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Synergy among Business Processes: The Construct, Drivers, Consequences and Managerial Implications

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Synergy among business processes:

The construct, drivers, consequences and managerial implications

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ABSTRACT

Despite the widely acknowledged importance of creating synergy among key business processes, both researchers and practitioners know little about the drivers of synergy and how synergy effects can be captured. Several questions remain: what is the meaning of process synergy? Why are some firms better than others in achieving process synergy? And does process synergy add value to firm performance? The literature reflects remarkably little effort to develop a framework for understanding these questions. This dissertation synthesizes extant knowledge on the subject and empirically demonstrates the inter-relationships among three key business processes: customer relationship management (CRM), supply chain management (SCM) and new product development (NPD). In addition, this dissertation provides a working definition of process synergy, identifies major facilitators and develops a direct measure of synergy (we call it synergy index value). Furthermore, this dissertation constructs an integrating framework on the consequences of synergy and empirically tests the impacts of synergy on both process performance and firm performance.

CHAPTER 1: INTRODUCTION

The role of marketing has been fundamentally reshaped by broader environmental forces relating to technology, globalization and competition in the last two decades. While the traditional role of marketing has been to link the customer with the products of the firm, the new role of marketing is to manage connections between customers and the firm's constituents or stakeholders so as to deliver superior customer value (Moorman and Rust, 1999). Interestingly, the notion of superior customer value has a broader definition today than ever before; it is not only based on some combination of price and quality, but also related to customers' expectations on delivery, service, ease of transaction and relationships. Therefore, the new role of marketing requires a multi-functional interface.

However, much has been talked and critiqued about the tendency of functions to operate in silos. For example, Stank, Daugherty, and Ellinger (1999) note that marketing and operational functions do not talk to each other, but instead they complain a lot about each other's role. To overcome the silo mentality and achieve better cross-functional cooperation, many firms have begun to transition from a functional structure to a process structure during the past two decades. Of course, process structure helps achieve better communication among functional areas; however, this shift has fallen short of expectations to achieve better integration and cooperation among functions. Individual processes still tend to work in silos, just as functions do (Ramaswami et al., 2009).

The critical questions then are why do processes still work in silos? Why do some firms do better than others? Does synergy really exist in every firm? What are the major facilitators or

drivers? What does the term 'synergy' really mean in the context of business processes? How can we operationalize it? Does synergy really benefit individual processes and the firm?

One might expect the concept of process synergy to have a clear meaning, a rich tradition of theory development, and a related body of empirical findings. However, that is not the case. The idea for this dissertation work grew from that same motivation. It is true that the importance of process synergy was acknowledged almost twenty years ago by Srivastava, Shervani, and Fahey (1999) who argued that synergy can occur spontaneously among three key business processes, named customer relationship management process (CRM), supply chain management process (SCM) and product development process (PDP). However, their postulates were purely conceptual and have not been tested even to date (except for one study conducted by Ramaswami, Srivastava, and Bhargava, 2009). Building on Srivastava et al's (1999) theoretical framework, Ramaswami et al., (2009) empirically tested the synergy among CRM, SCM and NPD on firm performance. In their study, they used the interaction of performance of business processes as the proxy to indirectly capture process synergy. Their results suggested that process synergy may not occur automatically, but has to be built diligently by firms.

Building on Srivastava et al.'s (1999) and Ramaswami et al.'s (2009) work, this dissertation begins by empirically testing the impact of synergy among CRM, SCM and NPD on firm performance using proxy measures of synergy. Chapter 2 examines the direct impact of CRM on firm performance, as well as how the CRM process leverages the performance of the firm's new product development (NPD) and supply chain management (SCM) processes and synergistically impacts firm performance.

Chapter 3 extends the synergy concept to capture the inter-relationship among the CRM, SCM and NPD processes. Like business functions, business processes also have a tendency to

work in silos and focus more on maximizing their respective objectives – customer satisfaction in the case of CRM, efficiency of operations in the case of SCM, and innovativeness in the case of NPD. The decisions taken in one process may go against or support the performance of the other process. It is difficult to break down silo mentality until we show the interdependence among processes. Therefore, this study examines how organizational actions relating to the SCM process (e.g., network leadership and outsourcing) and NPD process (e.g., innovation investment and customer co-creation) can affect firm's capability with respect to the CRM process and subsequently lead to superior firm financial performance.

