature by identifying and categorizing three specific coordination efforts from the suppliers’ perspective: information synchronizing, collective interacting and responsive adapting.

As exchanging and sharing task-related information can reduce inter-team uncertainty (Srikanth & Puranam, 2011), information synchronizing efforts are often invested by suppliers, in order to anticipate others’ task status and to take actions (Rico et al., 2008). Collective interacting efforts are invested when information synchronizing is not adequate, in particular, when coordinating the issues that require negotiation and discussions, such as developing mutual agreements, managing work hand-offs, and resolving unexpected changes. As the services of different suppliers need to be fitted with each other, it is necessary for suppliers to respond to others’ actions and changes. Therefore, the activities of internal adjustments and/or commitment enforcement are often necessary when suppliers are executing their individual tasks, resulting in responsive adapting efforts.

To conclude, by explaining how these efforts emerge and evolve (see Section 8.2.3), this study responds to earlier calls for more research on what coordination efforts may take place in multi-supplier environments (Skipper et al., 2008 p.50). Table 34 summarizes the existing knowledge of efforts in outsourcing and the knowledge this research offers.

### Table 34: Costs/Efforts in Outsourcing Engagements

<table>
<thead>
<tr>
<th>Categories</th>
<th>Client’s Effort</th>
<th>Supplier’s Effort (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search and selection,</td>
<td>Control, Coordination, Adaption, Cost of layoffs, Cultural costs, Ramp-up</td>
<td>Coordination Efforts:</td>
</tr>
<tr>
<td>Contract negotiation</td>
<td>costs</td>
<td>Information synchronizing,</td>
</tr>
<tr>
<td>and management</td>
<td></td>
<td>Collective interacting and</td>
</tr>
<tr>
<td>Specification/design,</td>
<td></td>
<td>Responsive adapting</td>
</tr>
<tr>
<td>Knowledge transfer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control, Coordination,</td>
<td></td>
<td>Types of task inter-dependence: pooled, integrative, sequential</td>
</tr>
<tr>
<td>Adaption, Cost of</td>
<td></td>
<td>and reciprocal</td>
</tr>
<tr>
<td>layoffs, Cultural costs,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp-up costs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Antecedents

| Task-specific factors:  | Types of task inter-dependence: pooled, integrative, sequential and reciprocal |
| Scale of services,      |                                                                                |
| Breadth of tasks,       |                                                                                |
| Customization/standardization, Task |                                                                |
| inter-dependence,       |                                                                                |
| Interaction intensity   |                                                                                |
| Location-specific factors: |                                                                 |
| Geographic dispersion,  |                                                                                |
| Geographic distance,    |                                                                                |
| Cultural distance,      |                                                                                |
| Language barrier        |                                                                                |

Note: (+) studied in this research

### 9.1.2 Contribution to Coordination Studies

Through analysing task inter-dependence and its implications for inter-supplier coordination, this research advances our knowledge of coordination in four aspects.
1) **Distinguishing Pooled and Integrative Inter-dependencies**

This research examines the applicability of task inter-dependence in inter-organizational relationships. The traditional classification of task inter-dependence has been widely used by scholars to study inter-team coordination within an organization (Thompson, 1967; Van de Ven et al., 1976). However, classification of task inter-dependence in the multi-supplier context has not received adequate attention (Hong et al., 2009). The emerging multi-sourcing phenomenon creates the need to examine task inter-dependence between suppliers. In particular, this research redefines the current knowledge of pooled inter-dependencies in multi-sourcing relationships.

The concept type of pooled inter-dependence was defined ambiguously in existing coordination studies. It is sometimes defined as a situation in which ‘no workflows exists between actors’ (Thompson 1967; Van de Ven et al., 1976) and efforts and contribution of each party are completely independent of others. It is also described as a relation in which ‘two or more activities/unit are linked’ and ‘the behaviours of units should be aligned’ (Grandori, 1997; Mintzberg, 1979). While both views provide complementary interpretations of the relationship of parallel tasks inter-dependence, it is necessary to make it clearer when analysing pooled inter-dependence in multi-sourcing settings (and probably also in intra-organizational settings). In particular, this research distinguishes between two cases: 1) the scenario in which the parallel tasks are simultaneously performed and essentially remain independent of each other, and 2) the scenario in which the parallel tasks need to be fitted together or make use the same resources. The former case represents the traditional interpretation of pooled inter-dependence while the latter case is conceptualized as integrative inter-dependence in this research. This observation is consistent with Kumar et al. (2009) who recognize the difference between simply pooling independent parallel tasks and fitting/integrating independent parallel tasks.

