

**Co-creating Effective and Profitable Customer Solutions in
Business Markets**

**A thesis submitted for the degree of
Doctor of Philosophy
of
The Australian National University**

by

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Statement of Originality

I certify that this PhD thesis is my own original work. I have not submitted the work contained in this thesis for another degree or diploma at any other tertiary institution.

I have acknowledged all the assistance that I received in preparing this thesis, and have made due references.



.....
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Dated: January 30, 2015

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Abstract

In this thesis, I identify the drivers of customer solutions that are both effective for customer firms *and* profitable for supplier firms in business-to-business (B2B) markets. In a value aggregation framework, I investigate how value is created for each firm in a supplier-customer dyad when providing solutions.

I introduce the co-creation orientation construct that reflects a supplier or customer firm's attitude and perceived behavioural control for working on a solution with another firm to achieve mutually beneficial outcomes. I propose that a firm's high degree of co-creation orientation leads to high level of dyadic investments into a customer solution. These dyadic investments combine with the dyad's interaction efficacy to improve solution effectiveness. Solution effectiveness has a positive effect on customer-based relational performance. Importantly, I propose that, to maximise profits from a customer firm, supplier firms need to avoid making investments that are misaligned with each firm's co-creation orientation. Misaligned investments have a negative effect on solution effectiveness and customer-based profit performance. Finally, customer-based profit performance has a positive effect on a supplier firm's overall profits.

This study involved: (1) a qualitative stage to conceptualise and develop measurement scales for the focal constructs under investigation, (2) a pilot study to purify and refine measurement models, (3) a study to test the theoretical framework in a generalisable manner, and (4) a study to verify and extend the structural model using a new data set. Results across these studies broadly support my research hypotheses.

This thesis makes three contributions to marketing theory and practice. First, co-creation orientation's elements give supplier firms actionable measures to develop the attitude and competencies required to survive in the customer solutions business. Second, by recognising their customer firms' co-creation orientation and aligning their investments accordingly, supplier firms are more likely to maximise their profits. Third, recognising the co-creation orientation of both firms in a supplier-customer dyad allows the supplier firms to select the right customer firms to develop mutually beneficial relationships.

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1 Introduction

1.1 Research Background

This study investigates the drivers of customer solutions that are both effective for customer firms and profitable for supplier firms. I investigate this topic for three primary reasons: first, business-to-business (B2B) firms face increasing pressure from customer firms to move from a product focus to a solution focus. Customer firms want suppliers to solve complete problems (Foote, Galbraith, Hope, & Miller, 2001) by providing end-to-end solutions (Kumar, 2004). Therefore, traditional manufacturers are moving into the field of customer solutions to strengthen their position and grow their revenues and margins (Ulaga & Reinartz, 2011).

Second, marketing academics are emphasizing more research on customer solutions to develop a better understanding of how B2B firms that provide solutions to their customers create value for themselves and their customers (e.g., Day, 2004; Jacob, Kleipañ, & Pohl, 2014; Lilien et al., 2010; Sawhney, 2006; Tuli, Kohli, & Bharadwaj, 2007). Providing effective solutions to customer firms requires processes for identifying needs, adapting, integrating, and deploying products, and providing post-sales support (Tuli et al., 2007). These relational processes underscore collaborative relationships with customer firms (Rust, Moorman, & Bhalla, 2010) and suggest a shift away from adding value for customers to co-creating value with them (Vargo & Lusch, 2004).

Third (and most importantly), while collaborative relationships might lead to effective solutions for customer firms, evidence that customer solutions might not necessarily be profitable for supplier firms exists (Biggemann, Kowalkowski, Maley, &

Brege, 2013; Eggert, Hogreve, Ulaga, & Muenkhoff, 2014; Hancock, John, & Wojcik, 2005; Renault, Dalsace, & Ulaga, 2010). Therefore, I develop a better understanding of what drives customer solutions to be effective for customer firms *and* profitable for supplier firms. Prior research has not addressed this question.

The scope of my thesis is limited to firms (or their business-units) that provide customer solutions in B2B markets (See Section 2.1 for a definition of “customer solutions” for the purpose of my thesis). Firms (or their business-units) that provide stand-alone products or stand-alone services to their customers are out-of-scope of this thesis.

1.2 Research Objective

In this thesis, I develop a better understanding of the drivers of customer solutions that are both effective for customer firms and profitable for solution providers. Collaborating with customers is critical and, indeed, not optional for solution providers to survive and thrive in the marketplace (Day, 2004; Deighton & Narayandas, 2004). For example, when Siebel started to sell sales automation software in early 1990s, it faced various challenges such as few existing customers, long sales cycles, and a complex product-development process. Siebel selected a few high-potential customers who invested with it to develop solutions for their specific needs. With a focus on understanding customer firms’ business processes, Siebel involved customer firms in solution design through to implementation (Deighton & Narayandas, 2003). Siebel experienced continuous growth and led the customer relationship management (CRM) software market with 25% share in 2001 (InternetNews, 2003). However, Siebel could not keep up with its customer firms’ emerging needs for an integrated front-office (e.g., CRM), and back-office (e.g., accounting software) solution. With plummeting investment returns on Siebel’s CRM

software, its customers started to defect to competitors (CNETNews, 2002), which resulted in Oracle taking over Siebel in 2005 (CNETNews, 2005). Siebel's initial success and subsequent failure in the customer solutions business highlight the importance of collaborating with *each customer firm* to provide an effective customer solution according to their idiosyncratic needs and requirements.

Collaborating with customer firms is necessary to deliver effective customer solutions, but it is not sufficient to ensure suppliers' profitability. A survey of Fortune 1000 firms offering customer solutions found that only half made moderate profits, and 25% actually lost money (Hancock et al., 2005). Several other studies have found similar results. Biggemann et al. (2013) report that, even after successfully developing a solution, some suppliers in the global mining industry may not recover their investments into customer solutions. In a case study of Michelin, a leading global tire manufacturer, Renault et al. (2010) found that it took several years for Michelin's customer solutions business to generate satisfactory revenues, control costs, and select the right customer firms to become profitable. Eggert et al. (2014) found that services directed at customer processes (a component of customer solutions) negatively affected solution suppliers' profits. These research findings consistently suggest that even top-ranking B2B firms find it challenging to deliver effective customer solutions to their customer firms that are also profitable for themselves.

Therefore, we need to gain a better understanding of how firms that design effective customer solutions for their customer firms also ensure their own profitability. Researchers have not, as yet, empirically identified what processes or supplier and customer firms' competencies and characteristics drive effective customer solutions that are also profitable

for suppliers. This gap has prompted scholars to call for more research on customer solutions to better understand how B2B firms achieve and appropriate value when providing solutions to their customer firms (e.g., Day, 2004; Jacob et al., 2014; Lilien et al., 2010; Sawhney, 2006; Tuli et al., 2007). Therefore, in this thesis, I develop and empirically test a framework to understand how customer solutions might become effective for customer firms and profitable for supplier firms.

1.3 Research Gaps

I conducted this study due to the research gaps that need to be addressed to gain a better understanding of the drivers of the customer solutions that are both effective for customer firms and profitable for solution providers. Table 1.1 highlights gaps in existing empirical research on customer solutions that I attempt to address in this thesis.

Despite increasing relevance of customer solutions to B2B marketing, academic research on customer solutions is sparse. Until recently, research on customer solutions was limited to conceptual papers that suggest theoretical frameworks or business models (e.g., Srivastava, Shervani, & Fahey, 1999; Storbacka, 2011), strategies to develop solution businesses based on case studies (Anderson, Kumar, & Narus, 2007; Kumar, 2004), and theory building based on qualitative research (Tuli et al., 2007; Ulaga & Reinartz, 2011). During the last few years, researchers have empirically investigated the relationship between suppliers' consulting capabilities and customer satisfaction (Jacob et al., 2014), and the relationship between solution offers and supplier's financial performance (Eggert, Högrevé, Ulaga, & Muenkhoff, 2011; Eggert et al., 2014).

Table 1.1: Empirical Research on Customer Solutions						
Research Study	Research Nature	Constructs included in the study				
		Supplier resource/capability	Customer resource/capability	Dyadic behaviour	Supplier outcomes	Customer outcomes
Tuli, Kohli & Bharadwaj (2007)	Qualitative	✓	✓	×	×	✓
Ulaga & Reinartz (2011)	Qualitative	✓	×	×	✓	×
Jacob et al. (2014)	Quantitative	✓	×	×	×	✓
Eggert et al. (2011, 2014)	Quantitative	✓	×	×	✓	×
This Thesis	Qualitative & Quantitative	✓	✓	✓	✓	✓
✓ means that a study included constructs/variable(s) to address this aspect × means that a study did not include constructs/variable(s) to address this aspect						

Existing empirical research on customer solutions has not investigated the factors that drive solutions that are both effective for customer firms and profitable for solution providers. Therefore, there is a need to develop and empirically validate a framework that identifies how value is created for customer and supplier firms in the process of providing solutions. To my knowledge, there is no empirical research that has investigated the drivers and their relative impact on value creation for customer and supplier firms in the context of customer solutions. I address these research gaps in my thesis.

1.4 Research Questions

Based on the research objectives and research gaps in Sections 1.2 and 1.3 above, in this thesis, I explore the following overarching research question:

RQ1: What factors lead to customer solutions that are effective for customer firms and profitable for supplier firms?

To investigate this question, I develop a framework that addresses how customer solutions might become effective for customer firms and profitable for solution providers.

Based on this research question, I explore three sub-questions:

RQ1.1. How is value created for the two firms in a supplier-customer dyad during the process of solution provision?

RQ1.2. What are the characteristics of the supplier firms and customer firms that lead to effective solutions for the customer firms?

RQ1.3. How can supplier firms ensure their own profitability while providing effective solutions to their customers?

I conduct multiple studies to investigate these research questions and provide an evidence-based understanding of the relative impact of the drivers of customer solutions' effectiveness and profitability.

1.5 Overview of the Theoretical Framework

Building on the existing research on customer solutions (e.g., Anderson et al., 2007; Eggert et al., 2014; Tuli et al., 2007; Ulaga & Reinartz, 2011), I draw upon the theory of planned behaviour (Ajzen, 1991) to develop a theoretical framework that proposes that the primary source of effective solutions is the presence of a collaborative attitude and a set of beliefs among each party of the supplier-customer dyad. I call this collaborative attitude

and set of beliefs a firm's "co-creation orientation". Importantly, supplier firms that align their investments with the two firms' co-creation orientation are likely to make higher profits from a customer solution than those firms who misalign their investments.

In a value aggregation framework, I investigate how value is created for both the firms in a supplier-customer dyad when providing solutions to customer firms (see Figure 1.1). In my solution effectiveness model, I propose that, in a supplier-customer dyad, each firm's co-creation orientation increases dyadic investments into a customer solution. Dyadic investments combine with the dyad's ability to work effectively (interaction efficacy) to have a positive effect on solution effectiveness, which, in turn, increases customer-based relational performance (CBRP), as measured by the customer firm's satisfaction, positive word-of-mouth, and the customer firm's commitment.

In the customer-based profit performance model, I am primarily interested in investments that supplier firms (rather than the dyad) make into the solution. I propose that supplier investments that are misaligned with the co-creation orientation of each firm in the dyad have a negative effect on solution effectiveness, which further limits suppliers' customer-based profit performance (CBPP). Therefore, to maximise profits from a customer firm, supplier firms need to recognise their own and their customer firm's co-creation orientation, and align their investments with the attitudes and beliefs that constitute these orientations. Finally, in the overall supplier profitability model, I propose that the customer-based profit performance (CBPP) has a positive effect on the profitability of a supplier firm's business unit.

Figure 1.1: An Overview of Theoretical Models, Value Drivers, & Value Creation			
Value drivers	<i>(Attitudes & beliefs)</i> Supplier co-creation orientation Customer co-creation orientation		<i>(Customer-specific value)</i> Customer-based profit performance (S)
	<i>(Behaviour)</i> Interaction efficacy Dyadic investments Supplier investments		
Value creation	<i>(Outcomes)</i> Solution effectiveness (C*) Customer-based relational performance (S) Customer-based profit performance (S)		Business unit profits (S)
<i>Theoretical Model</i>	<i>Solution effectiveness model</i>	<i>Customer-based profit performance model</i>	<i>Overall profitability model</i>
* C = customer value, S = supplier value			

1.6 Overview of Research Method

Overall, in this thesis, I identify the drivers of effective and profitable customer solutions. I use a four-stage methodological approach to identify these drivers, further investigate their relative impact on solution effectiveness and profitability, and validate the theoretical models. As such, this study involves: (1) a qualitative stage to conceptualise and develop measurement scales for the focal constructs under investigation, (2) a pilot study to purify and refine constructs’ measurement models by evaluating their validity and reliability, (3) a study to test the structural model (theoretical framework) in a generalisable manner, and (4) a study to verify and extend the structural model using a new data set. Table 1.2 shows the purpose of each research stage and the research method used.

Table 1.2: An Overview of the Research Strategy				
Research Stage	1	2	3	4
Study titles	“Qual Study”	“Pilot Study”	“RSN Study”	“Dyadic Study”
Purpose	To conceptualise constructs for scales development	To purify and refine measurement scales	To test the theoretical framework in a generalisable manner	To validate and extend theoretical framework using a new data set
Method	In-depth interviews with expert raters, and a literature review	Pilot study with key informants in supplier firms	Study with key informants in supplier firms	Study with key informants in matched supplier-customer dyads
Nature	Qualitative	Qualitative & Quantitative	Quantitative	Quantitative

1.7 Overview of Results

In stage 1 (hereafter called “Qual Study” to reflect its qualitative nature), I developed measurement scales for the focal constructs under investigation with the help of expert raters and key informants. In stage 2 (hereafter called “Pilot Study” to reflect that it was a pilot quantitative study that helped me refine my measures), I purified and refined measurement models of each construct by evaluating their validity and internal consistency reliability.

In stage 3 (hereafter called “RSN Study” to reflect that I collected data with the assistance of a market research company called ResearchNow), I collected data from the key informants in supplier firms to assess my solution effectiveness model. Results support that each firm’s co-creation orientation increases dyadic investments into customer

solutions. Results also support that dyadic investments, combined with the dyad's ability to work effectively (interaction efficacy), have a positive effect on solution effectiveness, which, in turn, increases customer-based relational performance (CBRP).

In stage 4 (hereafter called "Dyadic Study" to reflect that I collected data from both supplier firms and their associated customer firms), I first assessed the validity of my solution effectiveness model on new data collected from solution suppliers and their customer firms. Results support all the hypotheses for this model. I then assessed my customer-based profitability performance model on this dataset and found support for all the proposed hypotheses. Importantly, results support the hypotheses that the greater the misalignment, the lower the solution effectiveness. Further, the results show that misaligned investments had a net negative effect on customer-based profit performance (CBPP) that is significantly different from the net positive effect of aligned investments on CBPP. Finally, the Dyadic Study's results also support the hypotheses for my overall profitability model. Specifically, results support that customer-based profit performance (CBPP) has a positive effect on a supplier firm's business unit's profitability.

1.8 Research Contributions

In this thesis, I make important contributions to marketing theory and practice. I extend prior research on customer solutions to provide an evidence-based understanding of co-creation orientation as the main driver of customer solutions that are effective for solution customers and profitable for solution providers. In applying the theory of planned behaviour to my theoretical framework, I demonstrate the usefulness of theories from social psychology to B2B marketing.

Evidence of co-creation orientation's positive impact on solution effectiveness and supplier firms' profitability will help supplier firm managers to focus on building the attitude and competencies that constitute co-creation orientation to survive in the customer solutions business. Further, firms will be able to allocate resources to develop a culture that promotes behaviours that reflect an attitude of co-creation orientation. Further, by recognising and aligning their investments with their customer firms' co-creation orientation, supplier firms are more likely to maximise their profits. Lastly, recognising the co-creation orientation of both firms in a supplier-customer dyad allows the supplier firms to select the right customer firms to develop mutually beneficial relationships.

This research is relevant to firms as varied as chemical manufacturers (e.g., NOVA Chemicals that help their customers take *innovative solutions* into markets), motion technology manufacturers (e.g., Parker Hannifin that provide *precision-engineered solutions* for aerospace), security-related firms (e.g., Brinks that provide *transportation and vaulting solutions*), investment banks (e.g., UBS that provide *investment solutions*), information technology solution providers (e.g., Cognizant that provide *IT solutions* to customers), and management consulting firms (e.g., Deloitte that create powerful *business solutions* for their worldwide clients).

1.9 Thesis Structure

The remainder of this thesis is organised as follows:

- In Chapter 2, I briefly review the concept of customer solutions and existing research on customer solutions. I then present my theoretical models and arguments for the research hypotheses to investigate the research questions.

- In Chapter 3, I present my research strategy and field work undertaken to address the research questions.
- In Chapter 4, I present the data analysis conducted on the data collected through survey research and the results.
- In Chapter 5, I discuss the significance of my research findings and the research's contributions to marketing theory and relevance to marketing practice.
- In Chapter 6, I discuss the research's limitations, possible future research directions, and conclude the thesis.

2 Theoretical Background and Framework

Business-to-business (B2B) manufacturing firms face increasing pressure from their customer firms to move from focusing on products to focusing on solutions. In other words, customer firms increasingly want their suppliers to solve a complete problem (Foote et al., 2001) by providing end-to-end solutions (Kumar, 2004). For example, supplier firms are now being forced into risk-sharing agreements to prove how they create real value for buyers (Davie, Stephenson, & Valdivieso, 2010). Therefore, traditional manufacturers are moving into the field of customer solutions to strengthen their positions and grow their revenues and profit margins (Ulaga & Reinartz, 2011).

Providing effective solutions to customer firms requires processes for identifying needs, adapting, integrating, and deploying products, and providing post-sales support (Tuli et al., 2007). These relational processes underscore collaborative relationships with customers (Rust et al., 2010) and suggest a shift away from value-adding for customers to value co-creation with them (Vargo & Lusch, 2004). While collaborative relationships might lead to effective solutions, evidence that customer solutions might not necessarily be profitable for supplier firms exists (Biggemann et al., 2013; Eggert et al., 2014; Hancock et al., 2005; Renault et al., 2010). An important question then is: what drives customer solutions to be effective for customer firms and profitable for supplier firms? Prior research has not addressed this question.

In this research, I develop a better understanding of the drivers of customer solutions that are both effective for customer firms and profitable for solution providers. Building on existing research on customer solutions (Anderson et al., 2007; Eggert et al.,

2014; Tuli et al., 2007; Ulaga & Reinartz, 2011) and drawing from the theory of planned behaviour (Ajzen, 1991) in social psychology, I propose that the primary source of effective solutions is the presence of a collaborative attitude and a set of beliefs among each party in the supplier-customer dyad, which I call “co-creation orientation”. Further, and importantly, supplier firms who align their investments into a customer solution with the two firms’ co-creation orientation are likely to make higher profits than the firms who misalign their investments.

In a value aggregation framework, I investigate how value is created for the two firms in a supplier-customer dyad when providing solutions. In my solution effectiveness model, I propose that, in a supplier-customer dyad, each firm’s co-creation orientation increases dyadic investments into a customer solution. Dyadic investments combine with the dyad’s ability to work effectively (interaction efficacy) to have a positive effect on solution effectiveness. Solution effectiveness affects customer-based relational performance (CBRP), as reflected in measures such as satisfaction and word of mouth.

In the customer-based profit performance model, I propose that the misaligned supplier investments, i.e. those that are not aligned with the co-creation orientation of the supplier and customer firms, have a negative effect on solution effectiveness that further limits suppliers’ customer-based profit performance (CBPP). Therefore, to maximise profits from a customer, supplier firms need to recognise their own and their customer’s co-creation orientation, and align their investments with the attitudes and beliefs that constitute these orientations. Finally, in the overall supplier profitability model, I propose that the customer-based profit performance (CBPP) has a positive effect on business unit profitability of a supplier firm.

In Section 2.1, I build on existing research on the concept of customer solutions to define the term for the purpose of my thesis. In Section 2.2, I review existing research on customer solutions to identify important gaps in the current understanding of how value is created for supplier and customer firms when providing solutions. In Section 2.3, I present the conceptualization of the construct of co-creation orientation. Finally, in Section 2.4, I present my theoretical models and related hypotheses.

2.1 The Concept of Customer Solutions

The customer solutions concept builds on a shift in the dominant logic of marketing theory and B2B marketing practice. Marketing practitioners are increasingly emphasising traditional B2B firms to move from offering stand-alone products, or from selling products and services on their attributes, to providing complete customer solutions (Davie et al., 2010; Foote et al., 2001; Hancock et al., 2005). Marketing academics have argued for a shift in the focus of marketing theory from product orientation to service orientation (Lovelock & Gummesson, 2004; Vargo & Lusch, 2004), from having discrete transactions with customers to building long-term mutually beneficial relationships (Rust et al., 2010; Srivastava et al., 1999), and from doing things *for* customers to doing things *with* them (Ramirez, 1999; Vargo & Lusch, 2004).

In Table 2.1, I present existing definitions of customer solutions that appear in the academic and practitioner literature.

Table 2.1: Customer Solutions Concept		
#	Authors	Proposed definitions of customer solutions
1	(Cornet et al., 2000)	“Typically developed as a combination of products, service, and knowledge (e.g., risk management, performance guarantees, customer consulting), a solution is a supplier’s customized response to a customer’s pressing business need.” (p. 1)
2	(Johansson, Krishnamurthy, & Schlissberg, 2003)	“...a solution is a combination of products and services that creates value beyond the sum of its parts... More specifically, it is the level of customization and integration that sets solutions above products or services or bundles of products and services.” (p. 118)
3	(Brady, Davies, & Gann, 2005)	“...by providing solutions rather than individual products or services... firms design, integrate, and deliver complex products and systems...” (p. 360) “[Integrated Solutions] providers add value by providing combinations of products and services that create unique benefits for each customer (pg. 362).
4	(Sawhney, 2006)	“I define a solution as an integrated combination of products and services customized for a set of customers that allows customers to achieve better outcomes than the sum of the individual components.” (p. 369)
5	(Davies, Brady, & Hobday, 2007)	“[Providing solutions] involves the provision of tailored combinations of products and services ...Providers of integrated solutions offer to design and integrate components into a system and provide services to operate, maintain, and finance the system during its life cycle.” (p. 183)
6	(Tuli et al., 2007)	“... a solution is a set of customer–supplier relational processes comprising (1) customer requirements definition, (2) customization and integration of goods and/or services and (3) their deployment, and (4) post-deployment customer support, all of which are aimed at meeting customers’ business needs...” (pg. 5)
7	(Shankar, Berry, & Dotzel, 2009) (Ulaga & Reinartz, 2011)	Hybrid solutions are products and services combined into innovative offerings.
8	(Storbacka, 2011)	“...integrated solutions (are) defined as longitudinal relational processes, during which a solution provider integrates goods, service and knowledge components into unique combinations that solve strategically important customer specific problems, and is compensated on the basis of the customer’s value-in-use” (Pg. 699).

Researchers have converged on the concept of customer solutions with some common themes. First, products and services need to be combined in a solution offering. Second, the offered product and service combination has to be customised, unique, or innovative. Third, a solution offer has to be integrated in a way that benefits the customer firm more than its individual components or any other alternative. Fourth, a solution offer needs to be a customised response to solve a customer firm's need(s) or problem(s). Also, Tuli et al. (2007) and Storbacka (2011) present customer solution as an ongoing relational process, and they shift the focus from "solution offer" to the process of providing them. Therefore, to capture the true nature of customer solutions, it has to be defined in terms of the offering (i.e., what a customer solution is) and the process (i.e., how a solution is provided).

Building on the existing concept of customer solution, I present the following definition of customer solution for the purpose of my thesis:

A customer solution is a customised, dynamic, and integrated bundle of products and services that is developed and provided via an ongoing relational process to solve a customer firm's needs.

This definition captures both dimensions of customer solutions; that is, the offering and the process. Therefore, it is consistent with the existing understanding of customer solutions in marketing practice and academia. Importantly, this definition of customer solutions specifies the scope of my thesis. The scope of my thesis is limited to firms (or their business-units) that provide customer solutions in B2B markets. Firms (or their business-units) that provide stand-alone products or stand-alone services to their customers are out-of-scope of my thesis.

2.2 Existing Research on Customer Solutions

Existing research on customer solutions builds on the proposed theoretical frameworks and business models to provide solutions (Srivastava et al., 1999; Storbacka, 2011), strategies to develop solution businesses based on case studies (Anderson et al., 2007; Biggemann et al., 2013; Kumar, 2004), and theory building based on qualitative research (Tuli et al., 2007; Ulaga & Reinartz, 2011).

Reflecting changing market trends, Srivastava et al. (1999) conceptualise customer solutions as a core business process that drives customer value and firm value (also see Grewal & Lilien, 2012; Rust et al., 2010). They argue for a set of ongoing, tightly bonded relationships with customer firms to develop customer solutions, and for leveraging these relationships to gain a sustainable competitive advantage. Based on case studies of diverse B2B firms, Anderson et al. (2007) propose that successfully providing customer solutions requires B2B firms to have a philosophy of practicing their business on the principles of value demonstration to customer firms, and getting equitable profits from them in return.

In a seminal article, Tuli et al. (2007) interviewed supplier and customer managers to propose a framework of developing effective customer solutions. They propose four processes of (1) identifying needs, (2) adapting and integrating products, (3) deploying products, and (4) post-sales support. They also identify a set of supplier and customer characteristics that ensure firms can effectively provide customer solutions.

Ulaga and Reinartz (2011) use a mix of case studies and in-depth interviews with managers of manufacturing firms to propose a resource-capability framework for firms that provide customer solutions to gain a differential advantage or cost leadership (they use the

term “hybrid offerings”). Ulaga and Reinartz (2011) identify four critical resources: (1) installed base of product usage and process data, (2) product development and manufacturing assets, (3) sales force and distribution network, and (4) field service organisation. They propose that firms leverage these resources to build five critical capabilities: (1) data processing and interpretation, (2) risk assessment and mitigation, (3) design-to-service, (4) hybrid offering sales, and (5) hybrid offering deployment.

In a case study on Michelin, a leading global tire manufacturer, Renault et al. (2010) report that, after Michelin launched Michelin Fleet Solutions (MFS) in 2000, it struggled financially for several years. With MFS, Michelin entered the customer solutions business to offer comprehensive-tire management solutions to their fleet customers. However, for several years, MFS failed to achieve its revenue targets and was unable to control its actual costs against projections. To become profitable, Michelin had to modify its business model, change its organisational structure, and improve its selection of customers for its customer solution business.