Chapter 4 takes the ideas of chapter 2 and chapter 3 further to provide a foundation for studying systematically the development of synergy between two major business processes, CRM and SCM. Through in-depth interviews with CRM managers and SCM managers, this chapter identifies five major facilitators: customer-centric management, shared cognition, mandate from top management, relationship embeddedness and employee engagement. Using these five factors, this chapter develops a measure of synergy between CRM and SCM and empirically tests the consequences of this synergy index value on individual process performance and firm performance.

Overall, the primary contribution of the dissertation is to extend the work on synergy by developing a synergy metric that enables evaluation of the antecedents and consequences of synergy. Most previous studies have used the interaction term as a proxy measure of synergy between units; this dissertation will be the first to develop a synergy metric that is based on an understanding of the importance of different factors that contribute to synergy and the degree to which such factors are present and working in a firm. A key benefit of the experimental approach used in part five of the dissertation is that it allows capture of synergy at the individual firm level

(and not at the aggregate level as has been handled in all previous studies). This allows examination of the underlying factors that can drive synergy and development of recommendations for managers to enable and utilize these factors to positively drive firm performance.

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CHAPTER 2: WHAT IS SYNERGY?

Synergism can be defined as the interaction or cooperative action of two or more organizations or business units or discrete agencies to produce a combined effect that is greater than the sum of their effects taken independently (Webster's dictionary). The cooperation goes beyond simple exchange of resources; it involves combining the individual perspectives, resources and skills of the cooperating units to create something new and valuable (Lasker, Weiss, and Miller, 2001). In business literature, synergy is frequently described as the '2+2=5' effect to denote the fact that firms seek a product/market posture that can yield a combined performance that is greater than the sum of its parts (Ansoff and McDonnell, 1988). In marketing literature, synergy potential among marketing variables is a well-accepted notion. For example, the marketing mix concept, a core component of marketing, emphasizes that "marketing efforts create sales synergistically rather than independently" (Gatignon and Hanssens, 1987; p. 247).

Early studies on synergy appeared in the acquisitions and mergers literature. When two entities join and form a new one, the combined entity is expected to enjoy reduced costs (through operational efficiency), the ability to charge higher prices (through an increase in market power), or both. The combined entity is also expected to enable "increases in competitiveness and resulting cash flows beyond what two companies are expected to accomplish independently" (Sirower, 1997; p. 6). Overall, acquisitions and mergers are motivated by shareholders' interests to create economic value.

Several studies have examined synergy at the brand level. In a study relating to media, Naik and Raman (2003) examine the benefits of harnessing synergy across media options to build brand equity. Shine, Park, and Wyer (2007) suggest that synergy occurs if the evaluation of

two extension products in combination is the sum of the evaluation of the two products if they were introduced not together but separately. The symbiotic relationship between two brand names can help firms span multiple targets and gain promotional efficiency (Laforet and Saunders, 1999).

Synergy is also an important concept in the economic debate about the role of public versus private institutions. In the context of government and private institutions, Evans (1996) identified two facets of synergy: complementarity and embeddedness. Complementarity is based on the fact that while two agencies have clear division of labor, their combined and mutually reinforcing actions are needed to achieve an outcome that cannot be achieved by either agency acting alone. In an organizational context, different functions bring in different inputs; these inputs when combined can increase effectiveness of actions with regards a common purpose. Embeddedness refers to the effect of networks that exist at the boundary between two agencies and the ties that connect representatives belonging to either side. The social capital generated by these ties can be used to generate system-level outcomes that are superior.