2) **Linking Task inter-dependencies with Coordination**

Existing organizational studies and supply chain literature identified a variety of coordination mechanisms to manage task inter-dependence (Thompson, 1967; van de Ven, et al., 1976; Grandori, 1997; King, 1999). For instance, standardization, plan and mutual adjustment are suggested as appropriate coordination mechanisms to manage pooled,
sequential and reciprocal inter-dependencies, respectively. A basic assumption of these studies is that inter-dependent parties are essentially cooperating with each other (Formoso & Isatto, 2011) or under a formal authority relationship (Celly & Frazier, 1996). This greatly constrains the application of previous findings into multi-supplier contexts, where suppliers are usually competitors and they are not necessarily accountable to each other (Wiener & Saunders, 2014). Therefore, how the mechanisms earlier mentioned can be efficiently adopted by suppliers in the multi-sourcing context is still unknown.

Standardizing rules and sharing mechanisms are identified as the appropriate way to manage pooled interdependence (Thompson, 1967; Skipper et al., 2008). Such coordination mechanisms (involving procedures, standards and rules) govern the activities and behaviours of each supplier. In the context of multi-sourcing, these rules and procedures regulate interactions and ensure that each supplier in the multi-sourcing project remains in line with the others. Usually, these procedures and rules are defined by the client firm, and therefore, different suppliers can be comprehensively instructed in advance. As such, although standardizing standards and rules are suggested as coping mechanisms for pooled inter-dependence, it is less common for suppliers to establish such standards and rules. Coordination activities, such as information sharing and status updating, are undertaken by suppliers to comply with pre-defined rules and procedures.

Although rules and procedures serve as efficient mechanisms when suppliers are performing their individual tasks (Thompson 1967; Skipper et al., 2008), coordination challenges can be exacerbated due to the requirement of fitting parallel tasks. For instance, the problems of conflicts are not likely to be solved through information sharing mechanisms, if suppliers are simultaneously making changes on the same work. According to the case findings, integrative inter-dependence requires suppliers not only to be concerned about other suppliers’ outputs but also to be aware of the influence of their actions on others’ work. In order to avoid work duplications or task conflicts, paying attention to the work and progress of others supplier becomes essential (Kumar et al., 2009). As discussed in Chapter 7, the coordination mechanisms for managing integrative inter-dependence include rules and procedures (which are used to prescribe and regulate actions of multiple suppliers) as well as liaison contacts (who support coordination activities). Appropriate coordination for integrative inter-dependence is not yet studied in
existing literature; therefore, this research sheds lights on coordination activities for managing integrative inter-dependence.

Detailed schedules and plans govern the actions of each participant, and therefore, they serve as coordination mechanisms for sequential inter-dependence (Thompson, 1967; van de Ven, et al., 1976). Formal plans and schedules allow suppliers to perform their tasks with a shared understanding of each other’s schedules and goals (Galbraith, 1977). However, these *cross-activity programming* (Grandori, 1997) mechanisms fail to recognize technical blockers, changes and other emerging issues, especially when external changes inevitable occur in multi-supplier settings (Isatto & Formoso, 2011; Skipper et al., 2008). An example can be seen in the MS1 project, Pactera’s testing work could get stuck until specific bugs were fixed by the Chinasoft IPEs; this could be more daunting when Pactera had to complete their testing within a tight schedule. Therefore, additional coordination efforts become necessary when the process and performance of other suppliers are not meeting expectations. Coordinators and direct communication (Kumar & Dissel, 1996; Joseph et al., 2008) are called upon as they enable suppliers to respond to external changes (Skipper et al., 2008). For instance, project managers from Pactera had to communicate with the Chinasoft IPEs directly and urge them to fix the bugs.