In another case study, Biggemann et al. (2013) investigated the viability of customer solutions provided by mining equipment and services firms in the global mining industry. Their research findings suggest that solution suppliers in the mining industry struggle to recover their investments in customer solutions because, despite a supplier’s heavy investments to successfully developing a solution, customers make them compete with other firms to provide the solution that they developed.

In another study, Jacob et al. (2014) conducted a survey of information technology firms who provide customer solutions in Germany, and identified that suppliers’ characteristics of project management, information exchange, and flexibility have a positive

effect on customer satisfaction with supplier consulting. They also report a positive effect of customer satisfaction with supplier consulting on customer loyalty and trust.

Lastly, in a survey of the German mechanical engineering industry, Eggert et al. (2014) report that the manufacturers who supplied services directed at customers' processes (a customer solution offer) reported lower profit levels compared to those who supplied after-sales services that supported customers' products. This research suggests that firms that supply customer solutions struggle in leveraging the offered value, which their inability to extract greater profit reflects.

The above review of the literature on customer solutions suggests that, despite the increasing relevance of customer solutions to B2B marketing, empirical research on customer solutions is sparse. Importantly, researchers have not yet empirically identified the drivers of customer solutions that are both effective for customer firms and profitable for supplier firms. Therefore, there is a need to develop and empirically validate a framework that shows how value is created for suppliers and customers in the process of providing solutions.

Building on existing research on customer solutions (Anderson et al., 2007; Eggert et al., 2014; Tuli et al., 2007; Ulaga & Reinartz, 2011) and drawing from the theory of planned behaviour (Ajzen, 1991) in social psychology, I propose that the co-creation orientation of the two firms in a supplier-customer dyad is the primary source of value creation for each firm. I present an orientation-behaviour-outcomes framework to investigate the effect of firms' co-creation orientation on their investments in solutions (behaviour) and value creation (outcomes). No comprehensive construct exists in the literature that captures the key elements of co-creation orientation. I address this research

gap, and conceptualise co-creation orientation as a multi-dimensional construct that influences a firm's attitude and perceived behavioural control towards working on a solution with another firm with a goal to achieve mutually beneficial outcomes. Whereas a firm's attitude constitutes its behavioural beliefs (value trade concept, belief in learning, and relationship-building focus), its perceived behavioural control is embedded in its control beliefs (key account management (KAM) team ability and process articulation for supplier firms; key stakeholder participation and counselling ability for customer firms).

I draw upon the theory of planned behaviour (Ajzen, 1991) in social psychology to propose that the degree of a supplier or customer firm's co-creation orientation positively affects dyadic investments in customer solutions. My hypotheses posit that dyadic investments, in combination with the dyad firms' ability to collaborate effectively (i.e., interaction efficacy) has a positive effect on how effective a solution is for a customer firm. I also hypothesise that solution effectiveness has a positive impact on customer-based relational performance (CBRP). Importantly, I hypothesise that a supplier's misaligned investments (i.e., investments that are not aligned with the supplier and customer firms' co-creation orientation) have a negative effect on solution effectiveness. Solution effectiveness has a positive effect on CBRP, which positively affects customer-based profit performance (CBPP). I hypothesise that the net negative effect of misaligned investments on CBPP is significantly different from the net positive effect of aligned investments on CBPP. Therefore, to maximise profits from a customer firm, supplier firms need to align their investments with the two firms' co-creation orientation. Finally, in the overall supplier profitability model, I hypothesise that the customer-based profit performance (CBPP) has a positive effect on a supplier firm's business unit's profitability.

In Section 2.3, I conceptualise the co-creation orientation construct and present its key attributes for supplier firms and customer firms.

2.3 Co-creation Orientation: Construct Development

To conceptualise and develop new constructs, researchers have advocated reviewing literature that closely relates to the focal construct (MacKenzie et al., 2011; Sartori, 1984) and performing interviews with subject-matter experts and practitioners to identify the focal construct's key aspects or attributes (Rossiter, 2002).

Because the co-creation orientation construct does not exist in literature, I followed the guidelines given by MacKenzie et al. (2011) and Rossiter (2002) to develop this construct with the help of expert raters, who were senior managers working in B2B firms, and the extant literature on marketing strategy, value co-creation, and customer solutions. Specifically, I conducted in-depth interviews with eight senior managers in leading global solution-providing firms, and asked them the following questions to identify important elements of co-creation orientation:

1. How do “outstanding” firms differ from “mediocre” firms in their orientation or mindset toward approaching the solution business? What are the major differences in their mindsets and characteristics?
2. In your experience, how do customer firms differ from each other in the manner in which they approach dealing with you as a solution provider?
3. Do you invest more into customer firms who are willing to collaborate with you on solution development?
4. Why are you successful in providing effective solutions to some customer firms but not others?

Most expert raters identified that, to be successful at co-creating solutions, supplier and customer firms need to focus on understanding value to be created rather than focusing on price and products, be open to learning from each other, and have a relationship-building focus. Further, expert raters identified KAM team abilities and well-defined solution development processes as important aspects that supplier firms needed to co-create solutions. Expert raters identified participation of key decision-makers in the customer firms and customer firms' ability to guide their suppliers, as key characteristics of customer firms to co-create solutions.

I found theoretical support for the themes emerging from interviews with expert raters in the theory of planned behaviour (Ajzen, 1991) in social psychology. Existing research on organisational behaviour and management draws upon elements of the theory of planned behaviour (Ajzen, 1991) to further theory on inter-organisational relationships (e.g., Currall & Judge, 1995; McKnight, Cummings, & Chervany, 1998). Theory of planned behaviour (Ajzen, 1991) argues that a given behaviour is a joint function of attitude towards the behaviour, subjective norms, and perceived behavioural control, which are derived from a set of salient beliefs related to the behaviour. Attitude towards the behaviour refers to the degree to which an entity has a favourable or unfavourable evaluation of the behaviour. Subjective norm refers to the perceived social pressure to perform or not to perform the behaviour. Perceived behavioural control refers to the perceived ease or difficulty of performing the behaviour. As per Ajzen (1991), the relative importance of attitude, subjective norms, and perceived behavioural control in the prediction of (intention to perform) behaviour is expected to vary across behaviours and

situations, so that in some situations only attitudes and perceived behavioural control are sufficient to predict behaviour.

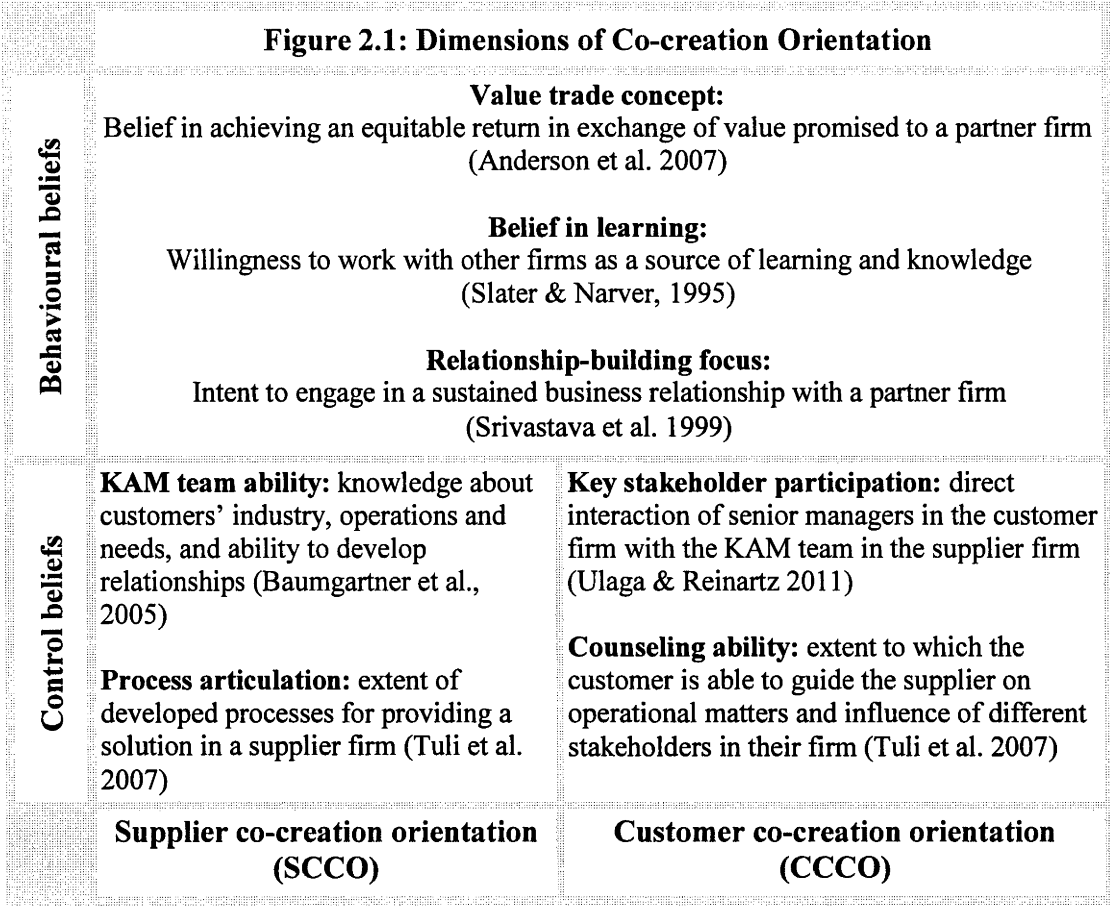
During interviews, expert raters identified “co-creation orientation” to exist at business-unit or team levels. Therefore, I propose that attitude towards, and perceived behavioural control of, working with another firm on solution development are relevant determinants of co-creation orientation of a business-unit or organisational team working on a customer solution. I do not consider subjective norm to conceptualize co-creation orientation because any social pressure to perform a desired behaviour is expected to be already accounted for at business-unit or organisational team levels.

Ajzen (1991) distinguishes between behavioural beliefs that influence attitude toward the behaviour, and control beliefs that provide the basis for perceived behavioural control. According to the theory of planned behaviour, if an entity has a positive attitude toward performing a given behaviour and it also believes that it possesses the required resources to perform it, the entity expects fewer impediments and perceives more control over that behaviour and, therefore, is more likely to perform it.

Based on the theory of planned behaviour, I propose that, if a focal firm believes that working with a customer (or supplier) firm on a solution will result in mutually beneficial outcomes, the focal firm will form a positive attitude towards working with the customer (or supplier) firm. Further, if a firm believes that it possesses the required resources to work on a solution with a customer (or supplier) firm, it will perceive itself as having enhanced control over working on the solution and, therefore, be more likely to work with the customer (or supplier) firm on it.

Therefore, at the core of the co-creation orientation concept is an attitude to obtain beneficial outcomes for the two firms, and the perceived control of the resources to engage in co-creation activities. I conceptualise the co-creation orientation concept based on key elements emerging from the themes from interviews with senior managers (expert raters), and apply the theory of planned behaviour to arrange these key elements in a set of behavioural beliefs and control beliefs (see Figure 2.1). Senior managers identified three behavioural beliefs that reflect a firm's co-creation orientation: (1) value trade concept, (2) belief in learning, and (3) relationship-building focus. This set of behavioural beliefs is relevant to both supplier and customer firms. However, firms in a dyad or firms across different dyads may have different strengths of these beliefs.

Whereas supplier and customer firms may bring shared behavioural beliefs to work together on a solution, they may perceive that they have control over very distinct resources. Importantly, firms may differ in their intent toward working on a solution because they have different perceptions of their skills and ability to exploit resources that are critical for providing solutions. I propose that supplier firms may differ in their co-creation orientation because of different perceptions of their ability to exploit two resources under their control: (1) key account management (KAM) team ability, and (2) process articulation. Similarly, customer firms may differ in their co-creation orientation because they differ in how they perceive their ability to exploit two resources under their control: (1) key stakeholders' participation, and (2) counselling ability.



Building on the arguments presented for the key elements of co-creation orientation, I define co-creation orientation as follows:

Co-creation orientation reflects a firm’s attitude and perceived behavioural control for working on a solution with its customers (suppliers) to achieve mutually beneficial outcomes.

Drawing from extant literature, I offer descriptions for different elements of co-creation orientation. First, I present three behavioural beliefs related to the co-creation orientation construct.

2.3.1 Value Trade Concept

During interviews in the Qual Study, managers suggested that supplier and customer firms need to focus on understanding the value to be created and shared, rather than price and products. Therefore, I conceptualise the value trade concept as a belief in achieving an equitable return in exchange for providing value to a partner firm.

Anderson et al. (2007) argue that, if a supplier has a value trade mindset, it will work to achieve a fair return for itself and its customers. A value trade mindset works when a supplier firm has a clear understanding about the costs of a market offering and its value to the customer firm. This concept of trading value emanates from a belief in supplier firms sharing risks and returns with customer firms by investing resources in their businesses (Dyer & Singh, 1998), and by sharing responsibilities for any negative outcomes customers experience as a result of using the supplier's products and services (Prahalad & Ramaswamy, 2004). Therefore, supplier firms are increasingly entering into risk-sharing agreements with their customer firms to prove how they create real value for them (Davie et al., 2010).

Customer firms that have a positive attitude toward value trade believe in concentrating on their core activities, and assume a business risk by letting the supplier firms perform processes related to products and services the supplier firms provide in exchange for cost savings, enhanced revenues, or reduced risks (Kumar, 2004). Such customer firms believe in sharing risks and returns with their supplier firms by signing performance-based, gain-sharing contracts. Therefore, believing in the value trade concept represents a positive attitude toward sharing risks and returns, and is an important component of both a supplier and a customer firm's co-creation orientation.

2.3.2 Belief in Learning

Most managers in the Qual Study suggested that both supplier and customer firms need to come together and learn whatever they can from each other to develop an effective solution. Whereas supplier firms need to learn their customer firms' needs and business requirements, customer firms need a willingness to learn new ways of doing their activities related to their suppliers' products and services in order to accommodate them into their own environment. Therefore, I conceptualise belief in learning as these two firms' willingness to work on a solution with each other as a source of learning, knowledge, and competence.

Firms that believe in learning from external stakeholders recognise them as an important source of information (Slater & Narver, 1995; Webster, 1992) and are willing to learn from their experiences (Day, 1991). An attitude of shared learning on part of supplier and customer firms facilitates dialogue to effectively address problems at hand (Prahalad & Ramaswamy, 2004). Supplier firms' engaging in meaningful dialogues entails much more than listening to their customer firms: it reflects a willingness to work on a solution as equal partners.

Supplier firms that believe in learning from their customer firms recognise that the latter are an important source of information to help supplier firms learn about the markets the customer firms operate in, the end customers they serve, and the business processes they perform (Slater & Narver, 1995). Equally, customer firms who believe in learning from suppliers acknowledge the latter's ability to improve their business processes (Kumar, 2004). Therefore, a belief in learning represents a positive attitude toward working on a

solution as equal partners, and is an important component of supplier and customer firms' co-creation orientation.

2.3.3 Relationship-building Focus

Managers in the Qual Study highlighted the importance of long-term relationships to develop successful customer solutions. Therefore, I conceptualise relationship-building focus as either (a supplier or customer) firm's intent to engage in a sustained business relationship with the other.

Customer firms are increasingly demanding their suppliers to solve complete problems (Foote et al., 2001) by providing end-to-end solutions (Kumar, 2004). Providing solutions entails ongoing processes of identifying needs, adapting, integrating, deploying products and providing post-sales support (Tuli et al., 2007) that underscore the need for supplier firms' continuing collaborative relationships with their customer firms (Rust et al., 2010). Importantly, supplier firms should differentiate solution customers from transactional customers, and should select only those customers for their solutions business that have a long-term profitability potential. Therefore, B2B firms are increasingly emphasising the importance of developing long-term partnering relationships with their promising customer firms over transactional relationships (Bradford & Weitz, 2012; Jones, Brown, Zoltners, & Weitz, 2005; Weitz & Bradford, 1999). Therefore, relationship-building focus represents each firm's commitment to working together on a solution in order to achieve mutually beneficial outcomes, and is an important component of supplier and customer firms' co-creation orientation.

As mentioned in the beginning of Section 2.3, supplier and customer firms may differ from each other in their co-creation orientation because of differences in their control

beliefs and perceptions of control over resources required to develop solutions. Supplier firms may differ from each other in perceptions of their ability to exploit two resources under their control: (1) key account management (KAM) team ability, and (2) process articulation.

2.3.4 KAM Team Ability

KAM team ability refers to the supplier firm KAM team's knowledge about their customer firms' industry, operations, and needs, and to their ability to develop relationships with their customer firms. Successful solution providers possess highly skilled consultative sales teams (or KAMs) that consist of industry experts (Baumgartner, John, & Naclér, 2005) and cater to their customer firms' specific needs. Sales consultants who have in-depth knowledge about their customer firms' industry are able to extract more relevant information from their customers, which helps them to develop a better understanding of the current and future needs of their customer firms through transfer of specialized knowledge (Grant, 1996) from the customer firm to the supplier firm.

Members of KAM teams come from different organisational functions and, thus, provide pooled intelligence. Unlike ordinary salespersons, KAM teams often take a consultative approach to providing solutions (Arnett, Macy, & Wilcox, 2005) by facilitating dialogues and knowledge sharing with customers rather than "telling and selling" (McKenna, 1991; Webster, 1992). Therefore, KAM teams are better able to understand the relative importance of the needs of different stakeholders in customer firms, and are better able to develop and maintain relationships with influential stakeholders.

A supplier firm's belief in the skills and ability of their KAM team would boost its perceived control over working with a customer firm on a solution; therefore, this belief reflects an important characteristic of the supplier firm's co-creation orientation.

2.3.5 Process Articulation

Process articulation refers to the extent to which processes for providing a solution in a supplier firm are developed. These processes include the roles and responsibilities of units and functions, rules for specifying reporting structures, the sharing of customer information, and mechanisms for resolving conflict between units and functions involved in developing a solution (Tuli et al., 2007). Therefore, process articulation reflects the extent to which a supplier firm believes that it has articulated the required processes for its units and functions to interact with each other and with their customer firms to develop a solution. A supplier firm's belief in the effectiveness of its units and functions to interact with each other and with their customer firms would boost its perceived control over working with a customer firm on a solution; therefore, process articulation reflects an important characteristic of their co-creation orientation.

Customer firms may differ in their co-creation orientation because they have different perceptions about their ability to involve key stakeholders' and use their counselling ability.

2.3.6 Key Stakeholder Participation

Key stakeholder participation refers to key decision makers' (e.g., senior management in the customer firm) direct interaction with the KAM team members in a supplier firm. These key stakeholders have knowledge about strategic issues and the vision

to invest in customer solutions (Reinartz & Ulaga, 2008). They also have access to important and relevant information, and the authority to make important decisions.

Therefore, a supplier firm's interaction with key stakeholders in a customer firm make the decision making process relatively faster, and avoids unnecessary delays in providing solutions and their associated costs. Senior management's involvement and their willingness to pay for complete solutions also ensure higher revenues for the supplier firm. A customer firm whose key stakeholders participate in providing a solution enhance the firm's perceived control over working on said solution with a supplier firm; therefore, key stakeholder participation reflects an important characteristic of a customer firm's co-creation orientation.

2.3.7 Counselling Ability

Counselling ability refers to the extent to which a customer firm is able to guide a supplier firm on operational matters, such as technical systems, business processes, company policies, and the priorities and relative influence of different stakeholders in their firm. Counselling enhances a supplier's learning about the unique elements of a customer firm's operating environment (Tuli et al., 2007). It enables a supplier to anticipate the required changes in its existing products and to identify new products required by the customer firm. Counselling also helps the supplier firm to customise and integrate products to address the sensitivities of various stakeholders (Tuli et al., 2007). A customer firm's counselling ability would enhance its perceived control over working on a solution with a supplier firm; therefore, it reflects an important characteristic of the customer firm's co-creation orientation.

I conclude my discussion on the conceptualization of the co-creation orientation construct. In Section 2.4, I present my theoretical models and related hypotheses.

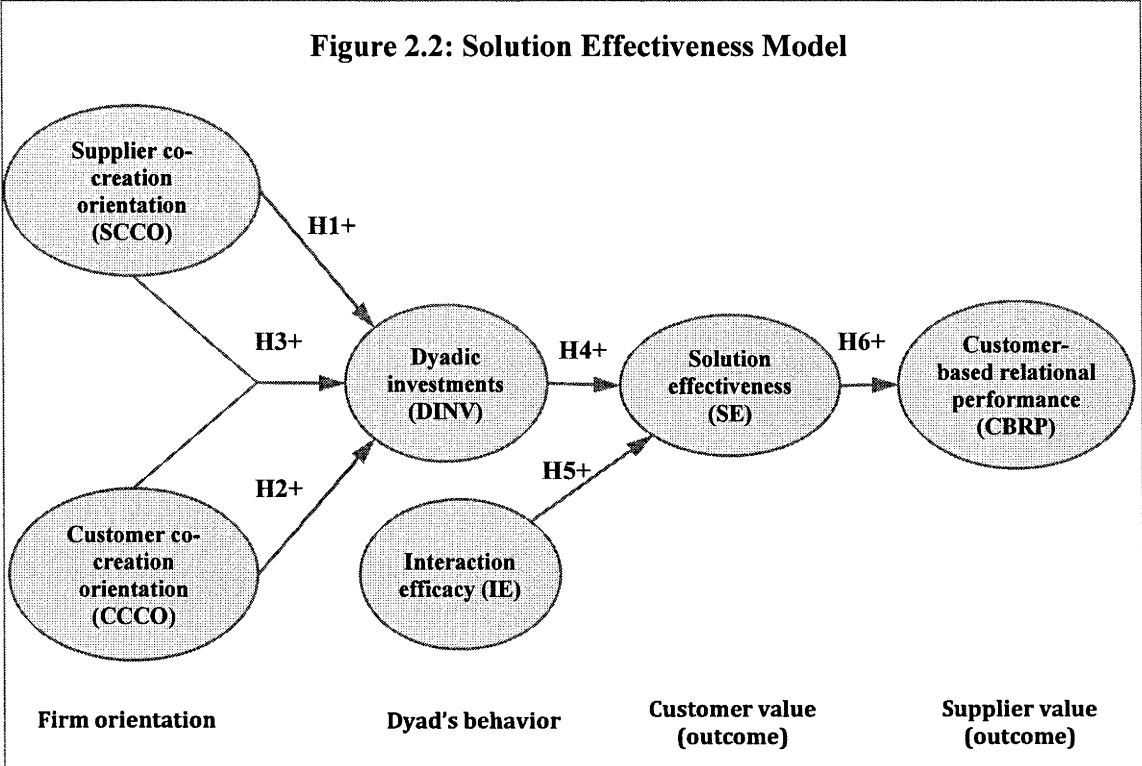
2.4 Theoretical Models and Hypotheses

In the process of providing solutions, value is created for the customer and supplier firms in different stages. I present three distinct theoretical models (and their related hypotheses) to show how value is created for both supplier and customer firms:

2.4.1 Solution Effectiveness Model

In my solution effectiveness model, I propose that the co-creation orientation of each firm in a supplier-customer dyad increases dyadic investments made into a customer solution. Dyadic investments combine with the dyad's ability to work effectively (interaction efficacy) to have a positive effect on a solution's effectiveness, which, in turn, increases customer-based relational performance (CBRP). Figure 2.2 presents my solution effectiveness model.

Because dyadic behaviour is specific to each supplier-customer dyad, it is logical to examine its impact on performance in terms of measures specific to each dyad member. Therefore, I examine value for the customer firm in terms of solution effectiveness, and value for the supplier firm in terms of customer-based relational performance (CBRP). In Sections 2.4.1.1 to 2.4.1.4, I present arguments for the specific hypotheses presented in this model.



2.4.1.1 Effect of Co-Creation Orientation on Dyadic Investments

As I define in Section 2.1, a “customer solution” is a customised, dynamic, and integrated bundle of products and services that a supplier firm develops and provides via an ongoing relational process to solve a customer firm’s needs. With a goal to achieve an effective solution for the customer firm, the supplier and customer firms work together on a customer solution by making investments that are specific to the solution being developed and provided—that is, they make dyadic investments.

Dyadic investments are non-fungible economic resources dedicated to a focal business relationship. Idiosyncratic investments made by both sides of the supplier-customer dyad represent credible, mutual commitments with economic stakes (Anderson & Weitz, 1992). Such investments create assets and knowledge that are idiosyncratic and specific to the focal relationship and have limited or no value outside of that relationship.

Supplier firms make idiosyncratic investments into a customer solution by investing in communication processes with a customer firm to identify its needs (Baumgartner et al., 2005), by customising and integrating products and services for them (Tuli et al., 2007), by providing pro-active after-sales service support to them (Challagalla, Venkatesh, & Kohli, 2009; Tuli et al., 2007), and by investing in research and development to offer new products and services to address their future needs. Similarly, customer firms make idiosyncratic investments into a solution by adapting their business processes and schedules to suit the supplier firm's products, services, and schedules (Tuli et al., 2007), and by investing into training their employees so that they can learn new business processes or products that their supplier firm is providing (Reinartz & Ulaga, 2008).

As I define in Section 2.3, a "co-creation orientation" reflects each firm's positive attitude and perceived behavioural control for working on a solution with the other firm in a dyad to achieve mutually beneficial outcomes. According to the theory of planned behaviour, attitude and perceived behavioural control are behaviour's main drivers. Therefore, supplier firms with a higher degree of co-creation orientation are likely to invest more into a customer solution as compared to supplier firms with a lower degree of co-creation orientation.

Research on channel relationships shows that retailers' investments are positively correlated with their perceptions of their suppliers' orientation toward doing business with them (Jap & Ganesan, 2000), and suppliers' commitment to their business relationship (Anderson & Weitz, 1992). Therefore, if a customer firm perceives that a supplier firm is committed to working with them to get mutually beneficial outcomes (i.e., it has a high degree of co-creation orientation), the customer firm is likely to invest more into solution

development with that supplier firm. Thus, a supplier firm's high degree of co-creation orientation will lead to higher investments into a customer solution by both firms in a supplier-customer dyad. Conversely, a supplier firm's low degree of co-creation orientation will lead to lower investments by both firms in a supplier-customer dyad. As such, I hypothesise that:

Hypothesis 1 (H1): A supplier firm's co-creation orientation has a positive effect on dyadic investments.

As I state above, customer firms may invest into a customer solution by adapting their business processes and schedules to accommodate a supplier firm's products, services, and deployment schedules (Tuli et al., 2007), and into training their staff to learn the business processes and products the supplier firm is providing (Reinartz & Ulaga, 2008). Customer firms with a higher degree of co-creation orientation are likely to adapt their business processes and invest more in staff training compared to firms with a lower degree of co-creation orientation.