Synergy has also been studied in the context of relationship between business units. Using the work of Evans (1996), Tanriverdi (2005, 2006) extended the synergy idea to the area of cross-unit knowledge synergy. He identified two sources of cross-unit synergy: resource relatedness and resource complementarity. Resource relatedness refers to the exploitation of common resources across business units. The use of common resources creates sub-additive production cost synergies (Tanirvedi, 2006). Resource complementarity is present when the returns to a resource vary based on the level of returns to other resources. They used knowledge and IT as resources that have usefulness across business units. Their empirical results show that these synergy components are major determinants of corporate performance.

Different from these studies, this dissertation attempts to investigate the potential for synergy among business processes. It examines three key business processes: CRM, SCM and NPD. In the context of business processes, synergy is defined as the interaction or cooperation of business processes to produce a combined effect greater than the sum of their separate effects (Srivastava et al., 1999; Ramaswami et al., 2009). Srivastava et al (1999) argued that CRM, SCM and NPD are distinctive, but intertwined. The synergy potential, if achieved, can generate superior shareholder value by (1) accelerating cash flows, (2) enhancing cash flows, and (3) reducing the vulnerability and volatility of cash flows (Srivastava et al., 1999). Using a resource based view of the firm, Ramaswami et al., (2009) offered the first empirical glimpse of the interrelationship among the three business processes and their impact on the market value of firm. In their study, they measured synergy as the interaction among the performance of business processes. Interestingly, the nonsignificant relationship between synergy and firm performance show that synergy may not occur magically inside firms. Studies on synergy at multiple levels are summarized in Table: studies on synergy.

While these efforts have slowly helped build a body of knowledge in the area of synergy among business processes, several important gaps in the literature remain at this time. These include: (1) the postulates about synergy are purely conceptual and have not been fully tested; (2) the literature lacks a good metric that measures synergy; (3) the literature lacks a theory that can guide firms to understand the potential for synergy among their business processes. This dissertation is designed to fill all these gaps. Using proxy measure of synergy, chapter 3 attempts to provide empirical evidence to the postulates of Srivastava et al., (1999).

Finally, a special mention is needed for the synergy metric gap. All previous studies that have examined synergy empirically have used the interaction term as the metric for synergy. The

problem with this metric is that it is a black box that captures the combinative effect at the aggregate level and does not say anything about what contributes to the observed overall effect. It also does not allow evaluation of the relative importance of drivers of synergy. Like previous studies, this dissertation uses the interaction term metric in chapter 3 and chapter 4. However, the dissertation makes a specific effort to open the black box in chapter 5 in its attempt to understand what causes synergy among business processes. Using inputs from managers, chapter 5 estimates the salience of synergy-driving managerial and relationship factors and builds a synergy index at the individual firm level. This effort is pioneering as it has not been attempted in any of the relevant literatures to date.

Table 1
Studies on Synergy

No	Authors	Journal	Context	Definition of Synergy	Operationalization of Synergy	Findings/Comments
1	Grewal, Kumar, Mallapragada and Saini (2013)	JMR	Synergy between output control and process control	The interaction between two mechanisms (output control and process control), whose effects are mutually contingent.	Proxy measure: interaction of process control and output control	Output control approximates a market contracting arrangement that firms use to assess the observable consequences of an exchange partner's actions against predetermined standards; Process control entails offering helpful suggestions or guidance to influence a partner's marketing activities, such as selling procedures, promotional practices, and product management, to achieve desired outcomes. The results show that as the MNC subsidiary's emphasis on process control increases, a greater emphasis on subsidiary output control enhances distributor performance.
2	Naik and Raman (2003)	JMR	Synergy between TV and print advertisements	The combined multi-media activities exceeds the sum of their individual effects	Proxy measure: interaction of TV advertising effort at time t and print advertising at time t	This study investigates the role of synergy in multimedia communications. It illustrates how advertiser can estimate and infer the effectiveness of and synergy among multiple media communication by applying Kalman filtering methodology. Using market data on Dockers brand advertising, the authors first calibrate the extended model to establish the presence of synergy between television and print advertisements in consumer market. As the synergy increases, advertisers should not only increase the media budget but also allocate more funds to the less effective activity.