While late responses and work delays can be addressed by direct communication in the cases of sequential inter-dependence, such interactions could be more complex in reciprocal inter-dependence situations. As discussed in Chapter 7, reciprocal inter-dependence requires constant bidirectional interactions between suppliers, resulting in *ad hoc* information processing and problem solving activities. According to previous literature, mutual adjustment fits best to coordinate reciprocal inter-dependence (Thompson, 1967; Grandori, 1997). In light of this, actions, reactions, communications and information sharing taken place between suppliers (Skipper et al., 2008). While information sharing could support real-time feedback between suppliers, coordinators and liaison contacts (i.e., the mechanisms for *ad hoc* discussion and problem solving) are also dedicated to facilitate mutual adjustment. An example can be seen in the BA case, subject matter experts (SMEs) or the defect management team from different suppliers could sit together (such as in workshops and joint forums) to address technical blocks or conflicts and re-negotiate further actions when changes/issues emerged.
To conclude, this research contributes to coordination studies by re-examining the match between task inter-dependence and coping mechanisms in multi-sourcing contexts. As task inter-dependence varies across multi-sourcing projects, the requirements of inter-supplier interaction are different. Thus, the diversity in coordination challenges entails a variety of inter-supplier coordination activities, creating variations in suppliers’ coordination activities: Pooled or integrative inter-dependence characterized by minimal inter-supplier workflows are mainly coordinated by following pre-defined procedures and keeping mutual awareness; the management of sequential inter-dependence is primary reliant on the efforts of planning and internal adjusting; while the coordination of reciprocal dependence can be achieved by constant information exchanging, and adjusting through explicit discussions. Table 35 summarizes the existing knowledge of coping mechanisms for different task inter-dependencies and the contribution of this research.

<table>
<thead>
<tr>
<th>Inter-dependence</th>
<th>Appropriate Coordination Mechanisms</th>
<th>How Mechanisms are Implemented in Multi-sourcing Settings (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooled</td>
<td>Standards and Rules</td>
<td>Complying with the rules and procedures defined by the client</td>
</tr>
<tr>
<td>Integrative</td>
<td>N/A</td>
<td>Clarifying and complying with rules and procedures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Keeping mutual awareness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jointly monitoring work progress</td>
</tr>
<tr>
<td>Sequential</td>
<td>Schedule and Plan</td>
<td>Scheduling and planning in line with other suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Developing mutual agreements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Updating and monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjusting initial plans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Requiring information from other suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clarifying information for other suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Re-developing/improving other suppliers’ work</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reminding other suppliers</td>
</tr>
<tr>
<td>Reciprocal</td>
<td>Mutual adjustment</td>
<td>Scheduling and planning in line with other suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sharing task-related information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Developing mutual agreements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Real-time feedback (checking others’ delivery capability)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technical issues resolution (through joint workshops and forums)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clarifying information for other suppliers</td>
</tr>
</tbody>
</table>

**Note:** (+) studied in this research
3) Identifying Underlying Conditions for Coordination

Previous studies on coordination mechanisms focus on analysing and distinguishing the modes of coordination; for instance, plan versus feedback (March & Simon, 1958), impersonal versus mutual adjustment (Van de Ven et al., 1976), formal versus informal (Kraut & Streeter, 1995), programme versus communication (Argote, 1982), as well as structured versus improvised (Kotlarsky et al., 2014). However, these approaches of characterizing coordination can hardly describe the underlying foundations of coordination (Okhuysen & Bechky, 2009), as coordination serves as a ‘service’ in an inter-supplier network (van Hillegersberg, Moonen, & Dalmolen, 2012). Therefore, the analysis of inter-supplier coordination should move beyond analysing the modes of coordination mechanisms toward exploring the purposes of these coordination mechanisms.

According to the finding of twelve multi-sourcing projects, ambiguity in responsibility, work delays and late responses are one set of the challenges faced by suppliers. In order to manage these accountability issues, suppliers spend time and efforts to negotiate and establish mutual agreements, in terms of delivery time, work procedure, and services quality. Once the formal agreements are established, suppliers have to comply with these rules and agreements. As the findings of this research indicate, suppliers engage in a variety of activities to monitor inter-supplier accountability, such as holding regular meetings to update and monitor each supplier’s progress and make each supplier’s status visible, as well as taking joint actions to minimize the issues associated with performance uncertainty.

Another coordination challenge is the uncertainty that arises from the misalignment between the parties (Handley & Benton, 2013; White & Lui, 2005). In multi-sourcing settings, suppliers spend time and effort to enact work alignment between them. For instance, inter-supplier alignment can be shaped through ‘sharing forecasts and schedules’ (Handley & Benton, 2013 p. 115) during the Planning phase. While in the Execution phase, alignment can be accomplished through both routinized actions and joint actions and events, as these ‘aligning actions’ (Orbuch,1997 p. 463) among multiple vendors enact a way for inter-dependent parties to observe and understand other’s actions and timeframes (Rico et al., 2008; Simon, 1965).