Research on customer relationships shows that supplier firms invest more in those customer firms whom they perceive to have a long-term profitability potential (Homburg, Droll, & Totzek, 2008) and whom are adaptable and willing to educate them about their business processes and political landscape (Tuli et al., 2007). Therefore, if a supplier firm perceives that a customer firm is committed to working with them on the solution being provided to achieve mutually beneficial outcomes (i.e., it has a high degree of co-creation orientation), the supplier firm is likely to invest more into that customer firm. Therefore, a customer firm's high degree of co-creation orientation will lead to higher investments into a customer solution by both the firms in a supplier-customer dyad. Conversely, a customer

firm's low degree of co-creation orientation will lead to lower investments by both the firms in a supplier-customer dyad. As such, I hypothesise that:

Hypothesis 2 (H2): A customer firm's co-creation orientation has a positive effect on dyadic investments.

Research on social psychology suggests that entities with similar attitudes, beliefs, and values interact with each other more effectively (McPherson, Smith-Lovin, & Cook, 2001). This phenomenon is called value homophily—a characteristic that shapes the orientation of an entity in the dyad toward its future behaviour. Therefore, according to the concept of value homophily, dyads that consist of supplier and customer firms that *both* possess a high degree of co-creation orientation are expected to invest even more into a solution compared to those dyads in which only one firm has a high degree of co-creation orientation. This is because the similar attitudes and beliefs of the two firms in a dyad in which both firms possess a high degree of co-creation orientation reinforce and motivate each other to invest more into the solution being developed and provided with a goal to achieve mutually beneficial outcomes. This synergic effect results in a much higher level of dyadic investments into a solution. Equally, dyads that have a low degree of co-creation orientation (due to the supplier firm, customer firm, or both firms having a low degree of co-creation orientation) will find it difficult to engage with each other to invest in a customer solution. As such, I hypothesise that:

Hypothesis 3 (H3): The interaction of supplier co-creation orientation and customer co-creation orientation has a positive effect on dyadic investments.

2.4.1.2 Effect of Dyadic Investments on Solution Effectiveness

Solution effectiveness refers to the extent to which a solution meets a customer firm's needs related to its performance (Tuli et al., 2007). A solution's performance is reflected in the extent to which a supplier firm is able to customise and integrate its products and services to meet the needs of different stakeholders in a customer firm (Sawhney, 2006; Tuli et al., 2007), the extent of being successful in avoiding product and service breakdowns (Challagalla et al., 2009), and the extent to which risks have been assessed and mitigated (Ulaga & Reinartz, 2011).

Solution effectiveness depends on supplier and customer firms' behaviours (Tuli et al., 2007). As I mention in Section 2.4.1.1, to work together on a customer solution, both supplier and customer firms make investments that are specific to the solution being developed and provided. Importantly, in order to realise the mutual benefits of the relationship, dyadic investments incentivise both the partners to act in their mutual benefit (Wang, Kayande, & Jap, 2010). Supplier firms invest in customised and integrated products and services that have the ability to function together effectively, and that fit into customer firm's existing infrastructure (Tuli et al., 2007). With a focus on customer needs and not their own products (Kumar, 2004), customised and integrated products and services improve customer firms' operational performance, which results in enhanced solution effectiveness.

Customer firms view after-sales service as an important component of a solution (Tuli et al., 2007), and after-sales services are the basis for competitive differentiation (Morschett, 2006). To provide pro-active after-sales services, supplier firms invest in resources to closely monitor customer firm operations, and provide training to the customer

firm's employees (Anderson et al., 2007). This is in contrast to attempting to minimise damage caused by breakdowns after they have occurred. Supplier firms who invest in proactive after-sales services are better able to avoid operational breakdowns at the customer firm's end (Challagalla et al., 2009) to meet performance expectations of the solution being provided.

Relationship-specific investments prevent collaborating firms from indulging in opportunistic behaviour, and instead focus on "expanding the pie" and sharing it fairly (Jap, 2001). Supplier and customer firms work to reduce the risk of idiosyncratic investments in relationship-specific assets by integrating safeguarding mechanisms, such as signing contracts for exclusive business, having long-term contracts, or guaranteeing business volume per year (Dyer & Singh, 1998). Supplier firms minimise unfavourable outcomes by taking appropriate action, such as spreading the risks across its customer firms, or training the customer firms to use its products and services (Ulaga & Reinartz, 2011). Therefore, dyads are better able to take preventive actions that minimise the risks associated with performance-based offerings, which enhances the solution's effectiveness.

As I mention above, customer firms invest in modifying their routines and processes to accommodate a supplier's products and services (Tuli et al., 2007), and in training their employees to learn new business processes or product operations that a supplier firm is providing (Ulaga & Reinartz, 2011). When a customer firm is open to making adjustments to its processes and routines, the supplier firm and the customer firm are more likely to engage in dialogue to explore different products the supplier firm could develop (Bettencourt, Ostrom, Brown, & Roundtree, 2002; Jaworski & Kohli, 2006), and ways the

customer firm could modify its internal routines to use the supplier firm's existing products with relatively minor modifications (Tuli et al., 2007).

Therefore, a customer firm's investing in solution processes makes it easier for supplier firms to do a more effective job of offering the right products, deploying them in the customer firm's environment, and providing after-sales services to its customer firms. Further, a customer firm that invests in training its employees to educate them about a supplier firms' products and processes enhances its ability to implement the customer solutions the supplier firm is providing. As such, I hypothesise that:

Hypothesis 4 (H4): Dyadic investments have a positive effect on solution effectiveness.

2.4.1.3 Effect of Interaction Efficacy on Solution Effectiveness

Supplier-customer dyads that combine their resources to work together realise a competitive advantage over other dyads (Dyer & Singh, 1998). Interaction efficacy refers to the ease with which a supplier and customer firm are able to interact with each other to effect change to meet the desired outcomes. Effective interactions in a supplier-customer dyad result in knowledge accumulation and the establishment of information exchange processes that allow the partners to be responsive to changing conditions, such that supplier firms can continue to create new value for their customer firms (Palmatier, Houston, Dant, & Grewal, 2013). Effective interactions in a supplier-customer dyad also leverage the supplier firm's know-how to improve existing products and develop new products in an efficient manner (Ulaga & Eggert, 2006).

Therefore, interaction efficacy allows supplier-customer dyads to achieve competitive advantage over other dyads through efficient interactions between key

stakeholders in the customer firm and the supplier firm's KAM team when providing solutions. Key decision makers' involvement in interactions with KAM teams makes available important information required to make decisions in timely and cost-efficient ways (Palmatier, 2008; Ulaga & Eggert, 2006). As such, I hypothesise that:

Hypothesis 5 (H5): Interaction efficacy has a positive effect on solution effectiveness.

2.4.1.4 Effect of Solution Effectiveness on Customer-based Relational Performance

I conceptualise customer-based relational performance (CBRP) as a construct that reflects customer satisfaction, positive word-of-mouth, and customer commitment (also see Ramani & Kumar, 2008). Customer satisfaction refers to the degree to which a customer firm is satisfied with the performance of the products and after-sales service that a supplier firm provides, and to the manner in which the solution was built for them (Tuli et al., 2007). A supplier firm's ability to meet a customer firm's needs related to the solution performance (i.e., how well it customises and integrates products and services, avoids product and service breakdowns, and mitigates risks) will positively affect its satisfaction with the solution being provided.

Positive word-of-mouth (WOM) relates to a customer firm's referral of a supplier firm's products to other customer firms (Reichheld, 2006). Solution effectiveness increases WOM because customer firms satisfied with the quality of products and services provided by a supplier firm are more likely to refer new customer firms to the supplier firm and spread positive word-of-mouth about the supplier firm's products and services (Fornell, 1992; Zeithaml, Berry, & Parasuraman, 1996). Similarly, dissatisfied customer firms are more likely to spread negative word-of-mouth about the supplier firm (Richins, 1983).

Customer commitment represents a customer firm's desire and motivation to maintain a valued relationship with a supplier firm. Solution effectiveness increases customer commitment because customer firms satisfied with the performance of a current solution being provided by a supplier firm develop a greater sense of belonging to the supplier firm, and are likely to protect its wellbeing (Ramani & Kumar, 2008). Therefore, such customer firms are more likely to continue with the existing successful relationship, rather than actively looking for options in the marketplace. As such, I hypothesise that:

Hypothesis 6 (H6): Solution effectiveness has a positive effect on customer-based relational performance.

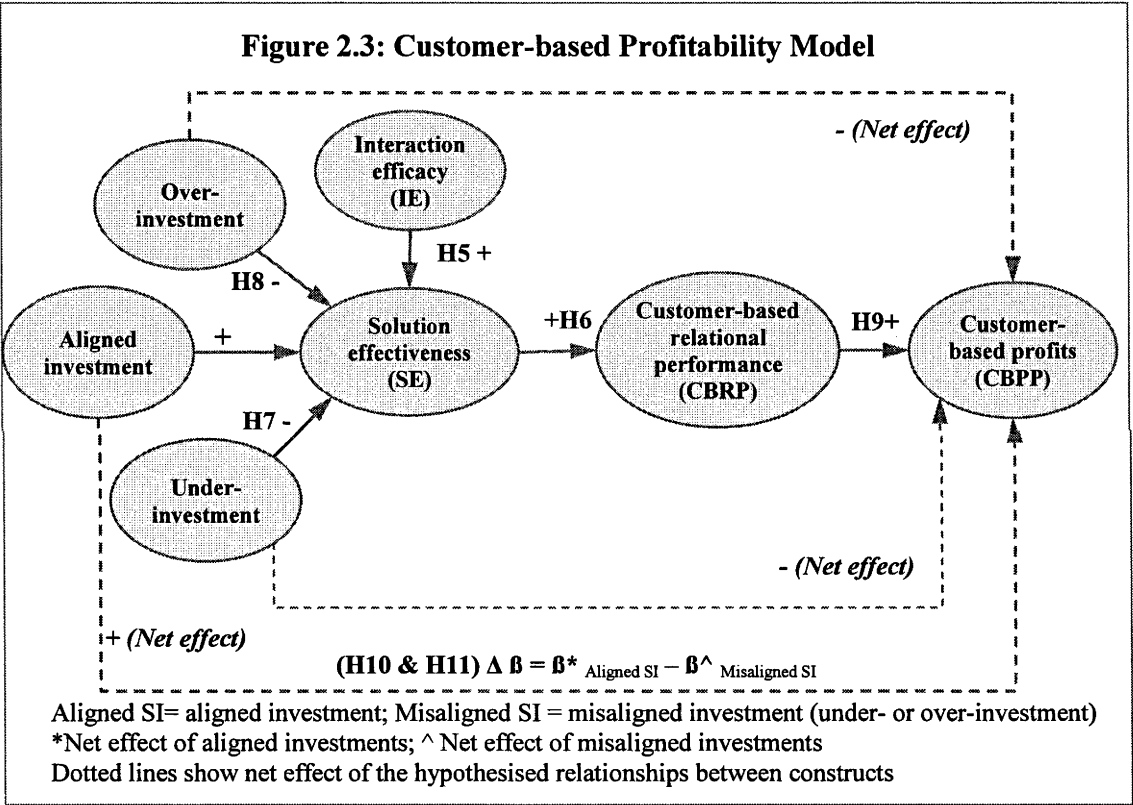
This concludes my discussion on the solution effectiveness model. In Section 2.4.2, I present my customer-based profit performance model and arguments for the hypothesised relationships in that model.

2.4.2 Customer-based Profit Performance Model

In the customer-based profit performance model, I investigate the drivers of customer-based profit performance (CBPP), which is central to the thesis's core objectives. Because I am primarily interested in the drivers of supplier firms' profitability here, I investigate the effect of investments that supplier firms (rather than the dyad) make in a solution, on CBPP. I argue that misaligned supplier investments (i.e., investments that are not aligned with a supplier and a customer firm's co-creation orientation) have a negative effect on solution effectiveness. Solution effectiveness has a positive effect on CBRP, which positively affects CBPP. Importantly, I hypothesise that the net negative effect of

misaligned investments on CBPP is significantly different from the net positive effect of aligned investments on CBPP.

Therefore, in order to maximise profits from a customer firm, supplier firms need to recognise their own and their customer firm’s co-creation orientation, and then align their investments with these orientations. I measure supplier value in terms of customer-based profit performance (CBPP). Figure 2.3 presents my customer-based profit performance model.



2.4.2.1 Effect of Under-Investments and Over-Investments on Solution Effectiveness

In Section 2.4.1.1, I suggest that a supplier firm’s co-creation orientation (SCCO) and a customer firm’s co-creation orientation (CCCO) (H1 and H2, respectively) have a

positive effect on dyadic investments into a solution. In Section 2.4.1.2, I suggest that dyadic investments positively affect solution effectiveness (H4).

Conceptually, aligned investments are investments that are in line with the co-creation orientation of each firm in a supplier-customer dyad. However, a supplier firm may underestimate a customer firm's co-creation orientation, and, therefore misalign, their investments with the two firms' co-creation orientation by under-investing in the solution. Equally, under-investments can result from the supplier firm wanting to lower costs of the solution to improve margins. Under-investing in customizing and integrating products may result in product and service offerings that have a lower effectiveness for the customer firm. Similarly, under-investing in after-sales services may result in frequent operational breakdowns. Further, supplier firm's under-investing may be perceived as a departure from expected behaviour, which, therefore, may signal an opportunistic behaviour on the supplier firm's part to the customer firm. Research shows that firms discount the performance evaluations of partners who unexpectedly behave opportunistically (Wang et al., 2010). Equally, under-investing in a solution implies that the relationship is under-safeguarded and under-coordinated (Mooi & Ghosh, 2010), which increases the customer firm's temptation to act opportunistically by refusing to adapt and evading performance, which negatively affects solution effectiveness. As such, I hypothesise that:

Hypothesis 7 (H7): Supplier firms' under-investing has a negative effect on solution effectiveness.

Conversely, a supplier firm's over-investments into a solution suggest that the supplier firm may have over-estimated the customer firm's co-creation orientation, or that it might be overly keen to impress the customer firm with its

investment in the solution. In such situations, contrary to the expectations of the supplier firm, the customer firm may not make the required investments to modify their routines and processes to accommodate the supplier firm's products and services, or may not train their employees to learn new business processes or product operations the supplier is providing. Customer firms may engage in this behaviour because, (1) they may perceive a supplier firm's over-investments as a signal of authority and their dependence on the supplier firm (Heide & John, 1988), or (2) they exploit the situation to behave opportunistically. Therefore, in such situations, it becomes difficult for suppliers to do a more effective job of offering the right products, deploying them in customer environment, and/or providing after-sales services to its customer firms. As such, I hypothesise that:

Hypothesis 8 (H8): Supplier firms' over-investing has a negative effect on solution effectiveness.

Consistent with the arguments presented in my solution effectiveness model, I expect that interaction efficacy has a positive effect on solution effectiveness (H5) and that solution effectiveness has a positive effect on customer-based relational performance (H6) in my customer-based profit performance model. In Section 2.4.2.2, I argue for the positive effect of customer-based relational performance (CBRP) on customer-based profit performance (CBPP).

2.4.2.2 Effect of Customer-based Relational Performance (CBRP) on Customer-based Profit Performance (CBPP)

Satisfied customers whose needs are rewarded are likely to protect the wellbeing of their supplier firm (Ramani & Kumar, 2008). Research shows that a customer firm's

satisfaction with a supplier's products and services is positively associated with an increase in the share of wallet (Keiningham, Perkins-Munn, & Evans, 2003) and results in increased business to the supplier firm from the customer firm (Anderson, Fornell, & Mazvancheryl 2004). Satisfied customers who are committed to a relationship with a supplier firm are also willing to pay more for the products and services that the supplier firm is providing (Franke, Keinz, & Steger, 2009). Measures of customer-based relational performance, such as WOM and satisfaction, are positively related to customer-based profitability (Ramani & Kumar, 2008).

Therefore, at lower levels of CBRP, customer firms are less likely to give more business to a supplier firm or to pay a higher price for the products and services it is providing. As a result, the supplier firm is less likely to recover its investments in the solution it is providing to the customer firm. As the level of CBRP increases, customer firms are more likely to give additional business to the supplier firm and reward them by paying a higher price for the products and services being provided. As a result, the supplier firm is more likely to recover their investments in the solution they are providing to the customer firm. As such, I hypothesise that:

Hypothesis 9 (H9): Customer-based relational performance has a positive effect on customer-based profit performance.

2.4.2.3 Difference between the Net Effects of Aligned vs. Misaligned Investments on Customer-based Profit Performance

In Section 2.4.2.1, I suggest that a supplier firm's investments that are misaligned with the co-creation orientation of the two firms in a dyad have a negative effect on solution effectiveness (H7 and H8). Because solution effectiveness positively affects customer-based profit performance through customer-based relational performance, I

expect solution effectiveness to be an important mechanism through which aligned investments positively, and misaligned investments negatively affect customer-based profit performance.

Higher aligned investments made by a supplier firm are, in part, due to the higher degree of a customer firm's co-creation orientation. Customer firms with high degree of co-creation orientation invest more into a solution and also pay a higher price for the products and services the supplier firm is providing to achieve mutually beneficial outcomes. Conversely, customer firms with a low degree of co-creation orientation invest less into a solution and pay a lower price for the products and services the supplier firm is providing to maximise their own profits. Therefore, I expect aligned investments to have a large net positive effect on customer-based profit performance.

It is reasonable to assume that the direct effects of a supplier firm's under-investing on customer-based profits would be positive for the former, albeit in the short-run. This is because supplier firms may seek to earn higher investment returns by behaving opportunistically. Conversely, gaining insights into a customer firm's needs and preferences is a lengthy process (Franke et al., 2009) and requires sales teams to commit more time and the supplier firm to expend more financial resources. Extant research shows diminishing returns on investment in service quality (Rust, Zahorik, & Keiningham, 1995). Therefore, any over-investments into a customised solution should have a negative direct effect on customer-based profits.

Because I expect under- and over-investments to have a negative effect on customer-based profits through the mechanism of solution effectiveness, and aligned investments to have a positive effect on customer-based profits through this same

mechanism, the difference between net effects of aligned investments versus under- and over-investments on customer-based profits should be significant. As such, I hypothesise that:

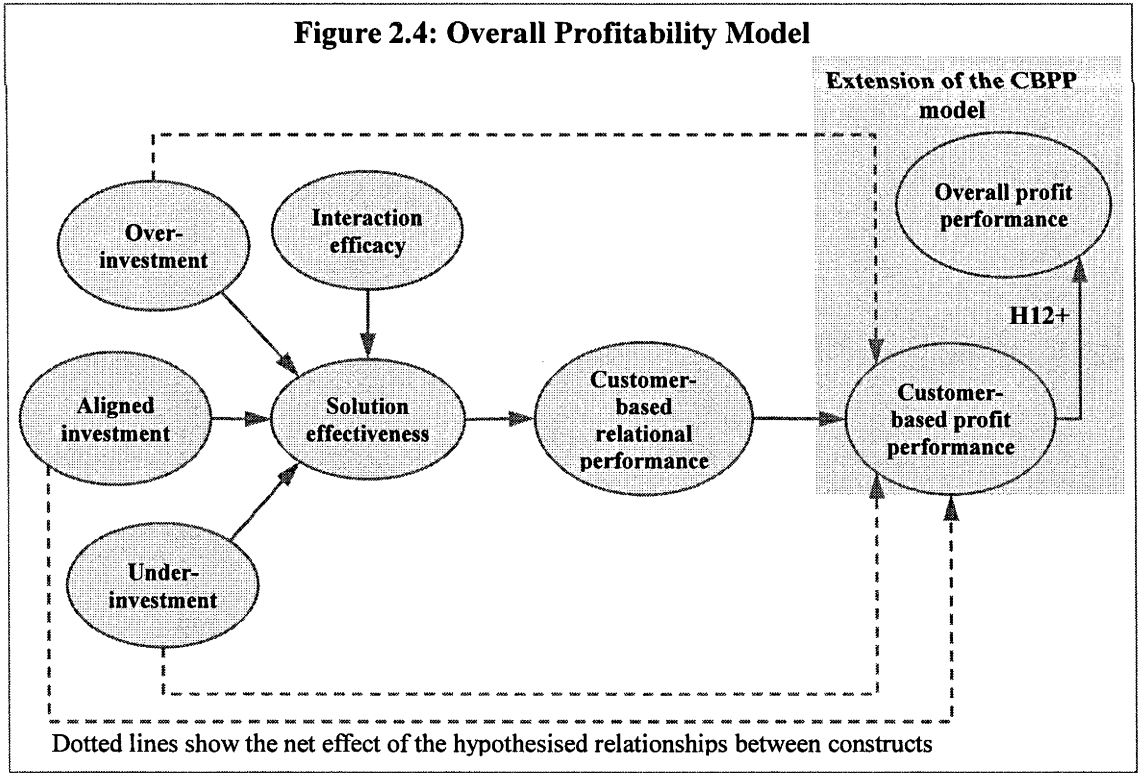
- Hypothesis 10 (H10):**

The difference between the net effects of aligned investments versus under-investments on customer-based profits is significant.
- Hypothesis 11 (H11):**

The difference between the net effects of aligned investments versus over-investments on customer-based profits is significant.

2.4.3 Overall Profitability Model

I extend my customer-based profit performance (CBPP) model to investigate CBPP’s positive effect on business unit profitability by retaining all the hypothesised relationships in my customer-based profit performance (CBPP) model (see Figure 2.4).



2.4.3.1 Effect of Customer-based Profit Performance on Business-unit Profitability

Previous research on firms' strategic orientation has shown that customer-level profits have a positive effect on firm-level performance. In their research on firms' "interaction orientation", Ramani and Kumar (2008) show that customer-based profitability has a positive relationship with measures of business-level profits. Therefore, in line with findings of existing research, I propose that customer-based profit performance is likely to result in the supplier firm's business unit dynamically maximising the profit function across most customer firms. As such, I hypothesise that:

Hypothesis 12 (H12): Customer-based profit performance has a positive effect on business unit profitability.

This concludes my discussion on my theoretical models and the arguments for my hypotheses for the relationships between constructs in my theoretical models. In this chapter, I present three distinct models (i.e., the solution effectiveness model, the customer-based profitability model, and the overall profitability model) to propose mechanisms for how supplier and customer firms in a dyad create value. In Chapter 3, I present my strategy for the research method I chose to test my theoretical models, and the field work I undertook to address the research questions.

3 Research Method

As per Bagozzi (2011), the objective of academic research on organizations is to formulate theories and test them against observations. Bagozzi states that a greater objective of research on organizations is to uncover truths about the effect of organizational philosophies and behaviour on organizational outcomes. To realise this objective:

researchers draw upon and create conceptual and theoretical ideas, derive hypotheses, design appropriate methods to test hypotheses, measure variables designed to link in some way to the concepts, theories, and hypotheses, and interpret findings in the light of the theories and hypotheses.

(Bagozzi, 2011, p. 262)

In this thesis, I identify the drivers of customer solutions that are effective for the customer firms and profitable for the supplier firms. I use a four-stage methodological approach to identify these drivers, further investigate their relative impact on solution effectiveness and profitability, and validate the theoretical models. As such, this study involves: (1) a qualitative stage to conceptualise and develop measurement scales for the focal constructs under investigation, (2) a pilot study to purify and refine constructs' measurement models by evaluating their validity and reliability, (3) a study to test the structural model (theoretical framework) in a generalisable manner, and (4) a study to verify and extend the structural model using a new data set. In Table 3.1, I present each research stage's purpose, the research method I used, and the raters' characteristics and sources. In Figure 3.1, I present the procedure that I followed to conceptualise, develop,

evaluate, refine, and validate the newly developed measurement scales across the different research stages.

Table 3.1: An Overview of Research Strategy & Information Sources				
Research Stage	1	2	3	4
Purpose	To conceptualise constructs for scales development	To purify and refine measurement scales	To test the theoretical framework in a generalisable manner	To validate and extend theoretical framework using a new data set
Method	In-depth interviews with expert raters (Qual Study), literature review	Survey of 29 key informants in supplier firms (RSN Study)	Survey of 194 key informants in supplier firms (Dyadic Study)	Survey of 102 matched key informants in supplier-customer dyads (Dyadic Study)
Nature	Qualitative	Quantitative & Qualitative	Quantitative	Quantitative
Raters	Expert raters* and Key informants^	Quantitative: Key informants Qualitative: Expert raters	Key informants in suppliers firms only	Key informants in supplier and customer firms
Sources	Multiple firms, multiple industries	Quantitative: Multiple firms Qualitative: Multiple firms and marketing academics	Multiple firms, multiple industries	Multiple firms, multiple key informants
* Expert raters: senior executives in firms offering customer solutions, and marketing academics ^ Key informants: key account managers, sales managers/directors, marketing managers/directors, managing directors, owner managers, and project managers				

3.1 Conceptualisation and Measure Development

The term “construct” represents an abstract or latent variable that cannot be directly observed or measured. Such a variable is something that scientists imagine or construct (Nunnally & Bernstein, 1994) with the help of subject-matter experts, practitioners, and existing literature (MacKenzie et al., 2011). Researchers operationalise these theoretical

constructs by developing valid measurement scales. In Section 3.1.1, I present the procedure I used to conceptualise and develop the measurement scales for this research.