Table 1 Continued

No	Authors	Journal	Context	Definition of Synergy	Operationalization of Synergy	Findings/Comments
3	Shine, Park and Wyer (2007)	JMR	Synergy between two brand extensions	Synergy is defined as the mutually beneficial effect of brand extensions on their evaluations.	Proxy measure: interaction of two brand extensions	The simultaneous introduction of two brand extensions can have a positive influence on their evaluations independently of parent–extension similarity. This "synergy" effect occurs when the extensions are complementary (e.g., a digital camera and a digital photo printer) but is not evident when they belong to the same category (two models of digital cameras) or to unrelated categories (a digital camera and a snowboard). In addition, the effect is restricted to extension products that are introduced by the same manufacturer. Finally, it occurs only among participants who are promotion focused and therefore are disposed to consider the benefits of owning the extensions rather than the disadvantages of doing so. These and other results suggest that the synergy effect is due to the appeal of completing a set of related products from the same manufacturer rather than the physical or functional similarity of their features to those of either the parent or each other.
4	Nevo and Wade (2010)	MIS Quarterly	Synergy between IT assets and organizational resources	Synergy is defined as positive emergent capability. One possible emergent capability is faster response time (more precisely, the value of the customer responsiveness capability will change, say, from slow to fast)	This study is a conceptual work	A relationship between an IT asset and an organizational resource results in a system that we call an IT enabled resource. To the extent that relationships between IT assets and organizational resources are synergistic, the ensuing IT-enabled resources are capable of positively affecting firms' sustainable competitive advantage via their improved strategic potential.

Table 1 Continued

No	Authors	Journal	Context	Definition of Synergy	Operationalization of Synergy	Findings/Comments
5*	Tanriverdi (2006)	MIS Quarterly	Synergy between IT relatedness and IT governance	Two business units (a) and (b) enjoy super additive value synergies if their joint value is greater than the sum of their individual values: Value (a, b) > Value (a) + Value (b). They enjoy sub-additive cost synergies (or economies of scope) if the use of common factors of production reduces joint production costs of the business units: Cost (a, b) < Cost (a) + Cost (b).	Proxy measure: Interaction of IT related ness and IT governance (complementarity of IT resources)	This study examines sources of cross-unit IT synergy and the conditions under which cross-unit IT synergies improve the performance of multibusiness firms. Building on the resource-based view of diversification and the economic theory of complementarities, the study identifies the relatedness and complementarity of IT resources as two major sources of cross-unit IT synergy. It argues that IT relatedness - the use of common IT infrastructure technologies and common IT management processes across business units - creates sub-additive cost synergies, whereas complementarities among IT infrastructure technologies and IT management processes create super-additive value synergies.
6	Venkatesh and Bala (2012)	Information Systems Research	Partnering synergy	Partnering synergy is conceptualized at a dyadic level, which suggests that international business process standards (IBPS) adoption hinges not only on factors that directly influence each firm's adoption decision but also on factors that are synergistic to trading partners	Proxy measure: the drivers of IBPS adaption (e.g., technology readiness, organizational innovativeness and relational trust)	Building on the technological, organizational, and environmental (TOE) framework and interorganizational theories, the authors propose a model that postulates that a set of TOE factors will have synergistic effects (i.e., interactions between a focal firm's and its partner's factors) on IBPS adoption. The results show that three TOE factors (i.e., process compatibility, standards uncertainty, and technology readiness) had synergistic effects and two factors (i.e., expected benefits and relational trust) had direct effects on IBPS adoption. The results also show that IBPS adoption led to greater relationship quality (i.e., partnering satisfaction) and operational efficiency (i.e., cycle time) and IBPS adoption mediated the effect of TOE factors on partnering satisfaction and cycle time.