Integrating the above two perspectives, managing performance uncertainty as well as
integrating suppliers’ processes, information and actions are two managerial imperatives when suppliers coordinate with each other, creating the requirements for establishing work accountability and alignment between suppliers.

In summary, identifying two underlying logics of coordination provides a way to embrace the coordination activities that were observed in twelve multi-sourcing projects. Rather than discussing the modes of coordination mechanisms, this research offers an alternative way to understand the vast variety of coordination activities. The analytical lens is used to categorize the coordination challenges for a supplier in multi-sourcing settings; it can also be used in other inter-organizational settings, suggesting the broad applicability of this lens.

9.2 Managerial Implications

This research also delivers practical relevance, especially for organizations that are currently experiencing, or are likely to engage in multi-sourcing arrangements. The findings presented in this study can be used as a guide for both supplier and client firms.

9.2.1 Implications for Suppliers

As an increasing number of firms are exposed to multi-supplier scenarios, understanding the inter-dependence and coordination efforts in a multi-sourcing arrangement has important implications for supplier firms. Multi-sourcing results in a shift from solely client-supplier interactions towards inter-supplier interactions. As a result, inter-supplier activities may subsume service execution, or the suppliers may devote themselves to identifying and managing inter-supplier task dependence. For example, suppliers made efforts and paid attention to check other suppliers’ work progress, adjust to other suppliers’ timelines and deliverables, and respond to other suppliers’ changes. It is a challenge for suppliers to balance their internal task execution and interaction with other suppliers within the budget, in terms of time and resources.

As the key feature of multi-sourcing, task inter-dependence needs to be managed through a variety of coordination mechanisms, resulting in the suppliers’ coordination efforts. When performing tasks in multi-sourcing projects, the main questions that managers from supplier firms have to consider include: 1) *What type(s) of inter-dependence may we face, given the need to work with other suppliers?* and 2) *What should we do to efficiently work with the other suppliers, so
as to satisfy the client, in terms of service speed and quality?

Various types of inter-dependence and their implications for suppliers’ coordination efforts are reported in Table 31, which provides a practical guidance for managers to make their decisions.

This guidance may encourage managers to differentiate between four different types of inter-supplier task dependence (such as pooled, integrative, sequential and reciprocal), so that suppliers can easily identify potential managerial challenges when coordinating task inter-dependence. For instance, suppliers have to take alignment-specific issues into account when they manage pooled or integrative inter-dependence, while accountability-specific issues should not ignored when tasks are sequential or even reciprocal inter-dependent between each other. The findings reported in Table 31 allows practitioners to identify the particular type(s) of task inter-dependence they may experience in a multi-sourcing project. With the awareness that different types of inter-dependence occur, supplier firms can differentiate their reactions and coping practices.

Although understanding potential coordination challenges may facilitate suppliers to prepare and adopt appropriate coping practices, it is yet enough for a supplier to coordinate task inter-dependence in multi-sourcing settings. This is because managing inter-supplier task dependence over time can be daunting, especially when the tasks are more complex and organizational boundaries are significant. Time and effort need to be taken into account when performing tasks in the multi-sourcing context. Specific managerial practices that were adopted by Pactera and TCS are reported and analysed in this research. Managers from supplier firms could draw insights from these findings to develop their managerial practices in their multi-sourcing engagements, in order to deal with the issues summarised in this research.

In addition, suppliers may informed by the findings that coordination challenges evolve and vary during the course of a multi-sourcing project, and therefore, supplier should take different actions in different project phases. Specifically, supplier have to ascertain responsibility and reduce uncertainty when they making plans, while they need to ensure status visibility and make constant adaptation when they executing their work. In light of these, different coordination focus should be taken into account when supplier design and
implement their coordination mechanisms.

Furthermore, suppliers can benefit from this research by adopting and implementing the dynamic model proposed in this research (see Figure 22). The framework can inform suppliers of what effort should be made and to enact inter-supplier accountability and alignment. For instance, supplier should consider spend time and effort in information synchronising, collective interacting and responsive adapting when they work with other suppliers in multi-sourcing scenarios.

9.2.2 Implications for Clients

Although this research focuses on the suppliers’ perspective, the findings of this study may also offer valuable insights for client firms. As the quality of a client’s end-to-end services/products is in the hands of its multiple suppliers, reducing the difficulty of inter-supplier coordination and establishing efficient coordination between suppliers become essential. Client firms need to pay attention to the coordination challenges that their suppliers may face, as reported in this study. With the knowledge that various types of inter-dependence exist and the awareness of how they influence suppliers’ coordination efforts, client firms can provide appropriate support for the coordination between multiple suppliers. Based on an in-depth understanding of suppliers’ coordination issues in the multi-supplier environment, client firms are able to facilitate effective inter-supplier coordination and shape fair supplier collaborations, so as to maximize the benefits from their multi-sourcing engagements.