3.1.1 Conceptualisation

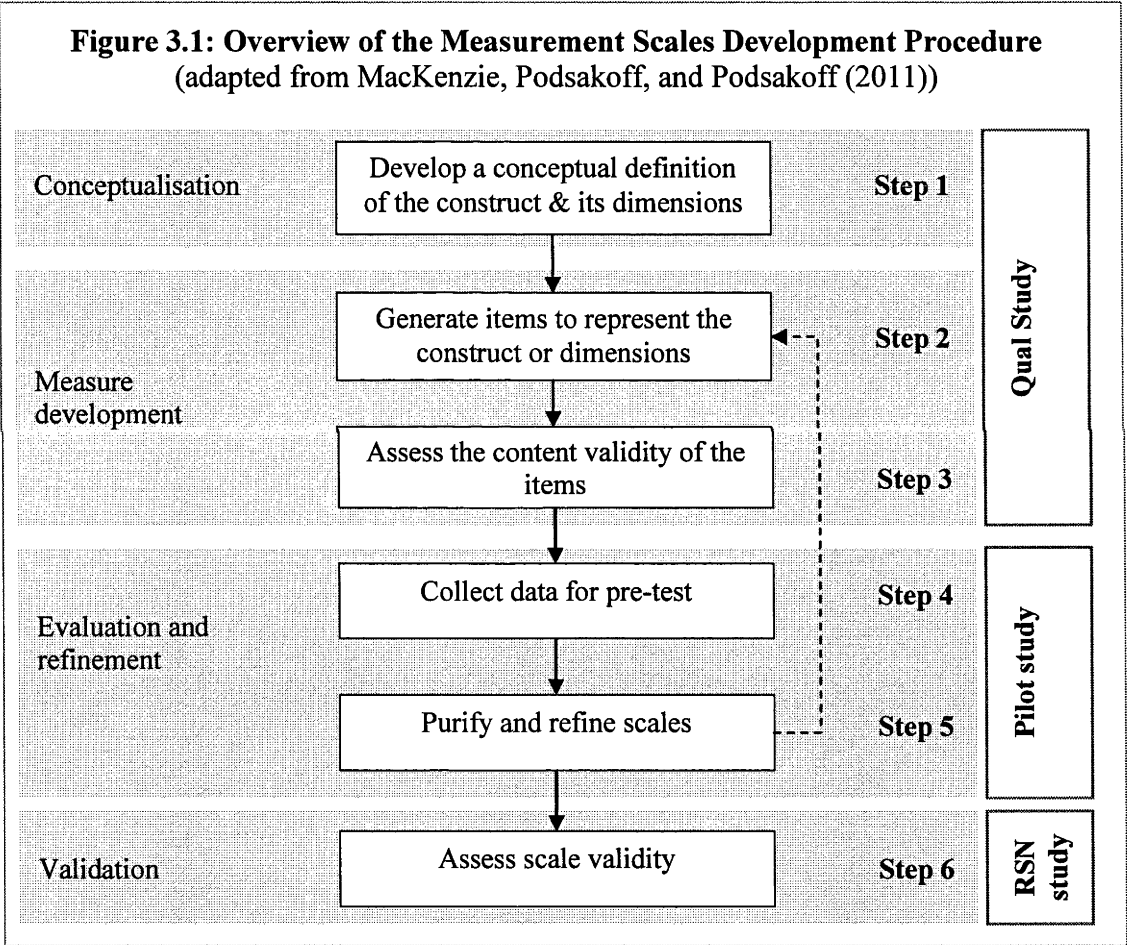
A valid measurement scale measures what is intended to be measured; that is, it captures the theoretical construct being measured (Churchill, 1979). Developing valid measurement scales requires clear thought about the construct being measured (DeVellis, 1991). Therefore, the first step in developing the measurement scales for a construct is to specify the construct's domain; that is, what the construct includes and doesn't include (Churchill, 1979).

At this stage, researchers need to specify the construct's nature and the entity to which it applies; that is, whether the construct relates to a thought, feeling, perception, action, or an outcome, and whether it relates to a person, organization, dyad, or a group (MacKenzie et al., 2011). Researchers have advocated reviewing the literature that closely relates to the focal construct (MacKenzie et al., 2011; Sartori, 1984) and conducting interviews with subject-matter experts and practitioners to identify the construct's key aspects or attributes (Rossiter, 2002).

During the conceptualisation process, researchers also need to evaluate whether the focal construct is uni-dimensional or multi-dimensional, and the expected relationship (i.e., formative versus reflective) between the dimensions and the construct. As MacKenzie et al. (2011, p. 301) state, for second-order constructs:

if the sub-dimensions are viewed as defining characteristics, the focal construct is a function of its sub-dimensions, and a change in only one of the sub-dimensions could be associated with a change in the focal construct,

then the sub-dimensions are best thought of as formative indicators of the second-order focal construct. In contrast, if the sub-dimensions are viewed as manifestations of a focal construct, the focal construct exists separately at a deeper and more embedded level than its sub-dimensions, and a change in the focal construct would be expected to produce a change in all of its sub-dimensions, then the sub-dimensions are best thought of as reflective of the second-order focal construct.



Finally, it is useful to state a short conceptual definition of the construct (Churchill, 1979; Rossiter, 2002) in relation to how it affects, or gets affected by, other constructs in the suggested theoretical framework. Conceptualising a construct in relation to its antecedents or consequences is important because a focal concept may be of little interest in itself for some researchers. Conceptualisation becomes more powerful when the focal construct is part of a nomological network in which it is embedded and is formally connected to other constructs (Bagozzi, 2011).

Because the co-creation orientation construct is new to the literature, I needed to develop its measurement scales by identifying its domain, nature, and the entity to which it applies (MacKenzie et al., 2011). I interviewed eight senior management and marketing executives to develop measurement scales for the construct. I qualified these senior executives as expert raters because of their extensive experience in offering customer solutions (Rossiter, 2002). I did not consult with senior marketing academics at this stage as expert raters. During this stage of scale development, the expert raters came from leading global firms operating in diversified B2B industries, such as information technology, industrial manufacturing, and medical equipment, and were based in the US, Australia, and India. I interviewed them via telephone and in person. During in-depth interviews with these expert raters, I asked them the following questions to conceptualise the co-creation orientation construct:

1. How do “outstanding” firms differ from “mediocre” firms in their orientation or mindset toward approaching the solution business? What are the major differences in their mindsets and characteristics?

2. In your experience, how do customer firms differ from each other in the manner in which they approach dealing with you as a solution provider?
3. Do you invest more into customer firms who are willing to collaborate with you on solution development?
4. Why are you successful in providing effective solutions to some customer firms but not others?

I identified common themes emerging from interviews with expert raters to identify the key components of the co-creation orientation construct, its domain, nature, and the entity to which it applies. I also found theoretical support for the themes emerging from interviews with expert raters in existing literature on strategy, customer solutions, and social psychology. As such, I conceptualise co-creation orientation as a second-order reflective construct that reflects a firm's attitude and perceived control to work on a solution with its customer firms (or supplier firms) to achieve mutually beneficial outcomes. This conceptualisation considers the *nature* of the construct (attitude and perceived control) and the *entity* to which it applies (firm or business-unit). Moreover, its meaning is enriched because it specifies both its *effect on other constructs* in the theoretical framework and its *dimensionality*. Therefore, my co-creation orientation construct conceptualisation follows existing guidelines for developing constructs in social and business research (Bagozzi, 2011; Churchill, 1979; DeVellis, 1991; MacKenzie et al., 2011; Rossiter, 2002).

3.1.2 Measurement Development

The next step in the measurement scale development procedure is to generate items for the construct's identified dimensions, followed by establishing their content validity. The goal of the item generation process is to produce a set of items that fully captures all of the essential aspects of the focal construct's domain. Researchers should consider several points at this stage of the scale development process. Wording should be kept as simple and precise as possible. Double-barrelled items should be split into two single-idea statements; else the item should be eliminated. Items that contain ambiguous or unfamiliar terms should be clarified, and items should be simplified and made more specific and concise. Finally, efforts should also be made to refine or remove items that contain obvious social desirability (MacKenzie et al., 2011).

I carefully developed an initial pool of measurement scale items for each dimension of the co-creation orientation construct. Instead of creating many items for each measurement scale, I restricted the number of items in order to have three to four items in my final measurement scale for each dimension to help me during later stages of scale development, where at least three items are required to test measurement scales' reliability and validity. At the same time, this approach would result in a shorter questionnaire to minimise respondent fatigue and non-response.

Content validity concerns the degree to which items reflect the content universe to which the measurement scale will be generalised. Two judgments are required when assessing content validity of a measurement scale: first, an individual item should represent an aspect of the construct's content domain; second, the items as a set should collectively represent the construct's entire content domain.

In his C-OAR-SE procedure of scale development, Rossiter (2002) recommends assessing content validity with expert raters. Therefore, at this stage of scale development, I consulted with four key informants in B2B firms and another four senior marketing faculty as expert raters. I developed an expert rater questionnaire (see Appendix A for this) and sought the expert raters' view on whether the questionnaire measured what it purported to measure. I provided the expert raters with each construct's definition and the items generated to represent it. I asked them to rate each item in a measurement scale from 1 to 5 (1 = most unsuitable; 5 = most suitable) based on each item's suitability in measuring the construct. At this stage, I highlighted the items that had an average score of below 3.5 for revision or deletion. I refined these scales through several iterations with the expert raters to add, delete, and change items' wording to measure each scale because these steps are necessary to ensure the content validity of newly developed scales (Rossiter, 2002). Therefore, most changes to the measurement scale items were done at this early stage to design items that were content-valid and reliable (Rossiter, 2002).

3.2 Pilot Study for Evaluating and Refining the Measurement Scale

I collected data for this pilot study to purify and refine the measurement models of the newly conceptualised constructs by evaluating their validity and internal consistency reliability (coefficient alpha).

3.2.1 Evaluating Construct Validity and Reliability

Convergent validity is evaluated by calculating the average variance in the indicators that is accounted for by the focal construct. One can calculate the focal construct's average variance extracted (AVE) by averaging the squared completely

standardised factor loadings (λ^2) for the indicators, or by averaging the squared multiple correlations for the indicators. An AVE greater than .50 is desirable because it suggests that the latent construct accounts for majority of the variance in its indicators. I used the coefficient alpha to estimate the measures' internal consistency reliability. It is widely known that the alpha increases as the number of measures increases. The accepted standard for this index is .70 or above for newly developed measures.

3.2.2 Evaluating Individual Indicator Validity and Reliability

One can assess the degree of an indicator's validity by examining the unique proportion of variance in the indicator accounted for by the latent construct. The indicator's validity is the square of the indicator's completely standardised loading (λ^2). A value greater than .50 would suggest an adequate level of validity. One can assess the reliability of an indicator by examining the indicator's squared multiple correlation. Typically, a value greater than .50 is desired because such a value suggests that the majority of the variance in the indicator is due to the latent construct.

3.2.3 Reliability and Validity Estimates

I conducted a pilot study with key informants in supplier firms who provided customer solutions in a global firm in information technology industry (see Table 3.1). In a one-sided design survey (Kenny, Kashy, & Cook, 2006), I collected data from 29 key informants in supplier firms. Reliability and validity checks showed that the majority of the newly developed scales were reliable with valid measurement items. I also identified potential items that needed to be revised.

Appendix B1 provide the means, standard deviations, and reliability and validity statistics for the measurement scales based on 29 observations from supplier firms. All the scales are reliable for theory development as the coefficient- α values of above 0.70 show. For each construct, I also provide the item-to-total correlations, squared multiple correlations, and average variance extracted (AVE) values. The majority of scale items show high validity (squared multiple correlation of >0.5) and convergent validity (AVE of >0.5). I identified the items that violated these recommended values as potentially requiring revision. I followed the advice of Rossiter (2002) who recommends that content-valid indicators of constructs should not be deleted if the removal of the item results in a change in the construct's domain. Therefore, I consulted with the expert raters to improve the wording of the items that showed low convergent validity. One item related to the scale of dyadic investments (DINV1) exhibited low validity. I consulted with the experts and revised its wording so that the meaning became clearer to the key informants and that the item wording was consistent with the rest of the items in the same scale.

I also deleted one item each from the SCCO and CCCO scales. These items related to the sub-dimension belief in learning (BL and CBL). Specifically, I deleted the following item from the sub-dimension of SCCO: "Our customers are an important source of information to us". I deleted the following item because it perfectly correlated with another item to measure the same construct: "Our customers are an important source of knowledge to us". When I consulted with the expert raters, they advised me to retain the latter of the two. I also deleted the item with similar content from the CCCO scale for the same reason.

I had only 29 observations that provided me with less than the required degrees of freedom to test the measurement model of my second-order co-creation orientation

construct with full information; that is, with individual items included in the measurement model. Therefore, I used mean values of item scores to create composite variables, and treated these composite variables as reflective indicators of each second-order construct rather than its dimensions (see Appendix B2). Scales are reliable as shown by coefficient- α values of above 0.70. The majority of the scale items show high validity (squared multiple correlation of >0.5) and convergent validity (AVE of >0.5).

I assessed my constructs' discriminant validity by testing whether any of the constructs in my measurement scales are perfectly correlated (Anderson & Gerbing, 1988), and found that the maximum shared variance between any two constructs was 0.72. This result indicates discriminant validity of constructs. I also assessed my constructs' discriminant validity by following a more stringent method that Fornell and Larcker (1981) recommend. Specifically, I compared the average variance extracted (AVE) of each reflectively measured construct with the maximum variance it shared with the other constructs. Results show that for all but one construct (interaction efficacy), AVE was greater than the shared variance with the other constructs (See Appendix B3). This result further establishes discriminant validity of constructs other than interaction efficacy (IE).

The AVE for interaction efficacy was 0.67, and its shared variance with customer co-creation orientation (CCCO) was 0.72. However, because I had a relatively smaller sample size ($n=29$) to test the psychometric properties of my measurement scales, high shared variance between CCCO and IE could be a problem specific to my sub-population (see MacCallum, Widaman, Zhang, & Hong, 1999; MacKenzie et al., 2011). Further, as mentioned above, interaction efficacy met the discriminant validity criteria suggested by Anderson and Gerbing (1988), and had content valid items (Rossiter, 2002). Therefore, I

did not consider its relatively high shared variance with CCCO to be a major issue at this stage.

In summary, in this pilot study, I purified and refined measurement models of each construct by evaluating their validity and internal consistency reliability. The majority of scale items show high validity (squared multiple correlation of >0.5) and convergent validity (AVE of >0.5). I identified the items that violated these recommended values as potentially requiring revision and did so accordingly with the help of experts for the main studies.

3.3 RSN Study

3.3.1 Study Objective

In this study, I tested my theoretical framework in a generalisable manner. Specifically, I tested the validity and reliability of measurement models for the new constructs, and structural relationships for my solution effectiveness model (hypotheses H1 to H6). I followed the cross-sectional survey research method, which is well established and is often employed in similar contexts; for example, see studies on market orientation (Jaworski & Kohli, 1993) and interaction orientation (Ramani & Kumar, 2008).

3.3.2 Research Design

Consistent with existing empirical research on B2B marketing, I sought reports on organisational data from key informants (Kumar, Stern, & Anderson, 1993; Van Bruggen, Lilien, & Kacker, 2002). In addition to being commonly employed, surveys are capable of providing insights into business activity (Rindfleisch & Antia, 2012). To test my theoretical

framework in a way that closely related to the real world of B2B customer solutions, I designed my survey to incorporate a challenging set of criteria. Specifically, I sought:

1. An environment where B2B firms provide customer solutions in *different contexts* to capture real-world phenomena.
2. A sample of key informants in supplier firms with *adequate knowledge* of and information on their own and their customer firms' businesses.
3. A scenario where the key informant was working on a customer solution with a *key customer*.
4. A scenario where the dyad's relationship was *ongoing* for a reasonable period.
5. A scenario that exploited *variation* in observations of outcome variables across different dyadic relationships.

In Section 3.3.3 I discuss how I conducted my survey research to satisfy the above criteria, and the strategies that I used to mitigate potential risks during each research phase. Table 3.2 summarises these issues.

3.3.3 Sample Characteristics, Survey Instrument Design, and Data Collection

3.3.3.1 Sample characteristics

My research required reporting on organisational data relating to supplier and customer firms working on customer solutions in different contexts. This setting necessitated engaging with key informants to collect relevant organisational data (Kumar et al., 1993; Van Bruggen et al., 2002). Panel members of ResearchNow (RSN), a global leading research agency, satisfied these criteria. Therefore, I contracted RSN to collect data for this study by contacting an appropriate sample of their panel members who met the requirement of being a key informant.

Table 3.2: Survey Research Framework (adapted from Rindfleisch & Antia, 2012)				
Survey phase	Key issues	Potential risks/biases	Mitigation strategy	
			Design stage	Analysis stage
Research design	Who will be asked and how we will get them to respond?	Non-response bias	Monetary incentive, confidentiality clause	Comparison of early versus late respondents
Survey instrument design	What questions will be asked and how we will ask them?	Common method bias	Marker variable inclusion, mixed-scale formats, pagination across constructs, labelling only anchoring positions, reverse-ordering items within constructs, instructions for key informants	Harmon's one-factor test, marker variable analysis
Data analysis	What interpretations will we conclude from their answers?	Causal inference	Well-developed conceptualisation	Use of simultaneous equation systems

I identified the organizational roles suitable for key informants in this research when interviewing the expert raters (stage 1 of research). Key informants working in these roles have adequate knowledge of and information on their own business and their customers’ business. I identified and targeted key informants by filtering potential informants at the beginning of the survey using the following criteria:

1. I filtered out potential informants who were working in a firm/business unit that supplied stand-alone products or stand-alone services. Informants who worked for a

firm that provided customer solutions responded to the survey. To assist informants, the survey included working definitions of each offer type.

2. I ensured all the informants in this survey worked in one of the following roles at the time of the survey: key account manager, marketing manager/director, sales manager/director, managing director, business-unit/divisional director, customer account manager, and project manager. During the in-depth interviews, expert raters recommended that key informants working in these roles have adequate knowledge of and information on their own solution business and their customers' business.
3. I filtered out informants who managed only smaller accounts. At the beginning of the survey, I included a question that asked the potential informants the type of accounts they managed. Options included: (a) key accounts only, (b) key accounts and small accounts, and (c) small accounts only. I filtered out those potential informants who chose option (c). To respond to the survey questions, I asked all the qualifying key informants to think about an "existing *key* customer" whom they had been managing for the past two years.

In the interest of the research findings' generalisability, I included companies from several industries in the sample, such as industrial manufacturing, medical equipment, managing consultants, engineering equipment, information technology, and financial services. I assured informants about the confidentiality of their own and their firms' identities, and offered them incentives in terms of reward points for responding to this survey. Panel members of RSN accrue points upon responding to surveys. Accrued points can be redeemed with rewards. These two procedures also helped to improve the response rate (see Section 3.3.3.3) and minimise non-response bias (discussed in Section 4.1.1).

3.3.3.2 Survey Instrument Design

Collecting information from multiple informants across organisations is difficult and expensive. Therefore, I followed a one-sided dyadic research design (Kenny et al., 2006) by collecting information on organisational data for the supplier and the customer firms from key informants in only supplier firms. Because informants who do not have adequate information or knowledge on a phenomenon being surveyed also have a low ability and motivation to respond to surveys (MacKenzie & Podsakoff, 2012), collecting data from relevant key informants ensured the information was high quality and minimised non-response bias.

However, this data-collection strategy may introduce common method bias in observations because all the survey responses are collected from a single source (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In situations like this, researchers recommend including a marker variable to estimate common method variance (Lindell & Whitney, 2001). A marker variable is theoretically unrelated to the constructs of interest in the study. I included the “competitive intensity” construct in my survey instrument and used it as a marker variable to estimate common method variance during the analysis stage (Lindell & Whitney, 2001).

MacKenzie and Podsakoff (2012) argue that common method bias is more likely to threaten the validity of research results when factors are present that: (1) undermine an informant’s capabilities, (2) make accurately responding more difficult, (3) decrease an informant’s motivation to respond accurately, and (4) make it easier for informants to satisfice (rather than optimise) their responses.

So that key informants' capabilities to respond to this survey were not undermined, I carefully identified and targeted key informants to make sure that they had adequate knowledge of and information on their own business and their customers' business. I attempted to make the task of responding less difficult at the time of survey administration by involving expert raters and key informants in developing the measurement scales (i.e., the questionnaire items). With key informants' help with generating items, I made attempts to avoid complex or abstract questions, reduce item ambiguity, and avoid double-barrelled questions in my questionnaire (Doty & Glick, 1998; Krosnick, 1991; Podsakoff et al., 2003).

Further, I attempted to make the task of responding less difficult by asking the informants to think about a current business relationship when answering the questionnaire. Therefore, informants did not have to rely on retrospective recall, which makes responding more difficult (Krosnick, 1991).

I attempted to increase the informants' motivation to respond accurately by having (1) different anchor labels for my outcome variables (MacKenzie & Podsakoff, 2012), (2) labelling only anchoring positions (Weijters, Cabooter, & Schillewaert, 2010), (3) spatially separating the items for different constructs, and (4) non-availability of answers to previous questions (Viswanathan & Kayande, 2012). I also gave detailed instructions to informants at the beginning of the survey, and gave specific instruction at the beginning of each section to clarify how to answer questions.

3.3.3.3 Data Collection

From ResearchNow's mailing list, I contacted 714 potential key informants by email with a request to participate in an online survey. Of these, 338 informants replied to

the survey, which represents a response rate of 59.17%. Informants who fulfilled the three criteria (see Section 3.3.3.1) went on to complete the survey. The average time taken to complete the online questionnaire was 12 minutes and 53 seconds. I automatically deleted any survey that took less than 1/3rd of the average time to complete (approximately less than 4 minutes and 20 seconds) because I expected its data to be low quality.

I received 200 complete surveys, which represents an effective response rate of 28%. I deleted six survey responses because they chose 3 (on a scale of 1 to 5) as the answer to all the questions included in the survey instrument. As such, I was left with 194 complete responses.

3.4 Dyadic Study

3.4.1 Study Objective

In this study, I validated the overall theoretical framework with a new dataset from another population (MacKenzie et al., 2011). Further, I gained support for my findings' validity by collecting data from matched dyads of key informants in supplier and customer firms. This strategy ruled out a major source of common method variance at the design stage by collecting data on predictor variables and outcome variables from different sources. I then tested my customer-based profit performance, and overall profitability models on dyadic data.

3.4.2 Sample Characteristics, Survey Instrument Design, and Data Collection

3.4.2.1 *Sample Characteristics*

I obtained this data from four large global firms, all of which were members of an industry association of technology-enabled business process management solution

providers. Therefore, the sample was drawn from a population to which I expected the focal constructs in this research applied. The four firms had clients located across the world. Importantly, I sought reports on organisational data from matched dyads of key informants in supplier *and* customer firms. Similar to the RSN Study, key informants in supplier firms were key account managers, project managers, marketing managers/directors, and sales managers/directors. A key contact person in the industry association solicited support for the study from senior executives working in each of the four firms at the time of the study. These senior executives identified key informants in their firm to participate in the study. I asked the key informant in the supplier firm to identify an individual in their customer firm who had the most knowledge about the solution being provided to them.

The senior executives in each firm sent each of the key informants in the supplier firm two sets of survey questionnaire. I designed the first questionnaire for the key informants in the supplier firms, and included questions related to these individuals (see Table 3.3 below). I designed the second questionnaire for the key informants in the customer firms, and included questions related to these individuals. Each informant returned the survey questionnaire directly to the main contact person in the industry association, who collated and forwarded the data to me.

The four firms from which I obtained data have multiple business-units that provide solutions to different customers. Further, I required questionnaires to be sent to key informants working on independent “solution” projects with their customers across different business units in these firms. Therefore, I do not expect customer or key account manager replication across different solutions. Importantly, because different business units operate independently in these firms, and questionnaires were required to be sent to key

informants who managed independent customer solutions, I expect enough variation on predictor (e.g., supplier co-creation orientation) and outcome (e.g., solution effectiveness) variables across different supplier-customer dyads. As such, my unit of analysis is a supplier-customer dyad working on each of these customer solutions.

Table 3.3: Sources of Information in the Dyadic Study		
Construct nature	Supplier key informant	Customer key informant
Attitudes & beliefs	Supplier co-creation orientation Customer co-creation orientation	Customer co-creation orientation
Behaviour	Interaction efficacy Dyadic investments Supplier investment	Interaction efficacy Dyadic investments
Outcomes	Solution effectiveness Customer-based profits Overall business-unit profits	Solution effectiveness Customer-based relational performance
For interaction efficacy, dyadic investments, and solution effectiveness, I collected data from the supplier and the customer firms, and used their average score for further analysis.		

3.4.2.2 Survey Instrument Design

In this dyadic study, I followed a two-sided dyadic research design (Kenny et al., 2006) by collecting organisational data for the supplier and the customer firms from key informants in supplier and customer firms. Table 3.3 provides details of information I collected from each key informant. Collecting data from two different sources ruled out a major source of common method variance at the research design stage. Further, identifying key informants in the supplier and the customer firms also helped to improve the response rate and minimise non-response bias.

All the measurement items in the supplier questionnaire in this study remained the same as the corresponding measurement items in the RSN Study. I adapted measurement items in the customer survey from the corresponding items in the RSN Study to appropriately address the key informants in the customer firms.

For interaction efficacy (IE), dyadic investments (DINV), and solution effectiveness (SE), I collected data from both supplier and customer firms, and used their average score for further analysis.

3.4.2.3 Data Collection

I sent supplier and customer questionnaires to 84 dyads that comprised key informants in the supplier firms and their customer firms. The number of potential informants in the four supplier firms ranged from 20 to 24. My key contact persons in the four firms, who were senior executives, sent a supplier questionnaire to each key informant in the supplier firm with a request to respond to the questionnaire, and to forward the customer questionnaire to their key contact person in the customer firm with a request to respond to the questionnaire. Note that I required the senior executives from each of the four firms to send the questionnaire to key informants in their firms who were working on independent “solution” projects with customers. Importantly, I asked them to specifically sample from customer relationships that were both challenging and excellent, with an equal number from each of relationship type. I asked them to sample these relationships to obtain sufficient variation in performance. To avoid any bias that may result from supplier firms being able to observe customer firm responses, I requested that key informants return their filled-in questionnaires in sealed envelopes directly to the key contact person in the industry association. I matched data across dyads with matching codes.

I received 69 completed questionnaires from the supplier firms. The number of completed supplier surveys among each of the four supplier firms was 17, 17, 19 and 16. I received 51 completed questionnaires from the customer firms. Therefore, I collected 51 sets of completed matched-dyad questionnaires from the supplier and the customer firms. The number of matched-dyads for each of the four supplier firms is 16, 12, 11 and 12. As such, the effective response rate was 60.71% (i.e., 51 dyads out of a possible 84).

This concludes my discussion on the research strategy I used to investigate my research questions. I used a rigorous four-step approach to identify the drivers of effective and profitable customer solutions, and further investigate their relative impact on solution effectiveness and profitability. In Chapter 4, I present the data analysis approach and research results for my two quantitative studies.

4 Data Analysis and Results

4.1 Data Analysis and Results of the RSN Study

4.1.1 Sample Characteristics

The respondents in this study were senior- and middle-level management, marketing, and sales executives. Table 4.1 presents the break-up of study participants according to their roles in the organisation they worked for at the time of the survey. In the interest of the research findings' generalisability, the sample included firms from several industries including industrial manufacturing, medical equipment, managing consultants, engineering equipment, and many others. Table 4.2 shows the different industries in my survey.