Table 1 Continued

No	Authors	Journal	Context	Definition of Synergy	Operationalization of Synergy	Findings/Comments
7*	Martin and Eisenhardt (2003)	AMJ	Cross-business synergy	Cross-business synergy is defined as "the value that is created and captured, over time, by the sum of the businesses together relative to what it would be separately	Qualitative study	This study adds to the understanding of the nature of the corporation and its value by developing a preliminary theoretical framework describing how managers of multi-business firms capture corporate value in dynamic markets through processes of corporate entrepreneurship. In particular, this study explores the changing role of the corporate center and the emerging role of the multi-business team (i.e., the general managers) — a new unit of governance that focuses on the relationships among the business-units.
8*	Srivastava Shervani and Fahey (1999)	JM	Synergy among business processes	Process synergy is defined as the interaction or cooperation of business processes to produce a combined effect greater than the sum of their separate effects.	This study is a conceptual work	The authors develop a framework for understanding the integration of marketing with business processes and shareholder value. The framework redefines marketing phenomena as embedded in three core business processes that generate value for customers – product development management, supply chain management and customer relationship management – which in turn creates shareholder values by (1) accelerating cash flows, (2) enhancing cash flows and (3) reducing the vulnerability and volatility of cash flows.

Table 1 Continued

No	Authors	Journal	Context	Definition of Synergy	Operationalization of Synergy	Findings/Comments
9*	Ramaswami, Srivastava and Bhargava (2009)	JAMS	Synergy among business processes	Process synergy is defined as the interaction or cooperation of business processes to produce a combined effect greater than the sum of their separate effects.	Proxy measure: Interaction of CRM process and SCM processes; interaction of CRM process and NPD process; interaction of SCM process and NPD process	Using a resource based view of the firm, the authors propose that (1) market-based assets and capabilities of a firm impacts (2) performance in three market-facing business processes (new product development, supply-chain and customer management), which in turn, influence (3) the firm's financial performance. This study also examines for the first time the interrelationship among the three business processes and their impact on the market value of firm. Interestingly, the nonsignificant relationship between synergy and firm performance show that synergy may not occur magically inside firms. A firm needs to work on it.
10*	This dissertation		Synergy among business processes	Process synergy is defined as the extent to which the dimensions of synergy are present in the relationship between business processes weighted by the salience of each dimension for inducing synergy effects	$S_i = \sum_{k=1}^{n} (D_{i,k} * W_{i,k})$ Where, S_i is the synergy index for firm I; $D_{i,k}$ is the position of the relationship between processes on dimension k for firm I; $W_{i,k}$ is the salience of dimension k for inducing synergy for firm i.	This dissertation synthesizes extent knowledge on the subject and empirically demonstrates the inter-relationships among three key business processes: customer relationship management (CRM), supply chain management (SCM) and new product development (NPD). In addition, this dissertation provides a working definition of process synergy, identifies major facilitators and develop a direct measure of synergy (we call it synergy index value). Furthermore, this dissertation constructs an integrating framework on the consequences of synergy and empirically tests the impacts of synergy on both process performance and firm performance.

* Synergy is studied at business unit level

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CHAPTER 3: SYNERGISTIC IMPACT OF CRM AND OTHER CORE BUSINESS PROCESSES ON FIRM EFFICIENCY AND EFFECTIVENESS

Modified from an article published in AMA Proceedings

Abstract

Linking market-based assets literature with the rich stream of literature on market orientation, this study examines the direct impact of the performance of customer relationship management (CRM) on firm performance, as well as how the CRM process leverages the performance of the firm's new product development (NPD) and supply chain management (SCM) processes. Specifically, our results show that CRM process has a direct impact on market performance of the firm, controlling for the other two processes. In addition, we investigate the performance synergy effects between CRM and NPD/SCM on two types of firm performance, namely, effectiveness (e.g., market share and sales) and efficiency (e.g., profitability and ROA). We find that high CRM performance has a significant positive impact on the firm's financial position (i.e., efficiency) in combination with the NPD process of the firm and a significant negative impact on the firm's financial position in combination with the SCM process of the firm. Besides the contributions to CRM and marketing-finance literature, we also contribute to market orientation literature by providing a broad understanding of process-based mechanisms through which market orientation of a firm enables superior firm performance. Our results provide evidence that the performance of CRM may have full mediating effects on both MO-firm effectiveness and MO-firm efficiency relationships. Both theoretical and managerial implications of our study are discussed.