9.3 Limitations and Further Research

This research is also subject to several limitations. In the following sections, the limitations of this research and opportunities for future research are presented.

9.3.1 Research Limitations

Limitations of this research mainly encompass the research method.

Firstly, the understanding of the multi-sourcing projects and each supplier’s services mainly relied on the interviewees’ perceptions and descriptions, which may be subjective. Exploring outsourcing contracts and collaborative agreements between multiple suppliers as well as
project documentation could offer more insights to this research, as they are more objective sources (Yin, 2014; Eisenhardt, 1989). Unfortunately, such access was not obtained because of confidential nature of these documents.

Secondly, a supplier’s effort could have been investigated in a wider context, involving all participating stakeholders. However, the data of this research was only collected from one particular supplier firm in each multi-sourcing engagement; this means that the viewpoints of their client and other suppliers were not included, which may cause bias issues. Further access to data from the client and other suppliers in the same project could increase the validity of this research.

Thirdly, the sample strategy of this research is subject to critiques. Although all of the three cases are related to IT multi-sourcing projects, the Pactera case does not fit well with the BA and Lloyds cases. The services provided by Pactera is software testing while the cases of BA and Lloyds are about application development and service integration. A lack of similarities in terms of the task complexity between cases has limited the discussion on coordination efforts. As the coordination relies not only the types of task inter-dependence but also the nature of the task (Kumar et al., 2009), the communication and clarification efforts are more intensive when coordinating more complex tasks (i.e., development) than simple work (e.g., testing). Owing to this limitation, the variations of coordination efforts are mainly discussed according to different types of task inter-dependence. Perhaps additional cases on service development and integration would have extended the findings of this research.

Fourthly, in terms of the depth of multi-sourcing project details, it was difficult to collect an infinite amount of interviews and observations and investigate the entire lifetime of the three multi-sourcing engagements, or conduct a longitudinal case study to analyse the chronology of events. This is mainly because several factors, such as the time and budget of a PhD researcher, have constrained this research.

Finally, although three cases were chosen to compare and distinguish various findings in different settings, this research still has limited generalizability (Klein & Myers 1999). Therefore, quantitative studies, such as surveys on more supplier firms across industries and countries, are required to make generalizations applicable to all settings.
9.3.2 Directions for Further Research

Theoretical considerations and empirical evidence from this research may provide a starting point for subsequent studies. Apart from coping with the abovementioned research limitations, directions for further studies are suggested as below.

Firstly, how task inter-dependence changes over time in a multi-sourcing engagement needs to be further explored. Although this research distinguishes various types of inter-supplier inter-dependence during different phases, further studies may examine whether and how task inter-dependence evolves in multi-sourcing, through longitudinal studies or more in-depth case studies.

Secondly, existing outsourcing studies have examined the relationship between client-supplier coordination and outsourcing performance (Gopal et al., 2009). However, the literature is relatively sparse when it comes to the performance implications of inter-supplier coordination in multi-sourcing contexts. Little empirical work was found to address these issues in any detail to understand the influence of suppliers’ coordination efforts on the project performance. Thus, further work is required to investigate the relationships between various coordination efforts and multi-sourcing performance, from either the client or supplier perspective.

Thirdly, this research studied suppliers’ efforts focusing on coordination issues; researchers may also investigate suppliers’ efforts from a different perspective. For instance, the learning and knowledge transfer between multiple suppliers could be a stimulating research direction. Therefore, further studies could consider whether and how supplier-to-supplier learning and knowledge sharing takes place in the multi-sourcing context. Likewise, high competition between suppliers is perceived as another challenge in the multi-sourcing environment. The competition among suppliers impedes mutual trust development (Bapna et al., 2010; Bringer et al., 2004) and information sharing (Faems et al., 2008). Thus, researchers may also investigate the efforts on inter-supplier relationships and discuss how supplier competition can be properly managed.

Finally, the advantages and risks of multi-sourcing have been intensively discussed from a client perspective. However, potential benefits for suppliers in the multi-sourcing engagement are still unexplored areas in the multi-sourcing literature. Therefore,
investigating supplier benefits could be another stimulating direction for further work.
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