Table 4.1 RSN Study—Designations of Key Informants		
Designation	Count	Percentage
Key account manager	85	43.8%
Divisional/business-unit manager	33	17.0%
Sales manager/director	29	14.9%
Project manager	24	12.4%
Managing director	10	5.2%
Customer account manager	9	4.6%
Marketing manager/director	4	2.1%
Total	194	100%

The annual sales of the business units ranged from US\$10,000 to US\$90 billion. The average sales value was US\$656.5 million. I compared the mean values of early versus late respondents based on their demographics (size and age) and on the supplier co-creation orientation construct (Armstrong & Overton, 1977); I found these differences to be non-significant. Therefore, non-response bias does not pose a threat to the study's results.

Table 4.2 RSN Study—Industry Representation		
Industry	Count	Percentage
Financial products and services	27	13.9%
Industrial manufacturing	40	20.6%
Information & communication technology	35	18.0%
Management consulting and related	32	16.5%
Medical and healthcare services	17	8.8%
Telecommunications technology and services	19	9.8%
Transportation and logistics	7	3.6%
Government and public services	6	3.1%
Others	11	5.7%
Total	194	100%

4.1.2 Measurement Models

I evaluated measurement properties of the new second-order constructs supplier co-creation orientation (SCCO) and customer co-creation orientation (CCCO) by running confirmatory factor analyses (CFA). I used raw data as the input to this maximum likelihood-based estimation procedure. Subsequently, I also examined SCCO's and CCCO's second-order factor structure by conducting a one-factor CFA on the average scores of SCCO's and CCCO's five first-order dimensions. I performed this analysis to obtain average variance extracted (AVE) scores for SCCO and CCCO to establish the discriminant validity of the constructs used in my structural model that also included dyadic investments (DINV), interaction efficacy (IE), solution effectiveness (SE), and customer-based relational performance (CBRP). I followed guidelines given by Gerbing and Anderson (1988) to do this analysis, and this approach is consistent with analyses dealing with organizational- and customer-level latent constructs (e.g. Jayachandran, Sharma, Kaufman, & Raman, 2005; Ramani & Kumar, 2008).

4.1.2.1 The SCCO Construct

SCCO is a second-order construct, and its five dimensions (i.e., value trade concept (VTC), relationship-building focus (RBF), belief in learning (BL), KAM team ability (KAM), and process articulation (PROC)) are its first-order factors measured through their respective indicators. I conducted a CFA of this hierarchical model (see Figure 4.1).

I deemed the second-order CFA model fit to be acceptable based on a battery of fit indexes ($\chi^2 = 163.52$, d.f. = 112; comparative fit index [CFI] = .98; goodness-of-fit index [GFI] = .91; Tucker–Lewis index [TLI] = .97; incremental fit index [IFI] = .98; standardised root mean square residual [SRMR] = .05; root mean square error of approximation [RMSEA] = .05).

The set of fit indexes reported is consistent with Hu and Bentler (1999) recommendations. The path coefficients between the indicators and their respective first-order factors were significant at an $\alpha = .05$ level. In addition, all the path coefficients between the second-order construct (SCCO) and its five dimensions (VTC, RBF, BL, KAM, and PROC) were significant at an $\alpha = .05$ level (see Table 4.3A).

I also examined the second-order factor structure by conducting a one-factor CFA on the average scores of the respective five first-order constructs. The model fit was good ($\chi^2 = 13.99$, d.f. = 5; CFI = .98; GFI = .97; TLI = .95; IFI = .98; and SRMR = .04). All the path coefficients were significant at an $\alpha = .05$ level (see Table 4.3B). I averaged the scores of the five dimensions of SCCO for further analyses.

Figure 4.1 Hierarchical Model for SCCO

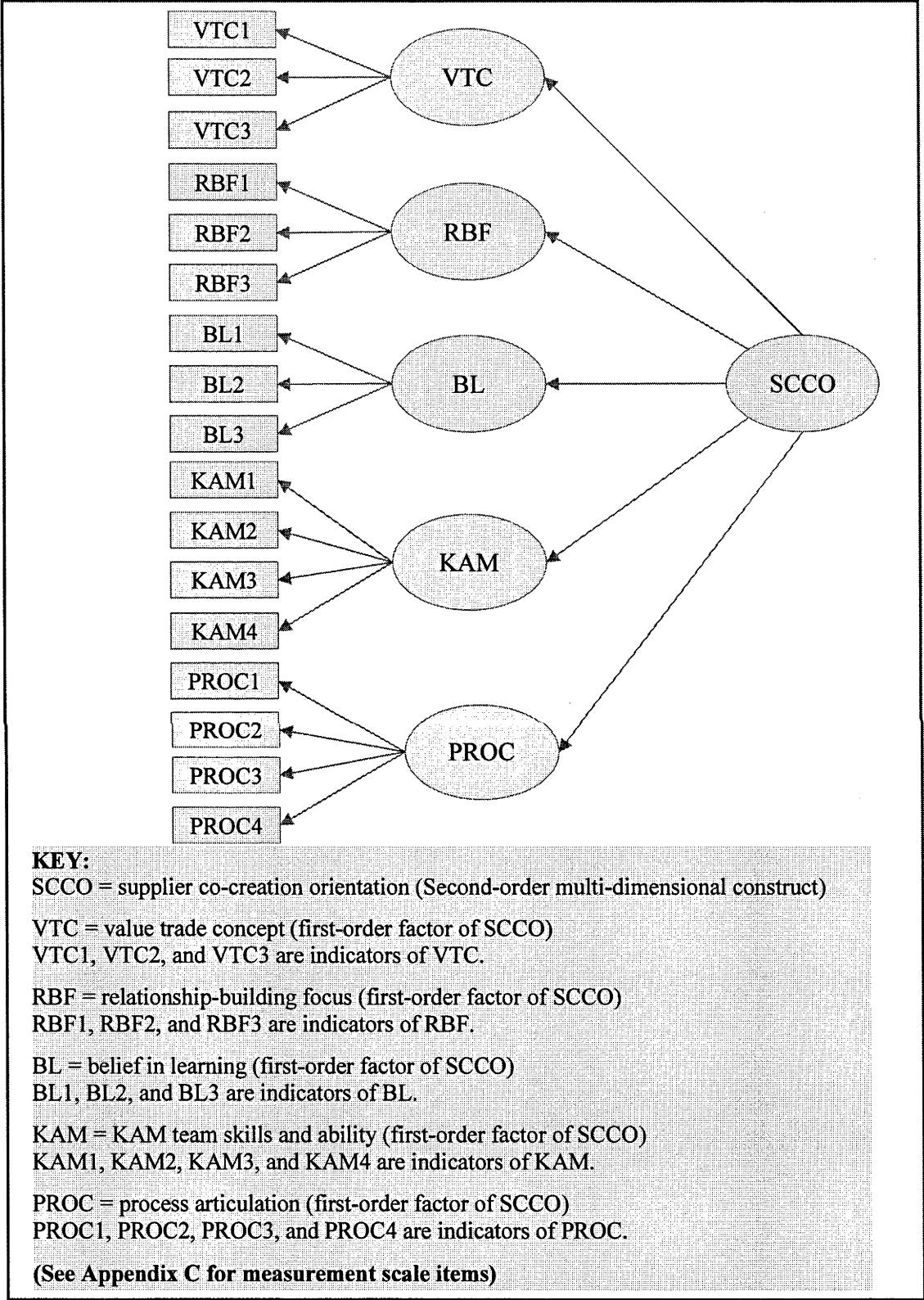


Table 4.3A Results of the CFA—SCCO: Using a Second-Order Conceptualization

Indicator	Direction	Construct	Standardised loading	Unstandardised loading	SE	t-value	p
VTC1	←	VTC	0.87	1.19	0.13	9.15	.00
VTC2	←	VTC	0.62	0.78	0.10	7.80	.00
VTC3	←	VTC	0.7	1.00			
RBF1	←	RBF	0.79	1.24	0.19	6.53	.00
RBF2	←	RBF	0.64	1.37	0.20	6.85	.00
RBF3	←	RBF	0.77	1.00			
BL1	←	BL	0.87	1.08	0.09	12.00	.00
BL2	←	BL	0.5	1.09	0.08	13.63	.00
BL3	←	BL	0.89	1.00			
KAM1	←	KAM	0.88	0.92	0.07	13.14	.00
KAM2	←	KAM	0.86	1.06	0.07	15.14	.00
KAM3	←	KAM	0.81	1.00			
KAM4	←	KAM	0.95	0.96	0.05	19.20	.00
PROC1	←	PROC	0.83	0.96	0.08	12.00	.00
PROC2	←	PROC	0.78	0.97	0.08	12.13	.00
PROC3	←	PROC	0.82	1.00			
PROC4	←	PROC	0.84	0.91	0.09	10.11	.00
VTC	←	SCCO	0.81	0.82	0.13	6.31	.00
RBF	←	SCCO	0.73	0.77	0.13	5.92	.00
BL	←	SCCO	0.84	0.97	0.11	8.82	.00
KAM	←	SCCO	0.79	1.00			
PROC	←	SCCO	0.64	0.83	0.12	6.92	.00

Table 4.3B Results of the CFA—SCCO: Using Average Scores for the Five Dimensions

Indicator	Direction	Construct	Standardised loading	Unstandardised loading	SE	<i>t</i> -value	P
VTC	←	SCCO	0.66	1.00			
RBF	←	SCCO	0.76	1.08	0.12	9.00	.00
BL	←	SCCO	0.79	1.14	0.13	8.77	.00
KAM	←	SCCO	0.77	1.18	0.14	8.43	.00
PROC	←	SCCO	0.61	0.93	0.13	7.15	.00

4.1.2.2 The CCCO Construct

In line with conceptualisation of SCCO, CCCO is a second-order construct, and its five dimensions (CVTC, CRBF, CBL, CKSP, and CSL) are first-order factors measured through their respective indicators. I conducted a CFA of this hierarchical model (see Figure 4.2).

I deemed the second-order CFA model fit to be acceptable based on a battery of fit indexes ($\chi^2 = 168.42$, d.f. = 85; comparative fit index [CFI] = .95; goodness-of-fit index [GFI] = .89; Tucker–Lewis index [TLI] = .94; incremental fit index [IFI] = .95; standardised root mean square residual [SRMR] = .05; root mean square error of approximation [RMSEA] = .07). The set of fit indexes reported is consistent with Hu and Bentler’s (1999) recommendations. The path coefficients between the indicators and their respective first-order factors were significant at an $\alpha = .05$ level. In addition, all the path coefficients between the second-order construct (SCCO) and its five dimensions (CVTC, CRBF, CBL, CKSP, and CSL) were significant at an $\alpha = .05$ level (see Table 4.4A).

Figure 4.2 Hierarchical Model for CCCO

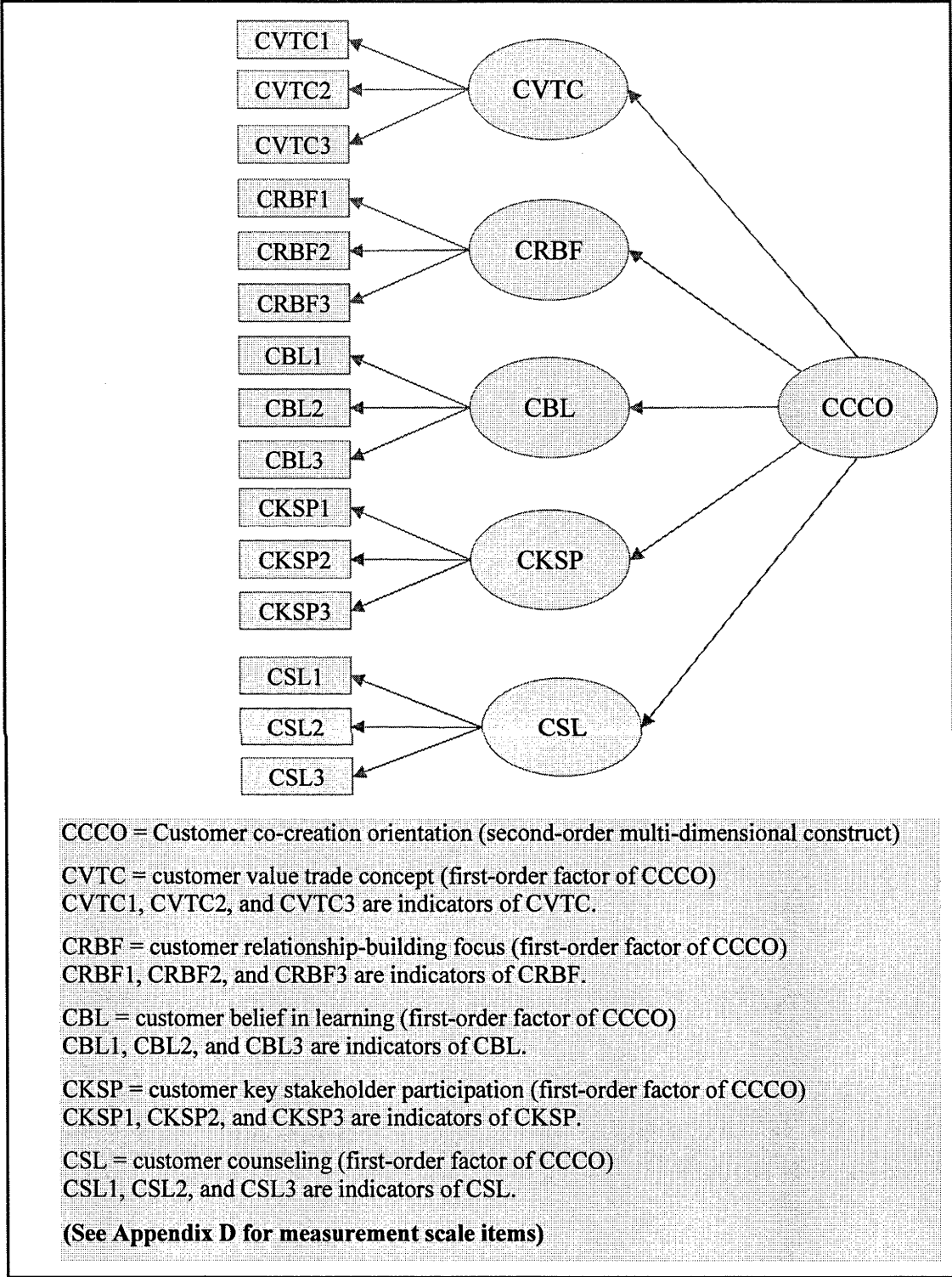


Table 4.4A Results of the CFA—CCCO: Using a Second-Order Conceptualisation

Indicator	Direction	Construct	Standardised loading	Unstandardised loading	SE	t-Value	p
CVTC1	←	CVTC	0.51	1.00			
CVTC2	←	CVTC	0.57	1.12	0.21	5.33	0.00
CVTC3	←	CVTC	0.79	1.00	0.13	7.69	0.00
CRBF1	←	CRBF	0.84	1.09	0.09	12.11	0.00
CRBF2	←	CRBF	0.69	0.99	0.10	9.90	0.00
CRBF3	←	CRBF	0.80	1.00			
CBL1	←	CBL	0.87	1.19	0.08	14.88	0.00
CBL2	←	CBL	0.88	1.13	0.08	14.13	0.00
CBL3	←	CBL	0.83	1.00			
CKSP1	←	CKSP	0.81	1.03	0.09	11.44	0.00
CKSP2	←	CKSP	0.91	1.08	0.08	13.50	0.00
CKSP3	←	CKSP	0.78	1.00			
CSL1	←	CSL	0.75	0.89	0.09	9.89	0.00
CSL2	←	CSL	0.85	1.06	0.10	10.60	0.00
CSL3	←	CSL	0.74	1.00			
CVTC	←	CCCO	0.68	0.56	0.11	5.09	0.00
CRBF	←	CCCO	0.87	0.98	0.12	8.17	0.00
CBL	←	CCCO	0.86	0.97	0.11	8.82	0.00
CKSP	←	CCCO	0.88	1.09	0.13	8.38	0.00
CSL	←	CCCO	0.85	1.00			

I also examined the second-order factor structure by conducting a one-factor CFA on the average scores of the respective five first-order constructs. The model fit was good ($\chi^2 = 9.8$, d.f. = 5; CFI = .99; GFI = .98; TLI = .98; IFI = .99; and SRMR = .03). All the path coefficients were significant at an $\alpha = .05$ level (see Table 4.4B). I averaged the scores of the five dimensions of CCCO for further analyses.

Table 4.4B Results of the CFA—CCCO: Using Average Scores for the Five Dimensions

Indicator	Direction	Construct	Standardised loading	Unstandardised loading	SE	t-Value	P
CVTC	←	CCCO	0.55	1.00			
CRBF	←	CCCO	0.76	1.41	0.19	7.42	0.00
CBL	←	CCCO	0.82	1.55	0.20	7.75	0.00
CKSP	←	CCCO	0.80	1.59	0.21	7.57	0.00
CSL	←	CCCO	0.79	1.43	0.19	7.53	0.00

4.1.3 Conceptualisation and validation of the Solution Effectiveness Construct

Solution effectiveness represents the extent to which a supplier firm is able to customise and integrate its products and services to meet the needs of different stakeholders in a customer firm (Sawhney, 2006; Tuli et al., 2007), the extent of being successful in avoiding product and service breakdowns (Challagalla et al., 2009), and the extent to which risks have been assessed and mitigated (Ulaga & Reinartz, 2011). I conceptualise solution effectiveness as a formative construct. If the items of a construct are viewed as defining characteristics, if the focal construct is a function of its items, and if a change in only one of the items could be associated with a change in the focal construct, then the construct is best thought of as *forming* the focal construct (MacKenzie & Podsakoff, 2012).

A formative measurement model means that the theoretical construct summarises the formative measures; that is, the individual items add distinctively to the latent construct. If any of the measures is dropped from the scale, the construct’s overall meaning may be lost. Therefore, unlike reflective measures, formative measures are not easily replaceable. Ideally, a researcher will identify all the construct’s significant defining measures that add up to capture the breadth of the focal construct and measure the latent construct without

error. The error, if any, is measured at the level of the focal construct, and not at the level of individual items, which is the case for reflective measures.

In case of a formative construct that is a part of an overall structural model, (1) at least two theoretically appropriate global reflective indicators, or (2) at least two other latent constructs with reflective indicators should be added in order to identify its measurement model (MacKenzie & Podsakoff, 2012). I established the construct validity for solution effectiveness by using the latter method, and added positive word-of-mouth (WOM) and customer satisfaction (CS) as the latent constructs with reflective indicators. WOM and CS are the components of customer-based relational performance (CBRP) in my structural model.

The measurement model of solution effectiveness exhibited a good fit with the data ($\chi^2 = 37.42$, d.f. = 18; CFI = .98; GFI = .96; TLI = .97; IFI = .98; SRMR = .03; and RMSEA = .08). The path coefficients from its measurement items to the formative construct and from the formative construct to its two consequences (WOM and CS) were statistically significant at an $\alpha = .95$ level (see Table 4.5). This provided the necessary evidence that all the formative indicators were valid measures of solution effectiveness.

Further, I examined multicollinearity among the four formative indicators of solution effectiveness by estimating variance inflation factor (VIF) for each indicator (Diamantopoulos & Winklhofer, 2001). Results show that the VIF for each indicator is below 3, which indicates non-existence of multicollinearity.

Table 4.5: Measurement Model for Solution Effectiveness

Indicator	Direction	Construct	Estimate	Standardised estimate	SE	t-value	p
SE1	→	SE	0.31	0.16	0.14	2.21	0.03
SE2	→	SE	0.43	0.23	0.14	3.07	0.00
SE3	→	SE	0.34	0.20	0.12	2.83	0.00
SE4	→	SE	0.55	0.34	0.12	4.58	0.00
CS1	←	CS	0.79	0.80	0.05	15.80	0.00
CS2	←	CS	1.00	0.91			
CS3	←	CS	1.11	0.94	0.05	22.20	0.00
WOM1	←	WOM	1.00	0.98			
WOM2	←	WOM	0.84	0.80	0.06	14.00	0.00
CS	←	SE	0.50	0.97	0.05	10.00	0.00
WOM	←	SE	0.45	0.76	0.04	11.25	0.00

4.1.4 Discriminant Validity of the constructs

Before estimating the path coefficients of the hypothesised structural model, I proceeded to fit a CFA on all the six latent factors: supplier co-creation orientation (SCCO), customer co-creation orientation (CCCO), dyadic investments (DINV), interaction efficacy (IE), solution effectiveness (SE), and customer-based relational performance (CBRP). Table 4.6A shows the coefficient- α value for all the latent constructs. These values ranged from .75 to .91—well above the recommended value of 0.7 (Nunnally & Bernstein, 1994). The six-factor CFA model exhibited a good fit with the data ($\chi^2 = 493.54$, d.f. = 215; CFI = .90; GFI = .82; TLI = .88; IFI = .90; SRMR = .07; and RMSEA = .08). The standardised factor loadings ranged from .55 to .92 and were statistically significant at an $\alpha = .95$ level (see Table 4.6B). This provided the necessary evidence that all the constructs exhibited convergent validity.

TABLE 4.6A: Scale Properties of Latent Constructs used in the SE Model

Construct	Coefficient alpha	Average variance extracted	Highest shared variance
SCCO	.84	.52	.46
CCCO	.87	.57	.51
DINV	.75	.60	.23
IE	.83	.62	.53
SE ¹	-	-	.56
CBRP	.91	.62	.56

¹Formative Construct**TABLE 4.6B: Results of the CFA of Latent Constructs used in the SE Model**

Indicator	Direction	Construct	Estimate	Standardised estimate	SE	t-Value	p
VTC	←	SCCO	1.00	0.64			
RBF	←	SCCO	1.08	0.74	0.13	8.31	0.00
BL	←	SCCO	1.18	0.78	0.13	9.08	0.00
KAM	←	SCCO	1.25	0.79	0.14	8.93	0.00
PROC	←	SCCO	0.98	0.63	0.13	7.54	0.00
CKSP	←	CCCO	1.00	0.81			
CSL	←	CCCO	0.89	0.78	0.08	11.13	0.00
CBL	←	CCCO	0.97	0.82	0.08	12.13	0.00
CRBF	←	CCCO	0.90	0.78	0.08	11.25	0.00
CVTC	←	CCCO	0.62	0.55	0.08	7.75	0.00
DINV1	←	DINV	1.00	0.69			
DINV2	←	DINV	1.26	0.83	0.14	9.00	0.00
DINV3	←	DINV	1.24	0.79	0.14	8.86	0.00
IE1	←	IE	0.96	0.85	0.09	10.67	0.00
IE2	←	IE	1.00	0.74			
IE3	←	IE	0.96	0.76	0.10	9.60	0.00
CBRP1	←	CBRP	0.73	0.74	0.06	12.17	0.00
CBRP2	←	CBRP	1.00	0.92			
CBRP3	←	CBRP	1.06	0.90	0.05	21.20	0.00
CBRP4	←	CBRP	0.89	0.76	0.16	5.56	0.00
CBRP5	←	CBRP	0.76	0.65	0.07	10.86	0.00
CBRP6	←	CBRP	0.68	0.70	0.06	11.33	0.00

I examined discriminant validity using a procedure that Fornell and Larcker (1981) suggest and that researchers in marketing widely follow (e.g., Kandemir, Yaprak, & Cavusgil, 2006; Ramani & Kumar, 2008). I computed the average variance extracted by the indicators corresponding to each of the relevant factors and compared it with the highest variance that each factor shared with the other factors in the model. The average variance extracted for each factor was always greater than the highest shared variance (see Table 4.6A), which indicates discriminant validity. Because solution effectiveness is a formative construct, it does not have a value for average variance extracted.

4.1.5 Interaction Term of SCCO and CCCO

As I mention in Chapter 2, I hypothesise that the interaction of SCCO and CCCO has a positive effect on dyadic investments (see H3). However, the correlation between SCCO and the product term ($\text{SCCO} \times \text{CCCO}$) was very high ($r = 0.87$), which may bias SCCO's and CCCO's regression coefficients' ability to estimate their effect on dyadic investments due to multicollinearity. Therefore, I used the residual centring approach (Lance, 1988; Little, Bovaird, & Widaman, 2006) to estimate SCCO's and CCCO's interaction effect on dyadic investments. Essentially, I regressed the product term ($\text{SCCO} \times \text{CCCO}$) on SCCO and CCCO, and used the residual as a measure of the interaction between SCCO and CCCO. By doing so, SCCO and CCCO were now uncorrelated with the interaction term, which overcame the multicollinearity problem and also captured the true effect of the joint presence or absence of co-creation orientations between the dyad's two members.

4.1.6 Common Method Bias

To ascertain whether common method variance posed a serious threat to the study's findings, I used the Harmon's one-factor test to assess whether a single latent factor would account for the explained variance in all the observed variables. The single-factor model yielded a chi-square of 1233.28 (d.f. = 230). I conducted a chi-square difference test against the hypothesised six-factor model to assess the impact of common method variance. A significant difference between the chi-square values of the two models indicated that the fit in the one-dimensional model was significantly worse ($\Delta\chi^2 = 739.74$, d.f. = 15, $p < .01$) than it was in the measurement model. This provided preliminary evidence that the measurement model was robust to common method variance.

In addition, I employed the procedure that Lindell and Whitney (2001) recommend to comprehensively test for common method bias. I chose competitive intensity (COMP) as the marker variable for the common method bias analysis because it was theoretically unrelated to the dependent variable of solution effectiveness (SE). In this study, COMP and SE had a correlation of 0.16. Therefore, I used COMP's measured correlation with SE as the indication of method variance. Table 4.7 presents the results, along with the reported correlations between all the other constructs and COMP.

Table 4.7 shows that the partial correlations between the constructs hypothesised to have a significant relationship were indeed significant, even after I partialled out the effect of common method bias. I also carried out a 95% sensitivity analysis to validate this result (Lindell & Whitney, 2001). From the above analysis, I concluded that common method bias did not pose a serious threat to the study's results.