Introduction

There is a growing recognition that marketing needs to be embedded in a firm's core business processes that create and sustain value for customers (Srivastava, Shervani and Fahey 1999). Consistent with this perspective, marketing literature has shown increasing interest in understanding the integration of marketing within business processes. Srivastava et al (1999) offered an exhaustive but untested theory relating marketing to activities and performance of three core business processes - customer relationship management (CRM), new product development (NPD) and supply chain management (SCM) - and further to their cash flow consequences. Although the Srivastava et al. (1999) framework was proposed more than a decade back, several important gaps still remain in our understanding of the relationships involving marketing, business processes and performance consequences.

First, there is a lack of clear understanding of the unique contributions made by the CRM processes of a firm toward firm performance controlling for performance of other critical business processes. We address this gap by examining the direct impact of CRM performance on firm performance, as well as how the CRM process leverages the performance of the firm's NPD and SCM processes. In this paper, we do not identify specific structures, platforms or types of assets a firm uses in its business processes nor do we identify how the structures, platforms or assets vary across firms; by capturing the performance impact of whichever structures, platforms or assets used by firms and their variability across firms, we illustrate the important integration role played by CRM. Results show that CRM process has a direct impact on market performance of the firm, controlling for the other two processes. Moreover, we find that CRM positively moderates the NPD-financial position relationship, but negatively moderates the SCM-financial position relationship. In other words, (a) high CRM-oriented firms are able to extract more value

from their NPD processes than moderate or low CRM-oriented firms, but (b) high-CRM oriented firms extract less value from their SCM processes. The latter finding is at odds with the results of Mithas, Krishnan and Fornell (2005) who show that returns to CRM are enhanced when firms share information with their supply chain members.

Second, more studies are needed to establish links between performance of business processes and various types of firm performance (Boulding et al 2005). In line with this reasoning, we investigate the performance synergy effects between CRM and NPD/SCM on two types of firm performance, namely, effectiveness (e.g., market share and sales) and efficiency (e.g., profitability and ROA). Our results show that controlling for the effects of NPD and SCM, high CRM performance has a direct influence in generating greater effectiveness through superior market position for the firm; further, it has a significant positive impact on the firm's financial position (i.e., efficiency) in combination with the NPD process of the firm and a significant negative impact on the firm's financial position in combination with the SCM process of the firm. The first result is consistent with previous findings that higher performance on CRM, as evidenced by high customer satisfaction and loyalty, should be able to drive a firm's market share and sales. The finding relating to CRM and NPD is also consistent with expectations. We expect CRM to provide useful input information to the NPD process in both the value creation and value extraction stages of new product offerings to the market. The finding relating to CRM and SCM suggests that the goals of the two processes may be at odds with each other. Attempting to maximize the goals of CRM may come at the expense of maximizing the goals of the SCM process. Overall our findings confirm the view that CRM is better treated as an investment rather than a cost.

Third, besides the contributions to CRM and marketing-finance literature, we also contribute to market orientation literature by providing a broad understanding of process-based mechanisms through which market orientation of a firm enables superior firm performance. Chain of marketing productivity model (Rust et al. 2004) indicates that one of the strategic roles of marketing is to guide the development of marketing assets which can then be leveraged within the firm's core business processes (e.g., CRM, NPD, and SCM) to affect its performance in both the short and long run. Since market orientation is a strategic philosophy of the firm that influences how it implements the marketing concept (Kohli and Jaworski 1990), we empirically test Rust et al's model in this paper with specific focus on the important role played by CRM in intervening between a firm's market orientation and its performance consequences. Additionally, even though the primary focus of this paper is on CRM, we do examine the mediation role of NPD and SCM simultaneously with CRM. Our results provide evidence that the performance of CRM may have full mediating effects on both MO-firm effectiveness and MO-firm efficiency relationships.

Fourth, there is a recognition that collective execution of business processes provides firms with sustainable competitive advantage (Srivastava et al 1999). The only study examining the effects of synergy among all three processes (Ramaswami et al 2009) did not find empirical support for this proposition. We provide a replication of their test and investigate if synergy among processes brings positive results for the firms in our study setting.

In summary, drawing upon Srivastava et al's (1999) marketing-business processes-performance framework and Rust et al (2004)'s chain of marketing productivity model, the goals of this paper are fourfold:

1. To provide an understanding on the contribution of CRM to a firm's market and financial performance
2. To reveal the different synergy effects between CRM and NPD/SCM on firm effectiveness and firm efficiency.
3. To examine the important role played by CRM in intervening between a firm's market orientation and its performance consequences.
4. To provide empirical support for the assertion that interaction among all three CRM, NPD and SCM positively contributes a firm's financial performance.

The remainder of this article is organized as follows. To begin, we offer a theoretical foundation to provide guidance to the study. Then we develop and set forth the research hypotheses. Next, we detail the methods, including a discussion of the data collection and data analysis procedures. Last, our study concludes with a discussion of findings and implications for theory and practice, as well as for future research.

From Market Orientation to Firm Performance

Consistent with extant literature, we adopt the cultural perspective of market orientation, defined as a set of organizational norms and values which help implement the 'marketing concept' (Narver and Slater 1990). During the past two decades, researchers have pursued intensive research on the consequences of market orientation (MO). The most popular notion in the literature has been that market orientation directly brings superior performance to a firm (e.g., Narver and Slater 1990, Slater and Narver 2000). However, the viability of such a direct MO-firm performance linkage has met with increased skepticism due to the non-significant, even negative effects of market orientation reported in recent empirical studies (e.g., Sandvik and Sandvik, 2003). Accordingly, researchers have shifted their attention from direct relationship to

potential mediators of the relationship. For example, in a recent meta-analysis, Kirca et al (2005) found that customer satisfaction, an indicator of the performance of CRM based on Srivastava et al (1999), may play an important mediating role. Contributing to the same literature, this paper investigates a more general CRM-based mechanism via which the value of MO can be transferred to superior firm performance. Further, we also examine the mediating effects of other two core processes in any organization, namely, NPD and SCM.

Hypotheses Development

CRM as a potential mediator. According to Slater and Narver (1999), a market-oriented firm "seeks to understand customers' expressed and latent needs and develop superior solutions to those needs" (p. 165). On one hand, a market-oriented firm is more likely to exploit and explore its knowledge to collect, analyze and apply the acquired customer information (Jayachandran et al. 2005) in pursuit of creating superior value for customers as compared to competitors. For example, through CRM, a market-oriented firm is more likely to create suitable advertising, promotion, sales and customer service programs to improve customers' perception and experience. On the other hand, implementation of CRM solutions requires firms to have a customer relational orientation (Jayachandran et al 2005; Srinivasan and Moorman 2005). In line with this reasoning, we believe that performance of CRM is the direct consequence of market orientation.

H_{1a}: Market orientation is positively related to performance of CRM.

In addition, CRM performance also plays a critical antecedent role to firm effectiveness and efficiency. On one hand, superior CRM performance, as evidenced by customer satisfaction and customer loyalty, helps a firm generate a stable customer base (e.g., Noordeweir, John and Nevin 1990; Mittal and Kamakura 2001) and improve its customer-learning capability (Tuli,

Kohli and Bharadwaj 2007). A firm with stable customer base and strong capability of learning enjoys a competitive advantage by providing superior value than competitors. On the other hand, superior CRM helps a firm reduce the costs of activity such as marketing-related costs, inventory costs and customer service costs etc. For example, customer loyalty and word of mouth enhance a firm's advertising and promotional efficiency and thus reduce marketing-related costs (e.g., Luo and Homburg 2007). In addition, superior CRM helps a firm better adjust its production cycle according to customer demand patterns to lower the mismatch between firm inventory and customer orders and thus reduce its inventory costs (e.g., Bharadwaj, Bharadwaj, and Bendoly, 2007). Furthermore, superior CRM helps a firm reduce its customer service costs that might occur because of the rejection of unsuitable offerings as a result of a poor understanding of customer requirements (e.g., Anderson, Fornell and Lehman, 1994). In line with this reasoning, we posit

H_{1b}: Performance of CRM is positively related to market position.
H_{1c}: Performance of CRM is positively related to financial position.