TABLE 4.7
Common Method Bias Analysis

	SCCO	CCCO	DINV	IE	SE	CBRP
CCCO	0.58					
	<i>0.50</i>					
	0.46					
DINV	0.37	0.44				
	<i>0.25</i>	<i>0.34</i>				
	0.19	0.29				
IE	0.27	0.59	0.34			
	<i>0.13</i>	<i>0.51</i>	<i>0.22</i>			
	0.07	0.47	0.16			
SE	0.50	0.57	0.41	0.63		
	<i>0.40</i>	<i>0.49</i>	<i>0.30</i>	<i>0.56</i>		
	0.36	0.45	0.25	0.53		
CBRP	0.48	0.59	0.37	0.60	0.72	
	<i>0.39</i>	<i>0.52</i>	<i>0.25</i>	<i>0.53</i>	<i>0.67</i>	
	0.34	0.48	0.19	0.49	0.65	
COMP	0.13	0.15	0.15	0.04	0.16	0.09
(MV)	<i>-0.05</i>	<i>-0.01</i>	<i>-0.01</i>	<i>-0.14</i>	<i>0.00</i>	<i>-0.08</i>
	-0.12	-0.08	-0.09	-0.22	-0.08	-0.16

MV = marker variable
All correlations above an absolute value of 0.14 were significant at $p < 0.05$.
The first value for each construct relationship (in **bold**) was the correlation between the constructs, the second value (in *italics*) was the correlation corrected for common method bias, and the third value (normal font) was the correlation value for a 95% sensitivity analysis.

4.1.7 Structural Model Analysis

For both the studies in this thesis (RSN Study and Dyadic Study), I collected data in a cross-sectional survey. My theoretical models include relationships in which endogenous variables (such as dyadic investments in the solution effectiveness model and supplier investments in the CBPP model) are also used as predictors of other variables (such as solution effectiveness). Using ordinary least squares (OLS) regressions in such a situation would give biased and inconsistent estimates of parameters for endogenous variables appearing as regressors (predictors) in other equations in the system (SAS, 1999). Therefore, the complex nature of my theoretical models needed multivariate regression modelling by using a system of simultaneous

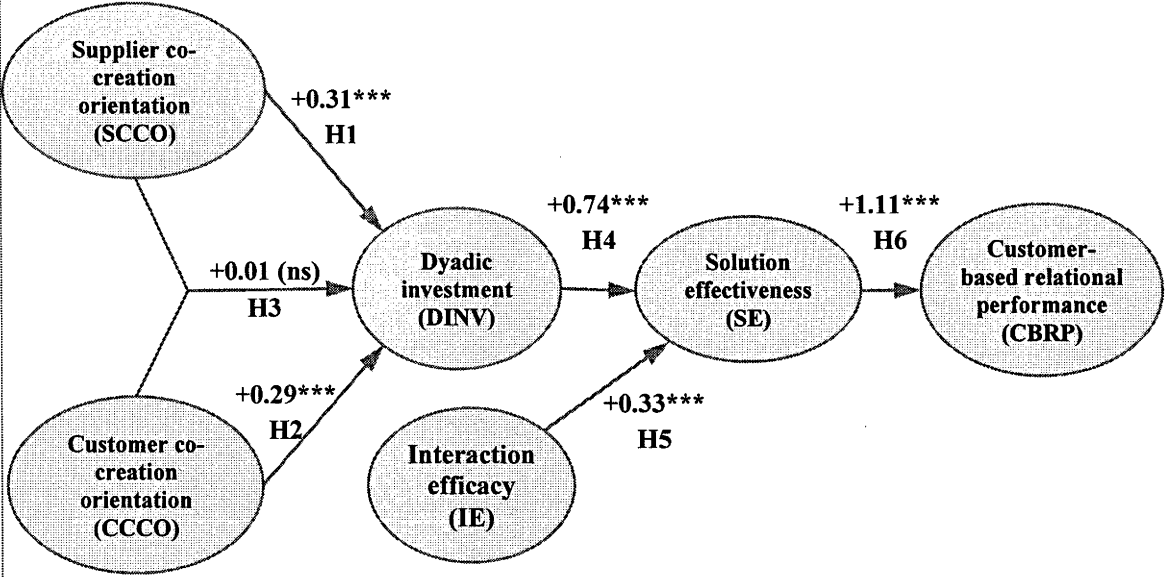
equations.

The error terms across different equations in a system of simultaneous equations are often correlated, and the efficiency of the estimates can be improved by taking these correlations into account. The full information maximum likelihood (FIML) method in the SYSLIN module in SAS produces consistent and asymptotically efficient estimates for a system of regression equations (SAS, 1999). Therefore, I investigated the hypothesised relationships in my structural models through a system of simultaneous equations estimated through the FIML method using the SYSLIN module in SAS 9.3.

Table 4.8 presents the results of the hypotheses testing for H1 to H6, estimated through the FIML method. Figure 4.3 presents the path coefficients for the hypothesised relationships.

Table 4.8: RSN Study—Results of the Hypotheses Testing (Solution Effectiveness Model)								
Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
DINV	Intercept	1.51	0.00	0.32	4.66	<.0001	-	
DINV	SCCO	0.31	0.27	0.07	4.46	<.0001	1	Supported
DINV	CCCO	0.29	0.24	0.07	4.13	<.0001	2	Supported
DINV	SCCO x CCCO	0.01	0.01	0.04	0.19	0.85	3	Not Supported
Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
SE	Intercept	-0.51	0.00	0.48	-1.06	0.29	-	
SE	DINV	0.74	0.90	0.13	5.55	<.0001	4	Supported
SE	IE	0.33	0.41	0.04	7.73	<.0001	5	Supported
SE	RSHIP	0.002	0.04	0.002	1.03	0.31	-	
SE	SIZE	-0.01	-0.02	0.02	-0.55	0.59	-	
Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
CBRP	Intercept	0.08	0.00	0.30	0.27	0.79	-	
CBRP	SE	1.11	1.00	0.08	13.22	<.0001	6	Supported
Note: t-values above may not calculate exactly because I have rounded-off the parameter estimates and std errors to two decimal places for ease of reading.								

Figure 4.3: RSN Study—Results of the Hypothesis Testing



In this study, I controlled for the effect of relationship duration and supplier firm size on solution effectiveness.
*** $p < 0.01$; ns = not significant.

In support of H1 and H2, I found that DINV was positively associated with SCCO ($\beta = 0.31, p < 0.01$) and CCCO ($\beta = .29, p < 0.01$). However, I did not find support for H3, which predicted that the interaction of SCCO and CCCO would lead to higher DINV ($\beta = .01, p > 0.1$).

In support of H4, DINV was positively associated with SE ($\beta = .74, p < 0.01$). I also found support for H5, in that IE was positively associated with SE ($\beta = .33, p < 0.01$). I also controlled for relationship duration (Kumar, Scheer, & Steenkamp, 1995) and size of supplier business unit in this equation, but did not find these variables to have any significant effect on solution effectiveness. In support of H6, SE was positively linked to CBRP ($\beta = 1.11, p < 0.01$). Overall, for this study in which I collected data from the key informants in supplier firms, I found strong support ($p < 0.01$) for five of the six proposed hypotheses for my solution effectiveness model.

4.1.8 Robustness Checks

As is the case with most empirical analyses, I made assumptions and choices related to my model, analyses, and sample. Although my model specification has a strong theoretical basis, it remains to be seen (1) whether firms' co-creation orientation provides an improved explanation of solution effectiveness; (2) whether dyadic investment is the mechanism that mediates the relationship between firms' co-creation orientation and solution effectiveness, and whether this mechanism provides an improved explanation of the relationship between the firms' co-creation orientation and solution effectiveness; and (3) whether it is the firms' co-creation orientation that lead them to invest more into a solution (i.e., this relationship is not the other way around). Reverse causality needs to be examined because it can be argued that higher dyadic investments made into a solution may cause the two firms in a dyad to become more co-creation oriented, and that the two firms strive more to work with each other to safeguard their investments. Therefore, I considered three alternate models for comparison with my hypothesised model.

First, my theory suggests that a supplier and a customer firm's co-creation orientation is a critical predictor of the effectiveness of the solution being provided through dyadic investments. To test whether the results support this hypothesis, I considered a model that did not include SCCO, CCCO, and their interaction as predictors of the dyadic investment. Second, I considered a model in which I allowed SCCO, CCCO, and their interaction—along with DINV, IE, RSHIP, and SIZE—to have a direct effect on SE. Finally, I tested a model in which dyadic investment (along with IE, RSHIP, and SIZE) predict the two firms' co-creation orientation, which then predict the solution effectiveness along with their interaction term. Table 4.9 overviews the results. My proposed model fit the data better than all three alternate models.

Akaike’s information corrected criterion (AICc) for the alternate models ranged from -857 to -1,008, which are greater than the AICc of -1,259 for my proposed model. Therefore, these results collectively support my proposed model.

Table 4.9: RSN Study—Assessment of the Alternate Models		
Test explanation	Alternative models	AICc
	My proposed model that includes SCCO, CCCO, and their interaction as predictors of dyadic investments	-1,259
Is my model better than a “dyadic investment → outcomes” only model?	A model without SCCO, CCCO, and their interaction as predictors of dyadic investments	-908
Is my model better than a model that does not have the mediation effect of dyadic investments?	A model with SCCO, CCCO, SCCO × CCCO, DINV (& IE, RSHIP, and SIZE) all as direct predictors of SE	-857
Is my model better than a “dyadic investment → co-creation orientation → outcomes” model?	A model with DINV (& IE, RSHIP, and SIZE) as predictors of SCCO and CCCO. SE is predicted by SCCO, CCCO, and their interaction.	-1,008

4.2 Data Analysis and Results of the Dyadic Study

4.2.1 Sample Characteristics

I obtained this dataset from four large global firms, all of which were members of an industry association of technology-enabled business process management solution providers. I sought reports on organisational data from matched dyads of key informants in supplier *and* customer firms. Similar to the RSN Study, key informants in supplier firms were key account managers, project managers, marketing managers/directors, and sales managers/directors. The annual sales of business units in supplier firms ranged from US\$10 million to US\$800 million. The average sales value was US\$179 million.

I received 69 completed questionnaires from the supplier firms, and 51 completed questionnaires from the customer firms, for a total of 51 sets of completed matched-dyad questionnaires. The effective response rate was 60.71%. Table 4.10 (supplier firm key informants) and table 4.11 (customer firm key informants) present

the break-up of study participants according to their roles in the organisation they worked for at the time of the survey.

Table 4.10 Dyadic Study—Designations of Key Informants in Supplier Firms		
Designation	Count	Percentage
Key account manager	11	21.6%
Divisional/business-unit manager	11	21.6%
Sales manager/director	4	7.8%
Project manager	16	31.4%
Customer account manager	7	13.7%
Marketing manager/director	2	3.9%
Total	51	100%

Table 4.11 Dyadic Study—Designations of Key Informants in Customer Firms		
Designation	Count	Percentage
Manager	9	17.6%
General manager	19	37.3%
Director	17	33.3%
Project manager	6	11.8%
Total	51	100%

Similar to the RSN Study, I compared the mean values of early versus late respondents on their demographics (size and age) and on the supplier co-creation orientation construct (Armstrong & Overton, 1977); I found these differences to be non-significant. Therefore, non-response bias does not pose a threat to the study’s results.

4.2.2 Validation of Solution Effectiveness Model

I conducted the Dyadic Study to validate my solution effectiveness model’s theoretical framework with a new dataset from another population. I also tested my supplier’s customer-based profit performance model with this dyadic dataset. By collecting data from matched dyads of key informants in supplier and customer firms, I also ruled out a major source of common method variance at the design stage.

For this study, I collected reports on customer co-creation orientation (CCCO)

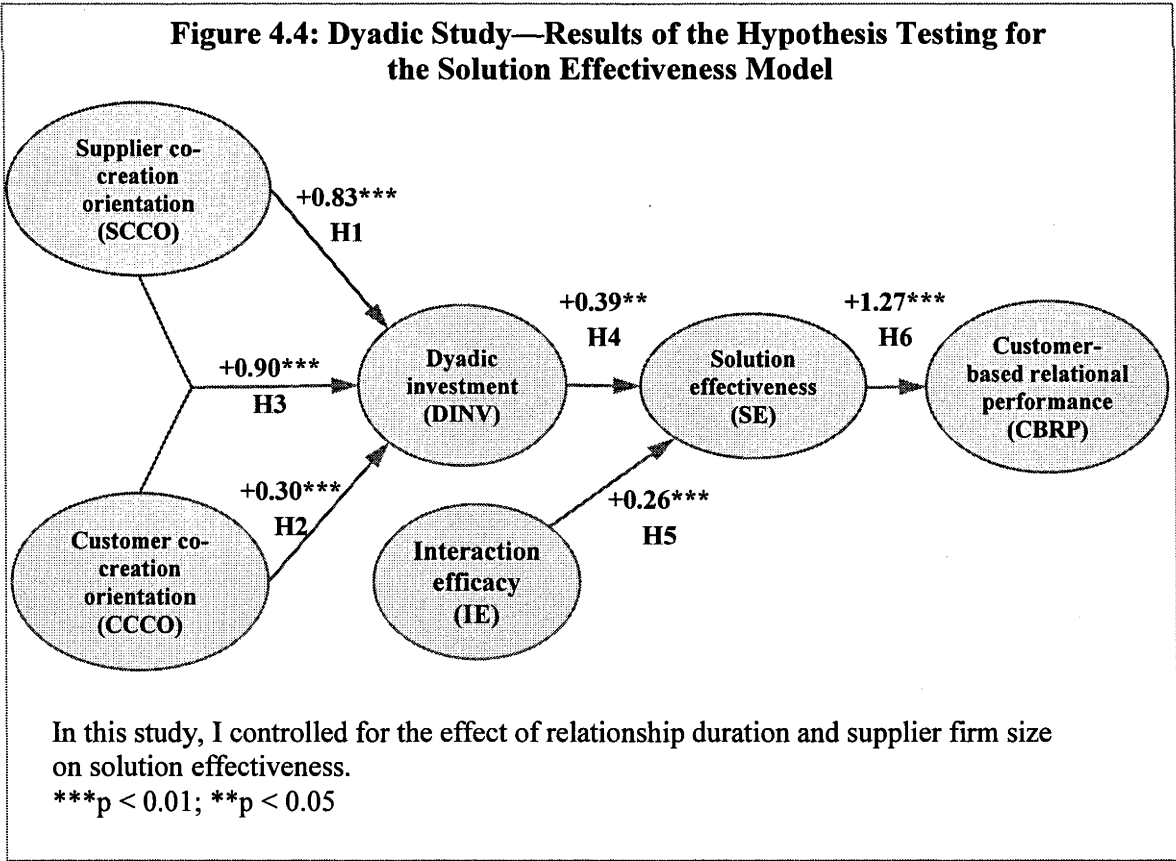
from key informants in supplier firms and customer firms. The correlation between supplier-reported CCCO and customer-reported CCCO is very high ($r=0.79$). This result indicates that supplier firms' perceptions of their customer firms' co-creation orientation are very similar to customer firm's perceptions of their own co-creation orientation. This result also indicates that use of supplier reports on customer co-creation orientation in the RSN study was an appropriate method. For this study, I used customer-reported CCCO for my data analysis.

Similar to data analysis for RSN study, I investigated H1 to H6 through a system of simultaneous equations estimated through a full information maximum likelihood (FIML) method using the SYSLIN module in SAS 9.3. Table 4.12 presents the results. Figure 4.4 presents the path coefficients for the hypothesised relationships.

In support of H1 and H2, I found that DINV was positively associated with SCCO ($\beta = 0.83, p < 0.01$) and CCCO ($\beta = .30, p < 0.01$). I also found support for H3 in this dataset, which states that the interaction of the firms' co-creation orientation (SCCO $\times$ CCCO) leads to higher DINV ($\beta = .90, p < 0.01$).

In support of H4, DINV was positively associated with SE ($\beta = .39, p < 0.05$). I also found support for H5, in that IE was positively associated with SE ($\beta = .26, p < 0.01$). I also controlled for relationship duration (Kumar et al., 1995) and size of supplier business unit in this equation, but did not find these variables to have any significant effect on solution effectiveness.

Table 4.12: Dyadic Study—Results of the Hypotheses Testing for the Solution Effectiveness Model								
Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
DINV	Intercept	-0.64	0.00	0.73	-0.88	0.39	-	
DINV	SCCO	0.83	0.61	0.13	6.26	<.0001	1	Supported
DINV	CCCO	0.30	0.25	0.11	2.64	<.01	2	Supported
DINV	SCCO x CCCO	0.90	0.25	0.33	2.73	<.008	3	Supported
Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
SE	Intercept	1.42	0.00	0.61	2.34	0.02	-	
SE	DINV	0.39	0.39	0.16	2.42	0.02	4	Supported
SE	IE	0.26	0.31	0.10	2.66	0.01	5	Supported
SE	RSHIP	-0.04	-0.23	0.02	-2.31	0.03	-	
SE	SIZE	0.00	-0.07	0.00	-0.73	0.47	-	
Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
CBRP	Intercept	-0.64	0.00	0.88	-0.72	0.47	-	
CBRP	SE	1.27	0.87	0.22	5.69	<.0001	6	Supported
Note: t-values above may not calculate exactly because I have rounded-off the parameter estimates and std errors to two decimal places for ease of reading.								



In support of H6, SE was positively linked to CBRP ($\beta = 1.27, p < 0.01$). Overall, for this study in which I collected data from key informants in supplier and customer firms, I found strong support ($p < 0.05$) for all six proposed hypotheses for my solution effectiveness model.

4.2.3 Robustness Checks

Similar to the RSN Study, I considered the three alternate models to assess whether my hypothesised model gives more information compared to these rival models. Table 4.13 overviews the results. My proposed model fits the data better than the three alternate models. Akaike’s information corrected criterion (AICc) for the alternate models ranged from -30 to -123, which are greater than -140 for my proposed model. Therefore, these results collectively support my proposed model.

Table 4.13: Dyadic Study—Assessment of the Alternate Models		
Test explanation	Alternative models	AICc
	My proposed model that includes SCCO, CCCO, and their interaction as predictors of dyadic investments	-140
Is my model better than a “dyadic investment → outcomes” only model?	A model without SCCO, CCCO, and their interaction as predictors of DINV	-123
Is my model better than a model that does not have the mediation effect of dyadic investments?	A model with SCCO, CCCO, SCCO × CCCO, DINV (& IE, RSHIP, and SIZE) as predictors of SE	-109
Is my model better than a “dyadic investment → co-creation orientation → outcomes” model?	A model with DINV (& IE, RSHIP, and SIZE) as predictors of SCCO and CCCO. SE is predicted by SCCO, CCCO and their interaction.	-30

4.2.4 Customer-based Profit Performance Model

In my customer-based profit performance model, I theorised that supplier firms' misaligned investments (i.e., under-investments and over-investments) have a negative effect on solution effectiveness.

Aligned investments (ALIGNED SI_i) are investments that are in line with the two firms' co-creation orientations in a supplier-customer dyad. To calibrate misaligned investments for each supplier firm, I regressed supplier investment (SI) on SCCO and CCCO:

$$\text{Equation 1 (E1): } SI_i = \beta_0 + \beta_1 * SCCO_i + \beta_2 * CCCO_j + \sigma_{ij}$$

In Equation 1, β_0 is the intercept, β_1 is SCCO's effect, β_2 is CCCO's effect, and σ_{ij} is the residual term. Subscript i relates to the supplier firm's key informant in each dyad ($i = 1, 2, 3...51$) and subscript j relates to the customer firm's key informant in each dyad ($j = 1, 2, 3... 51$). Results of the above regression show that supplier investment (SI) was positively associated with SCCO ($\beta = 0.51, p < 0.01$) and CCCO ($\beta = .46, p < 0.01$). This result means that, on average, supplier firms invested in a solution by taking into account their own and their partner firm's co-creation orientation. For each supplier firm, I estimated aligned investments as the predicted term of the above regression:

$$\text{Equation 2: } ALIGNED SI_i = \beta_1 * SCCO_i + \beta_2 * CCCO_j$$

For each supplier, I then estimated under- and over-investments by using the residual term σ_{ij} :

$$\text{Equation 3: } UNDER INVESTMENT_i = \sigma_{ij} \text{ (if } \sigma_{ij} < 0, \text{ ELSE } 0)$$

$$\text{Equation 4: } OVER INVESTMENT_i = \sigma_{ij} \text{ (if } \sigma_{ij} > 0, \text{ ELSE } 0)$$

I investigated H7 to H11 through a system of simultaneous equations estimated through the FIML method using SYSLIN module in SAS 9.3. Table 4.14 presents the results. Figure 4.5 shows the path coefficients for the hypothesised relationships.

In support of H7 and H8, I found that under-investments into a solution by the supplier firms had a significant negative effect on solution effectiveness ($\beta = -0.73, p < 0.01$), and that over-investments into a solution by the supplier firms also had a negative significant effect on solution effectiveness ($\beta = -0.21, p < 0.01$). Results also show support for interaction efficacy's positive effect on solution effectiveness ($\beta = 0.15, p > 0.05$). I found a positive effect of solution effectiveness on customer-based relational performance ($\beta = 0.95, p < 0.01$). In support of H9, I found a positive effect of CBPR on CBPP ($\beta = 3.67, p < 0.05$).

The results also support that under- and over-investments made by supplier firms trigger a net negative effect on supplier's customer-based profits (CBPP). In order to determine whether the difference between net effects of aligned investments versus misaligned-investments on customer-based profits was significant, I conducted the Wald test. The Wald test computes a test statistic that considers the difference between the estimated coefficients and the variances and co-variances of the relevant variables. Specifically, I conducted the following test:

$$Wald\ test\ statistic = \frac{(\Delta \beta)^2}{\sqrt{S_{Aligned\ SI}^2 + S_{Misaligned\ SI}^2 - 2(Cov\ Aligned\ SI, Misaligned\ SI)}}$$

Where: $\Delta \beta = \beta^*_{Aligned\ SI} - \beta^{\wedge}_{Misaligned\ SI}$

$\beta^* =$ net effect of aligned SI;

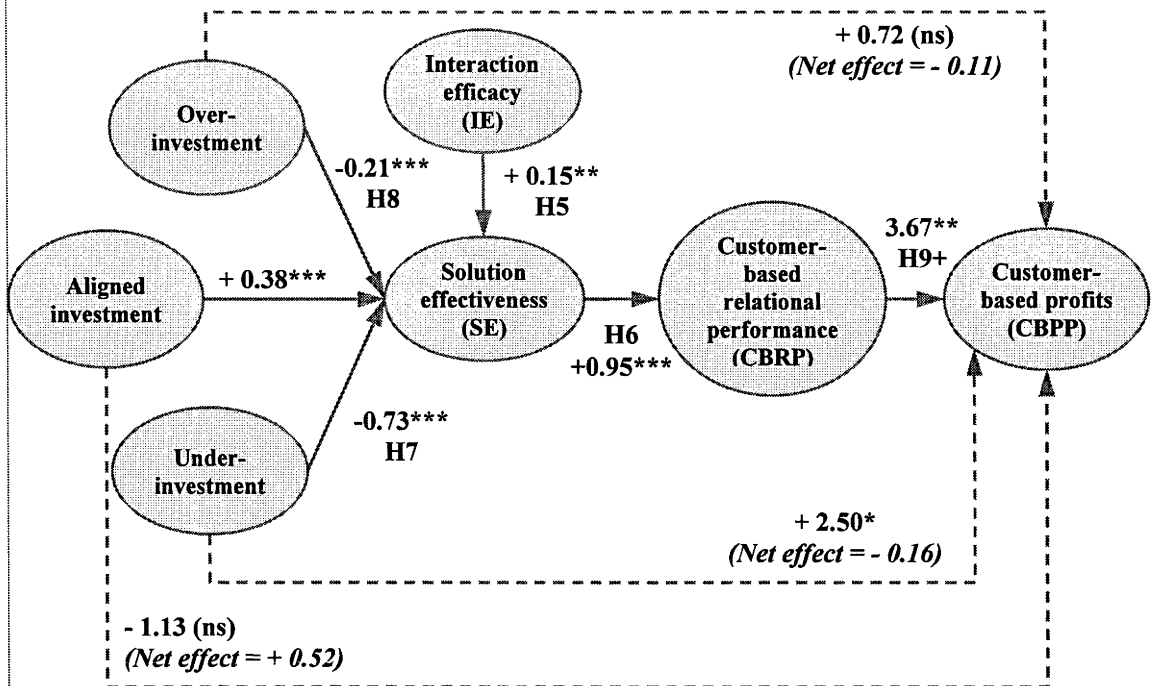
$\beta^{\wedge} =$ net effect of misaligned SI (under-investment or over-investment)

$S =$ standard deviation; $Cov =$ covariance

Table 4.14: Dyadic Study—Results of the Hypothesis Testing for the CBPP Model

Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
SE	Intercept	1.07	0.00	0.50	2.16	0.04	-	-
SE	Aligned SI	0.65	0.38	0.14	4.68	<.0001	-	-
SE	Under Investment	-1.31	-0.73	0.15	-8.99	<.0001	7	Supported
SE	Over Investment	-0.55	-0.21	0.19	-2.81	0.01	8	Supported
SE	Interaction Efficacy	0.12	0.15	0.06	1.96	0.06	5	Supported
SE	Relationship Duration	-0.003	-0.01	0.01	-0.33	0.75	-	-
SE	Customer Size	-0.003	-0.07	0.001	-1.72	0.09	-	-
Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
CBRP	Intercept	-1.11	0.00	0.62	-1.80	0.08	-	-
CBRP	Solution Effectiveness	1.39	0.95	0.16	8.94	<.0001	H6	Supported
Dependent variable	Predictor variable	Parameter estimate	Std estimate	Std error	t-value	Pr > t	Hypothesis	Conclusion
CBPP	Intercept	-2.43	0.00	2.83	-0.86	0.40	-	-
CBPP	Aligned SI	-2.94	-1.13	2.20	-1.34	0.19	-	-
CBPP	Under Investment	6.80	2.50	3.61	1.88	0.07	-	-
CBPP	Over Investment	2.78	0.72	1.91	1.45	0.15	-	-
CBPP	CBRP	3.82	3.67	1.91	2.00	0.05	9	Supported
CBPP	Market Turbulence	0.13	0.07	0.17	0.77	0.45	-	-
CBPP	Competitive Intensity	-0.05	-0.02	0.21	-0.23	0.82	-	-
Note: t-values above may not calculate exactly because I have rounded-off the parameter estimates and std errors to two decimal places for ease of reading.								

Figure 4.5: Dyadic Study—Results of the Hypothesis Testing for the CBPP Model



Wald test statistic for H10: $(\Delta \beta_2 = \beta^*_{\text{Aligned SI}} - \beta^*_{\text{Under Investment}}) = 2.60***$

Wald test statistic for H11: $(\Delta \beta_1 = \beta^*_{\text{Aligned SI}} - \beta^*_{\text{Over Investment}}) = 2.97***$

Aligned SI= aligned investment

Misaligned SI = misaligned investment (under- or over-investment)

*Net effect of aligned investments; ^ Net effect of misaligned investments

Dotted lines show net effect of the hypothesised relationships between constructs

***p < 0.01; **p < 0.05; *p < 0.1; ns = not significant

All parameter estimates given above are standardised parameter estimates.

I controlled for the effect of relationship duration and customer firm size on solution effectiveness. I also controlled for the effect of market turbulence and competitive intensity on CBPP.

In support of H10, the difference between net effects of aligned investments versus under-investments on customer-based profits was significant ($\Delta\beta = .68$, $p < 0.01$). Similarly, in support of H11, the difference between net effects of aligned investments versus over-investments on customer-based profits was also significant ($\Delta\beta = .63$, $p < 0.01$). Overall, for my customer-based profit performance model, I found strong support ($p < 0.05$) for all the proposed hypotheses.

4.2.5 Overall Profitability Model

To investigate the hypothesised relationships in my overall profitability model, I extended my customer-based profit performance model by retaining all the variables and paths of the hypothesised customer-based profit performance (CBPP) model (See Figure 2.4). I then further analysed the impact of CBPP on the aggregate business-unit level performance.

In support of H12, I found support for CBPP's having a positive effect on business-unit level performance ($\beta = 0.66$, $p < 0.01$).

In summary, my customer-based profit performance and overall profitability models collectively show that, if a supplier firm does not consider the collaborative attitudes of both parties in the supplier-customer dyad when investing in a solution, it is more likely to lose money on its investments. This concludes my discussion on data analysis and results for my fieldwork. In Chapter 5, I discuss the significance of my research findings on marketing theory and practice.

5 Discussion

In this chapter, I discuss this thesis's contributions in the context of its implications for theory and practice, with a focus on the customer solutions business. In a recent survey of 300 member firms of the German Engineering Association (VDMA), 74% reported that the top trend from their customers is an increase in demand for customised solutions (McKinsey & VDMA, 2014). Importantly, the survey reports that the "solutions business is less profitable than the standard business" (McKinsey & VDMA, 2014, p. 69). Interestingly, firms in the solutions business have a higher growth rate compared to firms that offer single machines/components. These two observations collectively indicate that the solution business results in an increase in revenues due to enhanced services that come with the solutions business, but a decrease in profits for these firms.

Importantly, over 77% of the firms in this survey reported that they wanted to adjust their portfolio toward customised solutions to grow faster. Further, the survey identified that the two main challenges associated with the customer solutions business were: (1) establishing internal expertise, which 72% of the firms identified; and (2) close cooperation with customers, which 68% of the firms identified. The German Engineering Association (VDMA) has a total membership of 6,400 firms, with an annual industry turnover of over €200 billion. This association's member firms collectively account for 11% of world machinery production, and 16% of global machinery exports (McKinsey & VDMA, 2014).

In summary, the German mechanical industry survey's results highlight the increase in demand for the end-to-end solutions from the customer firms, and, hence, the increased importance of this business and B2B firms' inclination to move into it. However, the findings also show that, entering the customer solutions business brings

with it the risk of lower profits, and that incumbent firms are struggling to identify the competencies that they need to build to collaborate with their customers to develop solutions that are profitable for them. Findings of the academic research on customer solutions (Biggemann et al., 2013; Eggert et al., 2014; Renault et al., 2010) are consistent with the German mechanical industry's survey. Specifically, academic research has identified that developing effective solutions for the customer firms is less profitable for B2B firms. The consistent empirical evidence of the current challenges that solution providers face in obtaining a reasonable profit highlights the importance of this thesis's findings, which I summarise and discuss in Sections 5.1 and 5.2.

5.1 Co-creation Orientation and Relationship Marketing

In their review of the state of the literature and research on customer relationship management, Boulding, Staelin, Ehret, and Johnston (2005) underscore that "dual-value" creation (i.e., creating value for customer and supplier firms) is at customer relationship management's core. Thus, Boulding et al. (2005) visualize customer relationship management as a pie-sharing mechanism, which allows firms to learn about their customers to create the value pie and share it with equity and fairness (Jap, 2001).

Interestingly, as Boulding et al. (2005) highlight, most of the popular measures for managing customer relationships are outcome measures (e.g., customer retention, customer migration, customer acquisition, customer lifetime value). These measures are necessary and important for firms to assess the effectiveness of their customer relationship programs. However, these measures:

may not be directly linked to the value dual-creation process... the core concept of CRM. Thus it is essential that the firm also develops measures that are directly connected with the value dual-creation process, enabling

the firm to understand the drivers of value and thus to ensure long-term success. (Boulding et al., 2005, pp. 160, emphasis added).

By conceptualising co-creation orientation as a construct that comprises characteristics that drive the value co-creation process, this thesis addresses Boulding et al. (2005) concerns, which, in my view, have received limited attention from academic researchers in marketing. In Section 5.2, I present the implications of having a co-creation orientation on value creation for the two firms in supplier-customer dyads.

5.2 Co-creation Orientation as a Driver of “Dual Value”

Co-creation is an emergent marketing concept that B2B firms that provide customer solutions and their managers must adopt to create value for each firm (Boulding et al. (2005) use the term “dual-value”). Existing research conceptualises co-creation as a “process” in which customer firms participate to achieve beneficial outcomes (e.g. Bendapudi & Leone, 2003; Bettencourt et al., 2002; Payne, Storbacka, & Frow, 2008; Prahalad & Ramaswamy, 2004). This thesis conceptualises “co-creation orientation” as a construct that drives dyadic investments into a solution, which has an onward effect on solution effectiveness. Therefore, this thesis’s main contribution is in identifying and specifying “co-creation orientation” as a psychological construct (attitude and perceived behavioural control) that shapes the orientation of the two firms in a supplier-customer dyad to work together on a customer solution in order to achieve mutually beneficial outcomes. In Section 5.2.1, I highlight how important it is for supplier firms to recognise co-creation orientation’s importance to drive the value creation for both firms.

5.2.1 Recognising Supplier Co-Creation Orientation

One of the revolutionary concepts in marketing for firms to survive is that they should not focus on selling products, but rather focus on fulfilling their customers’

changing needs (Levitt, 1960). This marketing concept gives foundation to a *dual* process of creating value (i.e., creating value for customers by fulfilling their dynamic needs and, in the process, creating value for the firm by making profit). In today's marketplace, B2B customers expect their suppliers to customise their products and services to meet their idiosyncratic needs. Therefore, traditional B2B manufacturers are increasingly moving into the field of customer solutions. At the same time, marketing and sales managers have to demonstrate the profitability of their individual customer firms to top management on an ongoing basis.

Customer firms' needs heterogeneity and increasing profit pressures suggest that firms need to develop an orientation that is appropriate for their survival and success in increasingly competitive market environments. A co-creation orientation reflects a supplier firm's attitude and perceived behavioural control for working on a solution with its customer firms to achieve mutually beneficial outcomes.

This thesis's findings indicate that supplier firms' capacity to move their customer solution business units to a co-creation orientation will strengthen their position in the market. Importantly, supplier firms need to recognise that co-creation orientation is the right orientation for their customer solutions business units to survive and thrive in the marketplace. This thesis's results suggest that a co-creation orientation leads to superior performance outcomes for both the firms in a supplier-customer dyad.

The five elements of co-creation orientation that I offer are precise and actionable measures that can indicate whether a supplier or customer firm has shown the inclination to develop solutions that are mutually beneficial for them both. Therefore, a co-creation orientation moves the supplier firms away from visualising the customer relationship management mechanism as a pie-splitting mechanism, whereby firms learn

about their customers and then aim for the big slice of the created value, to a mechanism where they are more inclined to share the expanded pie with equity and fairness (Jap, 2001).

For supplier firms, a co-creation orientation requires them to believe in (1) a value trade concept, (2) learning from their customers, and (3) a relationship building focus. Further, it requires suppliers to believe that they have control over critical resources of (4) KAM team skills and ability and (5) solution process articulation.

The first three constituents of co-creation orientation indicate that supplier firms need to inculcate a business philosophy that promotes a culture where value is traded (Anderson et al., 2007), where learning from customers is valued (Sujan, Weitz, & Kumar, 1994), and where a focus on building relationships is promoted (Rust et al., 2010). This proposed orientation resonates with organisational design theory (Tushman & Nadler, 1978), which proposes that an organisational culture that focuses on relationship with its customers may lead to relational behaviours that affect its own performance (Beck & Palmatier, 2012).

KAM team skills and ability refers to the expert account management teams that can identify the needs of key stakeholders in their customer firms, customise and integrate the identified products and services, deploy them in the customer environment, provide pro-active after-sales services, and mitigate risks to ensure that promised solution-related performance outcomes are achieved. Skills and knowledge are fundamental to exchange (Vargo & Lusch, 2004). Therefore, well-trained KAM teams who have expertise in a customer firm's industry would offer far greater benefits to enhance the relationship quality and solution effectiveness than other antecedents. Further, KAM teams facilitate supplier-customer communications through open

dialogues (Prahalad & Ramaswamy, 2004) that help in quickly resolving issues that may emerge between them when developing and providing solutions, and also help align their goals to create more opportunities to create value for each other through enhanced trust and commitment to the relationship (Beck & Palmatier, 2012).

Process articulation requires supplier firms to clearly state and make available to its employees the processes for developing a solution, including the roles and responsibilities of units and functions, rules for specifying reporting structures, the sharing of customer information, and mechanisms for conflict resolution between units and functions involved in developing a solution. Boulding et al. (2005) propose that, given a fixed level of investment into a customer relationship, the effectiveness of customer relationship management activities depends on how they are integrated with existing organisational processes and capabilities. Therefore, organisations that have already integrated co-creation orientation's elements into their core solution business strategy would have an advantage over competitors who don't possess these elements in their organisational culture.

5.2.2 Recognising Customer Co-creation Orientation

Once supplier firms have recognised co-creation orientation's importance for their survival and growth in the customer solutions business, they also need to recognise their customer firms' co-creation orientation. This recognition helps suppliers in two ways. First, supplier firms will be better able to align their investments into a solution with their and their customer firms' co-creation orientation to maximise their customer-based profits. Second, supplier firms can identify the elements of co-creation orientation that the customer lacks, and help them develop these elements to create more value for both firms.

For customer firms, the key to achieve an effective solution from a supplier is to have a positive attitude toward working with them and have control over the required resources to construct the solution with the supplier firm. Similar to supplier co-creation orientation, a co-creation orientation requires customer firms to have a (1) value trade concept, (2) belief in learning from their supplier firms, and (3) a relationship building focus. However, unlike supplier firms, customer firms have perceived control over very different resources: (4) their ability to counsel their suppliers about their business processes and political landscape, and (5) key stakeholders' participation to help supplier firms refine their knowledge about customer needs and preferences. Supplier-customer dyad firms that effectively manage their interactions are increasingly being recognised as sources of competitive advantage (Rayport & Jaworski, 2005). This thesis identifies that both parties require a high co-creation orientation to create a platform to successfully interact to develop and provide customer solutions. This finding is in line with research on supplier-buyer relationships, which identifies that corresponding organisational values, cultures, and goals of two firms in a supplier-buyer relationship have a positive effect on the quality of relationship (Doney & Cannon, 1997). Such cultural similarities also diminish uncertainty about a partner's actions and drive willingness to pay more and be loyal (Homburg, Wieseke, & Hoyer, 2009).

5.2.3 Co-creation Orientation and Customer Selection

Jap and Ganesan (2000) show, that one in three supplier-buyer relationships do not follow a typical relationship growth pattern (i.e., the exploration, build-up, mature, and decline stages). Instead, many relationships lapse back to the earlier stages, and then rebuild or decline. In such situations, supplier firms (and their customer firms) find it difficult to develop the appropriate levels of trust and commitment (Scheer, 2012) to equitably share the returns on investments into the solution being developed.

Further, Johnson and Selnes (2004) emphasise that firms that provide customised services to their customers should focus on building close relationships with them. Similarly, Homburg et al. (2008) emphasise that supplier firms should prioritise customers based on their long-term profit potential and that they should allocate resources to build relationships with them.

As I mention in Section 5.2.1, it is important for supplier firms to be able to recognise co-creation orientation as the primary source of effective and profitable solutions. A failure to do so may result in their inability to reap continued benefits from their key customer firms. In this thesis, evidence of (1) co-creation orientation's positive impact on customer value, and (2) the importance of aligning investments with co-creation orientation, will help managers to focus on building competencies required to deliver effective solutions and increase firm profitability.

In addition, by identifying their customers' degree of co-creation orientation, supplier firms can make informed decisions in selecting and retaining those customer firms that possess the required set of beliefs and attitudes. Therefore, supplier firms will be better equipped to know who their most profitable customers are, which will allow them to focus on retaining them. Further, identifying the right customer firms with whom to co-create successful solutions will help managers allocate their limited resources to customer firms who have the inclination and ability to co-create value.

In summary, this research makes important contributions to marketing theory and practice. This research confirms and extends the prior customer solutions and co-creation literature to provide an evidence-based understanding of co-creation orientation as a positive attitude and perceived behavioural control that is critical to develop and provide customer solutions that are effective for customer firms and profitable for supplier firms. In applying the theory of planned behaviour to my theoretical

framework, I demonstrate the usefulness of theories from social psychology to B2B marketing, which is particularly novel.

This thesis makes three contributions to marketing practice. First, co-creation orientation's elements give supplier firms actionable measures to develop the attitude and competencies required to survive in the customer solutions business. Second, by recognising their customer firms' co-creation orientation, and aligning their investments with the co-creation orientation, supplier firms are more likely to maximise their profits. Third, recognizing both firms' co-creation orientation allows supplier firms to select the right customer firms to build relationships for mutually beneficial outcomes.

This research is relevant to firms as varied as chemical manufacturers (e.g., NOVA Chemicals that helps their customers take *innovative solutions* into markets), motion technology manufacturers (e.g., Parker Hannifin that provides *precision-engineered solutions* for aerospace), security-related firms (e.g., Brinks that provides *transportation and vaulting solutions*), investment banks (e.g., UBS that provides *investment solutions*), information technology solution providers (e.g., Cognizant that provides *IT solutions* to customers), and management consulting firms (e.g., Deloitte that creates powerful *business solutions* for their worldwide clients).

6 Conclusion

This chapter discusses the current research's limitations and possible future research directions. I first outline my thesis's limitations. Next, I discuss possible avenues for future research on customer solutions. Finally, I conclude this chapter and my thesis.

6.1 Limitations

Although this thesis has realised several theoretical and practical contributions, I acknowledge that it has some limitations. First, the limitations of cross-sectional studies are also applicable to this thesis. Given that I used cross-sectional data, I captured the firms' co-creation orientation, their effect on dyadic investments in a solution, and dyadic investments' onward effect on solution effectiveness at a single point in time. One could argue that co-creation orientation evolves with time as dyads get to know each other better with the passage of time. A longitudinal survey would be able to capture this phenomenon.

Second, the results' generalisability for the RSN Study and the Dyadic Study are limited due to different reasons. I collected the data for the RSN Study from key informants only in U.S. firms. One could argue that supplier-customer relationships in countries with other cultures could be different to U.S. business relationships. The market characteristics in other countries such as market size, legal system, economic development, market uncertainty, and nature and intensity of competition could be different to the economic, legal, and market environment in which buyers and suppliers work in the US. Therefore, the findings of this study are generalisable only to markets that are similar to the U.S. market.

My Dyadic Study represents data collected from supplier key informants and customer key informants from firms with global operations and that, therefore, represented culturally diverse business relationships. I collected data for my Dyadic Study from only one industry that supplied customer solutions in the context of technology-enabled business process solutions. Therefore, findings for the customer-based profitability model cannot be necessarily generalised to other industries.

Third, my Dyadic Study had a small sample size ($n = 51$ matched dyads). As such, a larger sample could provide more confidence towards generalising the study's findings. However, the effect sizes and their statistical significance lend credence to the findings.

Another limitation is that a dyad's firms' co-creation orientation could be influenced by their investments into a customer solution. One could argue that previous experience with investments in co-creation processes with a particular customer may influence the orientation. Given the cross-sectional design of research, I could not capture this reverse causation, and, as such, it is a limitation. Ideally, this type of analysis requires a longitudinal study. However, I did compare the Akaike information corrected criterion (AICc) of my hypothesised model with a model in which dyadic investments predict co-creation orientation of a dyad's two firms. The results indicate that the hypothesised model in my thesis provides a better fit with the data, and, therefore, is the preferred model.

6.2 Future Research Directions

There are several key factors beyond this thesis's scope that I leave for future investigation. Specifically, I offer three future directions for further research in the area of customer solutions. First, my research investigates situations where single supplier firms provide solutions to their business customers. However, a supplier firm may

choose to provide a complete solution by itself, or it may work with other supplier firms to provide the solution. Therefore, it would be useful to investigate situations where multiple supplier firms provide different components of a customer solution to a particular customer firm.

Second, future research could investigate the dyadic factors that moderate the relationship between dyadic investments and solution effectiveness. Dyads could develop capabilities that may enhance the relationship between investments and solution effectiveness. Equally, different contexts such as supplier/customer industry, type of solution provided, and country culture may affect this relationship.

Finally, this thesis only measures firms' co-creation orientation at a particular point in time. The cross sectional nature of the data in my thesis limits the understanding of this phenomenon. However, attitudes and capabilities evolve over time, and may significantly change over the course of time or be affected by the relationship phase between partner firms. Future research could incorporate longitudinal data to understand the dynamics of the relationship between firms' co-creation orientation and the level of investments made and their onward effect of solution effectiveness and firm profitability.

6.3 Concluding Remarks

To conclude, I present an overview of my thesis, its theoretical framework, research strategy, and research contributions. As such, in this thesis, I identify the drivers of customer solutions that are both effective for customer firms *and* profitable for supplier firms in B2B markets. In a stage-wise value aggregation framework, I investigated how value is created for each firm in a supplier-customer dyad when providing solutions.

In this thesis, I introduce the co-creation orientation construct that reflects a supplier or customer firm's attitude and perceived behavioural control for working on a solution with another firm to achieve mutually beneficial outcomes. Building on existing research on customer solutions, I propose that a high degree of co-creation orientation in a supplier-customer dyad's firms leads to high level of dyadic investments into a customer solution. These dyadic investments combine with the dyad's interaction efficacy to improve solution effectiveness. Solution effectiveness has a positive impact on customer-based relational performance. Importantly, I propose that, to maximise profits from a customer firm, supplier firms need to avoid investments that are misaligned with each firm's co-creation orientation. Misaligned investments have a negative effect on solution effectiveness and customer-based profit performance. Finally, customer-based profit performance has a positive effect on a supplier firm's overall profits.

This study involved: (1) a qualitative stage to conceptualise and develop measurement scales for the focal constructs under investigation, (2) a pilot study to purify and refine constructs' measurement models by evaluating their validity and reliability, (3) a study to test the structural model (theoretical framework) in a generalisable manner, and (4) a study to verify and extend the structural model using a new data set. Results across these studies broadly support my research hypotheses.

Finally, this thesis makes three contributions to marketing theory and practice. First, co-creation orientation's elements give supplier firms actionable measures to develop the attitude and competencies required to survive in the customer solutions business. Second, by recognising their customer firms' co-creation orientation and aligning their investments with the co-creation orientation, supplier firms are more likely to maximise their profits. Third, recognising the co-creation orientation of both

firms in a supplier-customer dyad allows the supplier firms to select the right customer firms to develop mutually beneficial relationships.

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Appendix A – Expert Raters’ View on Survey Questionnaire Items

We would be grateful if you could spare some time to help us develop a better questionnaire to study the customer solutions business. Your participation will help us in refining and finalizing the items (questions) for our survey research on developing effective and profitable customer solutions. It will take approximately 15-20 minutes to complete this exercise. We sincerely thank you for taking the time to help us with our research.

Description of your task:

We are generally interested in your expert view on whether our survey is measuring what it purports to measure. Sales managers in supplier firms are the primary respondents for our survey. They will be asked to report on their firm’s orientation toward doing business with their customers, as well as their perceptions of their customers’ orientation towards doing business with them. For example, we are proposing to measure the concept of “*Supplier’s belief in learning from customers*” by asking sales managers to indicate their level of agreement with the following statement:

	Strongly disagree					Strongly agree
1. We encourage our customers to tell us their opinions of our products and services.	☐	☐	☐	☐	☐	

For your expert task, we would like you to inform us about the suitability of the above statement in measuring the concept called “*Supplier’s belief in learning from customers*,” using a scale of 1 to 5, where:

1 = Most Unsuitable, 2 = Not Suitable, 3 = Somewhat Suitable, 4 = Suitable, and 5 = Most Suitable

To do so, you will be first provided with the definition of the concept, and then be asked to indicate your expert view about the suitability of the statement in measuring the concept. To give a suitability rating to an item, *click* on the “Suitability Rating” box on the extreme right and *choose* the appropriate numeral from the dropdown menu based on the rating scale given above. An illustrative example is as below:

Supplier’s belief in learning from customers: A supplier’s belief in learning from its customers refers to the supplier’s aspiration to work on a business solution with its customers as a source of learning, knowledge, and competence.					
	Strongly Disagree			Strongly Agree	Suitability Rating
1. We encourage our customers to tell us their opinions of our products and services.	☐	☐	☐	☐	4

In the above example, a 4 in the suitability rating box implies that an expert rater believes that the statement is “Suitable” to measure the concept of “*Supplier’s belief in learning from customers.*”

On the pages that follow, you will see several concepts and their definitions, followed by statements that purport to measure the concept. Please report the degree to which each statement suitably measures the related concept.

Please go on to the next page

SECTION 1: SUPPLIER’S ORIENTATION TOWARDS DOING BUSINESS WITH CUSTOMERS

The defined concepts and related statements below refer to a supplier’s orientation towards doing business with its customers. Please indicate *the suitability of each statement in measuring the concept related to it*. Where:

1 = Most Unsuitable, 2 = Not Suitable, 3 = Somewhat Suitable, 4 = Suitable, and 5 = Most Suitable

To give a suitability rating to an item, *click* on the “Suitability Rating” box on the extreme right and *choose* the appropriate numeral from the dropdown menu based on the rating scale given above.

Supplier’s value trading concept: Supplier’s value trading concept is defined as a supplier’s desire to get an equitable financial return for the superior value delivered to their customers.

	Strongly Disagree				Strongly Agree	
1. We prefer to offer service contracts that outline performance targets for our products and services.	☐	☐	☐	☐	☐	Suitability Rating
2. We prefer that our customers let us perform their business processes related to the use of our products.	☐	☐	☐	☐	☐	Suitability Rating
3. We prefer to offer service contracts that are not just limited to our products’ routine maintenance and timely repairs.	☐	☐	☐	☐	☐	Suitability Rating

Supplier’s relationship building focus: A supplier’s relationship building focus refers to the supplier’s intent to engage in a sustained business relationship with a current or potential customer.

	Strongly Disagree				Strongly Agree	
1. We believe in maintaining a close relationship with our customers.	☐	☐	☐	☐	☐	Suitability Rating
2. We seek exclusive business from our customers.	☐	☐	☐	☐	☐	Suitability Rating
3. We seek long-term partnerships with our customers.	☐	☐	☐	☐	☐	Suitability Rating

Supplier’s belief in learning from customers: A supplier’s belief in learning from its customers refers to the supplier’s aspiration to work on a business solution with its customers as a source of learning, knowledge, and competence.

	Strongly Disagree				Strongly Agree	
1. Our customers are an important source of information to us.	☐	☐	☐	☐	☐	Suitability Rating
2. Our customers are an important source of knowledge to us.	☐	☐	☐	☐	☐	Suitability Rating
3. We can always learn something new from our customers.	☐	☐	☐	☐	☐	Suitability Rating
4. Customers may help us improve our product and service offers to them.	☐	☐	☐	☐	☐	Suitability Rating

Supplier Key Account Management Teams' (KAMs) skills and ability: KAM teams' skills and ability refers to the team's knowledge about their customers' industry, operations and needs.

	Strongly Disagree				Strongly Agree	
1. Our key account management teams (KAMs) are highly knowledgeable about our customers' industries.	☐	☐	☐	☐	☐	Suitability Rating
2. Our KAMs are highly skilled in understanding the needs of our customers.	☐	☐	☐	☐	☐	Suitability Rating
3. Our KAMs are highly skilled in understanding the relative importance of needs of different stakeholders in our customer firms.	☐	☐	☐	☐	☐	Suitability Rating
4. Our KAMs have excellent relationships with influential stakeholders in our customer firms.	☐	☐	☐	☐	☐	Suitability Rating

Process articulation: Process articulation refers to the extent to which a supplier firm clearly states and makes available to its employees the processes for developing a solution, including the clarification of roles and responsibilities of units and functions, rules for specifying reporting structures, sharing of customer information, and mechanisms for conflict resolution between units and functions involved in developing a solution.

	Strongly Disagree				Strongly Agree	
1. We have documented roles and responsibilities of different units for developing customer solutions.	☐	☐	☐	☐	☐	Suitability Rating
2. We have a documented system for specifying reporting structures between different units for solution provision.	☐	☐	☐	☐	☐	Suitability Rating
3. We have documented processes for sharing of customer information between different units.	☐	☐	☐	☐	☐	Suitability Rating
4. We have mechanisms for conflict resolution between different units for solution provision.	☐	☐	☐	☐	☐	Suitability Rating

SECTION 2: CUSTOMER'S ORIENTATION TOWARDS DOING BUSINESS WITH SUPPLIERS

The defined concepts and related statements below refer to a supplier manager's perception of a customer's orientation towards doing business. Please indicate *the suitability of each statement in measuring the concept related to it*.

Some statements have an (R) at the end, which means that the statement captures a concept's opposite. For statements that have an (R) at the end, please indicate *its suitability in measuring the concept's opposite*.

Customer's value trading concept: Customer's value trading concept is defined as a customer's willingness to give an equitable financial return for the superior value gained from their suppliers.

	Strongly Disagree				Strongly Agree	
1. This customer prefers its suppliers to outline performance targets for products and services supplied by them.	☐	☐	☐	☐	☐	Suitability Rating
2. This customer prefers that its suppliers perform the business processes related to products supplied by them.	☐	☐	☐	☐	☐	Suitability Rating
3. This customer prefers to give service contracts that are not just limited to routine maintenance and timely repairs of products.	☐	☐	☐	☐	☐	Suitability Rating

Customer's relationship building focus: A customer's relationship building focus refers to the customer's intent to engage in a sustained business relationship with a current or potential supplier.

	Strongly Disagree				Strongly Agree	
1. This customer believes in maintaining a close relationship with us.	☐	☐	☐	☐	☐	Suitability Rating
2. This customer seeks to give exclusive business to us I we can satisfy its business needs.	☐	☐	☐	☐	☐	Suitability Rating
3. This customer seeks long-term partnerships with us.	☐	☐	☐	☐	☐	Suitability Rating

Customer's belief in learning from suppliers: A customer's belief in learning from its suppliers refers to the customer's aspiration to work on a business solution with its suppliers as a source of learning, knowledge, and competence.

	Strongly Disagree				Strongly Agree	
1. This customer believes that their suppliers are an important source of information for them.	☐	☐	☐	☐	☐	Suitability Rating
2. This customer believes that their suppliers are an important source of knowledge for them.	☐	☐	☐	☐	☐	Suitability Rating
3. This customer is willing to learn something new from its suppliers.	☐	☐	☐	☐	☐	Suitability Rating
4. This customer believes that its suppliers may help improve its business processes.	☐	☐	☐	☐	☐	Suitability Rating

Customer’s key stakeholder participation: Key stakeholder participation refers to direct interaction of the key decision-makers in the customer firm, such as senior management, with the KAM team members in the supplier firm.

	Strongly Disagree				Strongly Agree	
1. This customer gives us access to their senior management.	☐	☐	☐	☐	☐	Suitability Rating
2. This customer’s key decision makers are willing to interact with us.	☐	☐	☐	☐	☐	Suitability Rating
3. In this customer firm, stakeholders belonging to different areas willingly interact with us.	☐	☐	☐	☐	☐	Suitability Rating

Counselling ability: Counselling ability refers to the extent to which a customer firm is able to guide the supplier firm on operational matters, such as technical systems, business processes, and company policies, as well as priorities and relative influence of different stakeholders in their firm.

	Strongly Disagree				Strongly Agree	
1. Our main contact person in this customer helps us understand the priorities of different stakeholders in their firm.	☐	☐	☐	☐	☐	Suitability Rating
2. Our main contact person in this customer guides us in understanding the relative influence of different stakeholders in their firm.	☐	☐	☐	☐	☐	Suitability Rating
3. This customer is skilful in guiding us on their operations, such as technical systems, business processes, and company policies.	☐	☐	☐	☐	☐	Suitability Rating

SECTION 3: DYADIC COMPETENCE & SOLUTION EFFECTIVENESS

The defined concepts and related questions below refer to a supplier manager’s perception of a supplier-customer dyad’s competence, and effectiveness of the customer solution being provided. Please indicate *the suitability of each question in measuring the concept related to it.*

Interaction efficacy: Interaction efficacy is defined as the timely access of key stakeholders and management in the customer firm by the supplier KAM teams, and getting relatively quick decisions to achieve the desired results.

1. How often do your interactions with this customer’s management get you the desired outcomes?	very rarely	☐	☐	☐	☐	very frequently	Suitability Rating
2. How often do you get timely decisions from this customer’s management?	very rarely	☐	☐	☐	☐	very frequently	Suitability Rating
3. How often are you able to promptly interact with this customer’s management?	very rarely	☐	☐	☐	☐	very frequently	Suitability Rating

Product & service customization: Customized and integrated products and services are focused on customer needs and fit into customer’s existing infrastructure, working with each other effectively.

1. How successful have you been in customizing your products to meet the needs of different stakeholders within this customer firm?	very unsuccessful		☐	☐	☐	☐	very successful	Suitability Rating
2. How successful have you been in integrating your products and services with this customer’s infrastructure to meet the needs of different stakeholders?	very unsuccessful		☐	☐	☐	☐	very successful	Suitability Rating

Proactive after-sales management: Pro-active after-sales services management refers to the ability of a supplier-customer dyad to take initiatives to avoid operational breakdowns at the customer end, discuss efficient use of supplier’s products based on product/service usage data, and identify the future requirements and training needs of the customer staff.

1. How successful are you at avoiding breakdowns in your products and services that are being used by this customer?	very unsuccessful		☐	☐	☐	☐	very successful	Suitability Rating
2. How successful are you in identifying the future training needs of this customer regarding the use of new product offers?	very unsuccessful		☐	☐	☐	☐	very successful	Suitability Rating
3. How successful are you in maintaining up-to-date information on this customer’s usage of your products and services and related business processes?	very unsuccessful		☐	☐	☐	☐	very successful	Suitability Rating

Risk mitigation capability: Risk mitigation capability is a supplier-customer dyad’s ability to reduce uncertainty by designing and executing safeguarding mechanisms to meet operational outcomes for the customer firm.

1. How successful are you in installing mechanisms that reduce uncertainty of performance-outcomes of your products and services being used by this customer?	very unsuccessful		☐	☐	☐	☐	very successful	
2. How certain are you that contractually agreed-upon outcomes of your offerings to this customer will be realized?	very uncertain		☐	☐	☐	☐	very certain	
3. As compared to your other customers, what is the relative duration of your business contract with this customer?	much shorter		☐	☐	☐	☐	much longer	
4. As compared to your other customers, how successful have you been in getting exclusive/guaranteed business from this customer?	very unsuccessful		☐	☐	☐	☐	very successful	

Customer satisfaction: Customer satisfaction refers to the extent to which a customer is satisfied with the (a) solution performance for the purpose for which it was built, (b) solution development process, and (c) after-sales support.

	Strongly Disagree				Strongly Agree	
1. Our products and services provided to this customer meet the performance standards for the purpose for which they were built.	☐	☐	☐	☐	☐	
2. In my view, this customer is satisfied with the manner in which we built the solution being provided to them.	☐	☐	☐	☐	☐	
3. In my view, this customer is satisfied with the after-sales support being provided to them.	☐	☐	☐	☐	☐	

Positive word-of-mouth: Positive word of mouth refers to the acts of communicating positive experiences with a product or service of an organization by an existing customer to other existing or potential customers and referring and recommending to them the firm's products and services.

	Strongly Disagree				Strongly Agree	
1. This customer has referred new customers to us.	☐	☐	☐	☐	☐	
2. This customer positively relates its experiences with our products and services to others.	☐	☐	☐	☐	☐	
3. This customer recommends our products and services to others.	☐	☐	☐	☐	☐	
4. This customer has only good things to say about us to others.	☐	☐	☐	☐	☐	

Customer Commitment: Customer commitment represents a customer's desire and motivation to maintain a valued relationship with the supplier firm.

	Strongly Disagree				Strongly Agree	
1. This customer wants to continue doing business with us.	☐	☐	☐	☐	☐	
2. This customer goes an extra mile to work with us.	☐	☐	☐	☐	☐	
3. This customer wants to help us achieve our goals.	☐	☐	☐	☐	☐	
4. This customer cares about the future of our firm.	☐	☐	☐	☐	☐	

Thank You

Appendix B1 – Pilot Study: Reliability & Validity Estimates of Items & Constructs

Scale Name & Item code	Item description	Mean	Std. Dev.	Corrected Item-Total Correlation	Squared Multiple Correlation*	Average Variance Extracted*	Coefficient's Alpha
Supplier value trading concept							
VTC1	We prefer to offer service contracts that outline performance targets for our products and services.	4.52	0.57	0.80	0.65	0.61	0.89
VTC2	We prefer to perform our customers' business processes related to the use of our products.	4.52	0.63	0.75	0.56		
VTC3	We prefer to offer service contracts that are not just limited to our products' routine maintenance and timely repairs.	4.52	0.51	0.78	0.63		
Supplier relationship-building focus							
RBF1	We believe in maintaining a close relationship with our customers even if it is costly in the short-run.	4.41	0.68	0.81	0.65	0.75	0.93
RBF2	We believe in continuously expanding and enhancing relationship with our customers.	4.55	0.51	0.86	0.78		
RBF3	We seek long-term partnerships with few customers over short-term engagements with many customers.	4.45	0.63	0.88	0.81		
Supplier belief in learning from customers							
BL1^	Our customers are an important source of information to us (deleted).	4.62	0.56	-	-	0.87	0.96
BL2	Our customers are an important source of knowledge to us.	4.62	0.56	0.96	0.93		
BL3	We can always learn something new from our customers.	4.62	0.56	0.87	0.79		
BL4	Customers may help us improve our product and service offers to them.	4.66	0.55	0.91	0.89		
Supplier KAM Team Skills and Ability							
KAM1	Our key account management teams (KAMs) are highly knowledgeable about our customers' industries.	4.45	0.63	0.88	0.85	0.81	0.95
KAM2	Our KAMs are highly skilled in understanding the needs of our customers.	4.45	0.63	0.92	0.88		
KAM3	Our KAMs are highly skilled in understanding the relative importance of needs of different stakeholders in our customer firms.	4.38	0.62	0.83	0.74		
KAM4	Our KAMs have excellent relationships with influential stakeholders in our customer firms.	4.38	0.56	0.86	0.75		
* Items that have squared multiple correlations of less than 0.5, and constructs that have Average Variance Extracted (AVE) values of less than 0.5 (Mackenzie et al., 2011) were revised in consultation with expert judges (Rossiter, 2002).							
^ Item deleted because it had a correlation of 1 with BL2, and upon consultation expert judges preferred BL2 over BL1.							

Scale Name & Item code	Item description	Mean	Std. Dev.	Corrected Item-Total Correlation	Squared Multiple Correlation	Average Variance Extracted	Coefficient's Alpha
Supplier Process Articulation							
PROC1	We have clearly defined roles and responsibilities of different units for developing customer solutions.	4.34	0.77	0.90	0.87	0.82	0.96
PROC2	We have a clear-cut system for specifying reporting structures between different units for solution provision.	4.38	0.78	0.91	0.86		
PROC3	We have clearly defined processes for sharing of customer information between different units.	4.24	0.87	0.91	0.84		
PROC4	We have mechanisms for conflict resolution between different units for solution provision.	3.97	1.05	0.83	0.72		
Customer Value Trading Concept							
CVTC1	This customer is willing to assume a business risk by letting us perform its own processes related to products & services provided by us.	3.86	0.92	0.87	0.75	0.75	0.94
CVTC2	This customer prefers to engage in complex performance-based contracts over basic fee-based contracts.	3.86	0.92	0.87	0.75		
CVTC3	This customer is not afraid of getting involved in gain-sharing agreements with us.	3.72	0.84	0.87	0.75		
Customer Relationship-building Focus							
CRBF1	This customer believes in maintaining a close relationship with us.	3.86	1.03	0.90	0.86	0.74	0.91
CRBF2	This customer seeks to give exclusive business to us if we can satisfy its business needs.	3.31	1.11	0.71	0.54		
CRBF3	This customer seeks long-term partnerships with us.	3.86	1.13	0.84	0.83		
Customer belief in learning from suppliers							
CBL1^	This customer believes that its suppliers are an important source of information for them (deleted) .	4.07	0.96	-	-	0.90	0.97
CBL2	This customer believes that its suppliers are an important source of knowledge for them.	4.07	0.96	0.97	0.94		
CBL3	This customer is willing to learn something new from its suppliers.	3.90	1.14	0.91	0.84		
CBL4	This customer believes that its suppliers may help improve its business processes.	4.07	0.96	0.94	0.92		
Customer Key Stakeholder Participation							
CKSP1	This customer gives us access to their senior management.	3.07	1.19	0.91	0.83	0.89	0.97
CKSP2	This customer's key decision makers are willing to interact with us.	3.34	1.23	0.96	0.93		
CKSP3	In this customer firm, stakeholders belonging to different areas willingly interact with us.	3.28	1.22	0.95	0.92		
^ Item deleted because it had a correlation of 1 with CBL2, and upon consultation expert judges preferred CBL2 over CBL1.							

Scale Name & Item code	Item description	Mean	Std. Dev.	Corrected Item-Total Correlation	Squared Multiple Correlation	Average Variance Extracted	Coefficient's Alpha
Counselling ability							
CSL1	Our main contact person in this customer firm helps us understand the priorities of different stakeholders in their firm.	3.66	1.14	0.95	0.95		
CSL2	Our main contact person in this customer firm guides us in understanding the relative influence of different stakeholders in their firm.	3.72	1.10	0.96	0.95	0.89	0.97
CSL3	This customer is skilful in guiding us on their operations, such as technical systems, business processes, and company policies.	3.52	1.15	0.88	0.78		
Supplier investments in solution							
INVCOM1	How much have you invested into the following elements of the solution being provided to this customer, as compared to your <u>other customers</u> ? a. communication interfaces and processes	4.07	0.80	0.89	0.82	0.77	0.93
INVPROD1	b. customized products	4.28	0.80	0.79	0.74		
INVAS1	c. after-sales services	4.14	0.99	0.92	0.88		
INVRSH1	d. research and development to offer new products and services	3.52	1.09	0.76	0.63		
Interaction Efficacy							
IE1	How good are the communication processes in place with this customer?	3.93	0.92	0.81	0.66		
IE2	How timely are the decisions from this customer's management?	3.24	1.30	0.80	0.64	0.65	0.91
IE3	How easy is it to interact with this customer's management?	3.48	1.21	0.85	0.72		
Solution Effectiveness				Solution Effectiveness is a formative construct. Please refer to section 4.1.3 for assessment of construct validity for Solution Effectiveness.			
SE1	How successful are you at avoiding breakdowns in your products and services that are being used by this customer?	4.07	0.88				
SE2	How successful have you been in customizing your products to meet the needs of different stakeholders within this customer firm?	3.90	0.77				
SE3	How successful have you been in integrating your products and services with this customer's infrastructure to meet the needs of different stakeholders?	4.07	0.80				
SE4	How certain are you that contractually agreed-upon outcomes of your offerings to this customer will be realized, as compared to your other customers?	4.10	0.98				

Scale Name & Item code	Item description	Mean	Std. Dev.	Corrected Item-Total Correlation	Squared Multiple Correlation	Average Variance Extracted	Coefficient's Alpha
Dyadic Investments in solution							
DINV1	How much investments have you and this customer together made in building up this solution?	4.00	0.76	0.36	0.14	0.61	0.78
DINV2	If your relationship with this customer were to end, how much investment that is made into building this solution would both the firms be wasting?	4.55	0.57	0.72	0.84		
DINV3	If your relationship with this customer were to end, how much knowledge that is tailored to advance this solution would both the firms be wasting?	4.48	0.63	0.74	0.84		
Customer-based relational performance							
CBRP1	Our products and services provided to this customer meet the performance standards for the purpose for which they were built.	4.48	0.63	0.67	0.52	0.75	0.90
CBRP2	In my view, this customer is satisfied with the manner in which we built the solution being provided to them.	4.28	0.80	0.83	0.92		
CBRP3	In my view, this customer is satisfied with the after-sales support being provided to them.	4.28	0.88	0.84	0.93		
CBRP4	This customer positively relates its experiences with our products and services to others.	3.86	0.88	0.82	0.83		
CBRP5	This customer recommends our products and services to others.	3.86	0.88	0.72	0.77		
CBRP6	This customer wants to continue doing business with us.	4.41	0.73	0.77	0.63		
Customer-based profit performance							
CBPP1	Relative to our other customers, this customer is more profitable to us.	3.48	1.21	0.88	0.81	0.72	0.92
CBPP2	This customer has a long-term profit potential.	3.38	1.35	0.86	0.80		
CBPP3	Our profitability from this customer has improved over the last year.	3.41	1.24	0.75	0.56		
* Items that have squared multiple correlations of less than 0.5, and constructs that have Average Variance Extracted (AVE) values of less than 0.5 (Mackenzie et al., 2011) were revised in consultation with expert judges (Rossiter, 2002).							

Appendix B2 – Pilot Study: Reliability & Validity Estimates of Second-order Constructs

Construct Name & Composite Items	Mean	Std. Dev.	Corrected Item-Total Correlation	Squared Multiple Correlation	Average Variance Extracted	Coefficient' Alpha
Supplier co-creation orientation						
Value trading concept (VTC)	4.52	0.52	0.35	0.31	0.54	0.84
Relationship building focus (RBF)	4.47	0.57	0.75	0.57		
Belief in learning from customers (BL)	4.63	0.54	0.60	0.53		
Key account team skills and ability (KAM)	4.41	0.57	0.81	0.67		
Process articulation (PROC)	4.23	0.81	0.77	0.64		
Customer co-creation orientation						
Value trading concept (CVTC)	3.82	0.84	0.79	0.76	0.77	0.95
Relationship building focus (CRBF)	3.68	1.00	0.89	0.81		
Belief in learning from suppliers (CBL)	4.01	1.00	0.83	0.73		
Counseling ability (CSL)	3.63	1.10	0.90	0.77		
Key stakeholder participation (CKSP)	3.23	1.18	0.89	0.79		

Note: This analysis is based on composite variables created by calculating the mean value of scale item scores, and treating these composite variables as reflective indicators of each second-order construct rather than its dimensions.

Appendix B3 – Pilot Study: Discriminant Validity of the Constructs

Construct	Coefficient Alpha	Average Variance Extracted	Highest Shared Variance
SCCO	0.84	0.54	0.05
CCCO	0.95	0.77	0.72
SI	0.93	0.77	0.33
DINV	0.78	0.61	0.33
IE	0.91	0.67	0.72
SE ¹	-	-	0.50
CBRP	.92	0.77	0.55
CBPP	0.92	0.72	0.62

¹Formative Construct

Appendix C – Measurement Scale Items in Supplier Survey Instrument

Code	Construct Name	Description
VTC1	Supplier value trade concept	We prefer to offer service contracts that outline performance targets for our products and services.
VTC2	Supplier value trade concept	We prefer to perform our customers’ business processes related to the use of our products.
VTC3	Supplier value trade concept	We prefer to offer service contracts that are not just limited to our products’ routine maintenance and timely repairs.
RBF1	Supplier relationship building focus	We believe in maintaining a close relationship with our customers even if it is costly in the short-run.
RBF2	Supplier relationship building focus	We believe in continuously expanding and enhancing relationship with our customers.
RBF3	Supplier relationship building focus	We seek long-term partnerships with few customers over short-term engagements with many customers.
BL1	Supplier belief in Learning from customers	Our customers are an important source of knowledge to us.
BL2	Supplier belief in Learning from customers	We can always learn something new from our customers.
BL3	Supplier belief in Learning from customers	Customers may help us improve our product and service offers to them.
KAM1	KAM team skills and ability	Our key account management teams (KAMs) are highly knowledgeable about our customers' industries.
KAM2	KAM team skills and ability	Our KAMs are highly skilled in understanding the needs of our customers.
KAM3	KAM team skills and ability	Our KAMs are highly skilled in understanding the relative importance of needs of different stakeholders in our customer firms.
KAM4	KAM team skills and ability	Our KAMs have excellent relationships with influential stakeholders in our customer firms.
PROC1	Process articulation	We have clearly defined roles and responsibilities of different units for developing customer solutions.
PROC2	Process articulation	We have a clear-cut system for specifying reporting structures between different units for solution provision.
PROC3	Process articulation	We have clearly defined processes for sharing of customer information between different units.
PROC4	Process articulation	We have mechanisms for conflict resolution between different units for solution provision.

Code	Construct Name	Description
CVTC1	Customer value trade concept	This customer is willing to assume a business risk by letting us perform its own processes related to products & services provided by us.
CVTC2	Customer value trade concept	This customer prefers to engage in complex performance-based contracts over basic fee-based contracts.
CVTC3	Customer value trade concept	This customer is not afraid of getting involved in gain-sharing agreements with us.
CRBF1	Customer relationship building focus	This customer believes in maintaining a close relationship with us.
CRBF2	Customer relationship building focus	This customer seeks to give exclusive business to us if we can satisfy its business needs.
CRBF3	Customer relationship building focus	This customer seeks long-term partnerships with us.
CBL1	Customer belief in learning from supplier	This customer believes that its suppliers are an important source of knowledge for them.
CBL2	Customer belief in learning from supplier	This customer is willing to learn something new from its suppliers.
CBL3	Customer belief in learning from supplier	This customer believes that its suppliers may help improve its business processes.
CKSP1	Customer key stakeholder participation	This customer gives us access to their senior management.
CKSP2	Customer key stakeholder participation	This customer's key decision makers are willing to interact with us.
CKSP3	Customer key stakeholder participation	In this customer firm, stakeholders belonging to different areas willingly interact with us
CSL1	Counselling ability	Our main contact person in this customer firm helps us understand the priorities of different stakeholders in their firm.
CSL2	Counselling ability	Our main contact person in this customer firm guides us in understanding the relative influence of different stakeholders in their firm.
CSL3	Counselling ability	This customer is skilful in guiding us on their operations, such as technical systems, business processes, and company policies.

Code	Construct Name	Description
INVCOM1	Supplier investment	How much have you invested into the following elements of the solution being provided to this customer, as compared to your other customers?
INVPROD1	Supplier investment	a. communication interfaces and processes
INVAS1	Supplier investment	b. customized products
INVRSH1	Supplier investment	c. after-sales services
		d. research and development to offer new products and services
CREV	Sales revenue earned from customer	How much sales revenue did your division/unit earn from this customer during the last financial year?
RSHIP	Years of relationship with customer	How many years has your division/unit been doing business with this customer?
IE1	Interaction efficacy	How good are the communication processes in place with this customer?
IE2	Interaction efficacy	How timely are the decisions from this customer's management?
IE3	Interaction efficacy	How easy is it to interact with this customer's management?
SE1	Solution effectiveness	How successful have you been in customizing your products to meet the needs of different stakeholders within this customer firm?
SE2	Solution effectiveness	How successful have you been in integrating your products and services with this customer's infrastructure to meet the needs of different stakeholders?
SE3	Solution effectiveness	How successful are you at avoiding breakdowns in your products and services that are being used by this customer?
SE4	Solution effectiveness	How certain are you that contractually agreed-upon outcomes of your offerings to this customer will be realized, as compared to your other customers?
DINV1	Dyadic investment	How much investment have you and this customer together made in building up this solution?
DINV2	Dyadic investment	How much investment made into building this solution would both firms be wasting if your relationship with this customer were to end?
DINV3	Dyadic investment	How much knowledge that is tailored to advance this solution would both firms be wasting if your relationship with this customer were to end?

Code	Construct Name	Description
CBRP1	Customer satisfaction	Our products and services provided to this customer meet the performance standards for the purpose for which they were built.
CBRP2	Customer satisfaction	In my view, this customer is satisfied with the manner in which we built the solution being provided to them.
CBRP3	Customer satisfaction	In my view, this customer is satisfied with the after-sales support being provided to them.
CBRP4	Positive word-of-mouth	This customer positively relates its experiences with our products and services to others.
CBRP5	Positive word-of-mouth	This customer recommends our products and services to others.
CBRP6	Customer commitment	This customer wants to continue doing business with us.
CBPP1	Customer-based profit performance	Relative to our other customers, this customer is more profitable to us.
CBPP2	Customer-based profit performance	This customer has a long-term profit potential.
CBPP3	Customer-based profit performance	Our profitability from this customer has improved over the last year.
OP1	Overall profitability	Our division/unit's current profits are higher than our main competitors.
COMP1	Competitive intensity	In our business, competitors can readily match any product or service that a firm can offer to its customers.
COMP2	Competitive intensity	Competition in our industry is cutthroat.
COMP3	Competitive intensity	Our competitors are relatively strong.
MT1	Market turbulence	In our markets, we encounter new customers who have product-related needs different from those of our existing customers.
MT2	Market turbulence	In our markets, customers' needs and preferences change rapidly over time.
MT3	Market turbulence	Our customers tend to look for new products all the time.
SIZE	Number of employees in business unit	How many people are employed in your division/unit?

Appendix D – Measurement Scale Items in Customer Survey Instrument

Code	Construct Name	Description
CVTC1	Customer Value Trade Concept	We are willing to assume a business risk by letting our suppliers perform our own processes related to products & services provided by them.
CVTC2	Customer value trade concept	We prefer to engage in complex performance-based contracts over basic fee-based contracts.
CVTC3	Customer value trade concept	We are not afraid of getting involved in gain-sharing agreements with our suppliers.
CRBF1	Customer relationship building focus	We believe in maintaining a close relationship with our suppliers.
CRBF2	Customer relationship building focus	We seek to give exclusive business to our suppliers if they can satisfy our business needs.
CRBF3	Customer relationship building focus	We seek long-term partnerships with our suppliers.
CBL1	Customer Belief in Learning from Supplier	We believe that our suppliers are an important source of knowledge for us.
CBL2	Customer Belief in Learning from Supplier	We are willing to learn something new from our suppliers.
CBL3	Customer Belief in Learning from Supplier	We believe that our suppliers may help improve our business processes.
CKSP1	Customer key stakeholder participation	We give our suppliers access to our senior management.
CKSP2	Customer key stakeholder participation	Our key decision makers are willing to interact with our suppliers.
CKSP3	Customer key stakeholder participation	In our firm, stakeholders belonging to different areas willingly interact with our suppliers.
CSL1	Counselling ability	We help our suppliers understand the priorities of different stakeholders in our firm.
CSL2	Counselling ability	We guide our suppliers in understanding the relative influence of different stakeholders in our firm.
CSL3	Counselling ability	We are skilful in guiding our suppliers on our operations, such as technical systems, business processes, and company policies.

Code	Construct Name	Description
IE1	Interaction efficacy	How good are the communication processes put in place by this supplier?
IE2	Interaction efficacy	How timely is your management able to make decisions regarding the solution being developed by this supplier?
IE3	Interaction efficacy	How easy is it for this supplier to interact with your management?
SE1	Solution effectiveness	How successful has this supplier been in customizing its products to meet the needs of different stakeholders within your firm?
SE2	Solution effectiveness	How successful has this supplier been in integrating its products and services with your firm's infrastructure to meet the needs of different stakeholders?
SE3	Solution effectiveness	How successful is this supplier at avoiding breakdowns in its products and services that are being used by you?
SE4	Solution effectiveness	How certain are you that this supplier will realize the contractually agreed-upon outcomes with you?
DINV1	Dyadic investment	How much investments have you and this supplier together made in building up this solution?
DINV2	Dyadic investment	If your relationship with this supplier were to end, how much investment that's made into building this solution would both the firms be wasting?
DINV3	Dyadic investment	If your relationship with this supplier were to end, how much knowledge that's tailored to advance this solution would both the firms be wasting?
CBRP1	Customer-based relational performance	This supplier's products and services meet the performance standards for the purpose for which they were built.
CBRP2	Customer-based relational performance	We are satisfied with the manner in which this supplier built the solution being provided to us.
CBRP3	Customer-based relational performance	We are satisfied with the after-sales support provided to us by this supplier.
CBRP4	Customer-based relational performance	We positively relate our experiences with this supplier's products and services to others.
CBRP5	Customer-based relational performance	We recommend this supplier's products and services to others.
CBRP6	Customer-based relational performance	We want to continue doing business with this supplier.