Synergy between NPD and CRM. At a macro-level, customer value creation and appropriation necessitate the achievement of two central organizational tasks: exploiting existing competencies and exploring new opportunities. The notion of exploitation and exploration (March 1991) has been studied in several strategy disciplines including organizational learning and strategy (e.g., Levinthal and March 1993), innovation (e.g., Rothaermel and Deeds 2004) and entrepreneurship (e.g., Shane and Venkataraman 2000). However, how the synergy of core business processes contributes to a firm's exploitative and explorative activities is still a mystery. We believe that the synergy of CRM with NPD optimizes a firm's execution of its exploitative and explorative activities.

A firm may develop incremental innovations to exploit its existing competencies. Incremental innovations involve small improvements to an existing product or product line that helps maintain or improve a firm's competitive position over time (Business Dictionary). Although firms spend a great deal of energy and R&D budget on incremental innovations, the magnitude of the linkage between incremental innovation and market share is still inconclusive. While most managers believe that incremental innovation has relatively little impact on market performance, Banbury and Mitchell (1995) found that a firm's ongoing ability to introduce important incremental innovations quickly has a major impact on its market share. Regardless of whether the magnitude of the linkage is strong or weak, we believe that CRM could help magnify this relationship by 1) increasing current customers' usage of new products through superior customer loyalty programs; 2) gaining new customers (especially non-users) through superior WOM/referral program; and 3) providing insights on the needs of competitors' customers to increase the number of switching customers.

On the other hand, a firm may introduce radical or breakthrough innovations, which involve the application of significant new technology (Tushman and Nadler, 1986), to explore new market opportunities. There is a strong and consistent support on the market-share rewards to pioneers in extant research (e.g., Robinson and Fornell 1985, Urban et al. 1986). However, in reality, firms face enormous failure rate with radical innovations due to risk arising from customer and market uncertainties (Rice et al. 2001). As a result, effective NPD process can reduce risk by developing products that match customer needs as closely as possible. CRM also provides a tool for managers to minimize risks associated with customers and markets. In addition, recent findings reveal that the major challenge of radical innovations lies not in the radical technology creation process, but in the commercialization of these technologies

(Christensen and Bower, 1996; Tushman and O'Reilly 1996). The commercialization stage of NPD requires firms to have a superior customer-facing and learning function. Firms with superior CRM are more likely to optimize the performance of commercialization by selecting the right segments, picking the right launch time, providing suitable positioning strategy, and creating effective advertising, promotion and sales campaigns etc. Last, providing valuable insights on customers' requirements on either incremental or radical innovations, CRM helps a firm decrease the high costs associate with each stage of NPD, from idea generation, idea evaluation, idea implementation to final idea commercialization. Thus we posit that

H_{2a}: The synergy between CRM and NPD positively contributes to market position.
H_{2b}: The synergy between CRM and NPD positively contributes to financial position.

Synergy between SCM and CRM. A supply chain is defined as "a set of three or more entities directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer (Mentzer et al, 2001)." Like NPD, effective SCM should be able to contribute to a firm's exploitation and exploration activities and the synergy between CRM and SCM may help it maximize the returns from these activities.

One of the exploitative strategies, for example, is market penetration. By significantly decreasing the associated costs such as costs of raw materials, manufacturing costs, transaction costs and customer service costs etc., superior SCM may help a firm quickly penetrate a market in which current or similar products already exist. However, overly pursuing efficiency may be very risky for a firm. Due to the conflicting goal of high customer value and low costs, the short-term success of market penetration may be achieved at the cost of sacrificing a firm's long-term benefits. Without understanding the necessary level of customer requirements, efficiency-oriented SCM may decrease usage from current customers and motivate customers to try competitor's products. Thus, CRM, as a lever, helps a firm achieve the long-term returns of

market penetration by providing updated and current insights from customers and thus maximize the long-term returns to market penetration.

In addition, in order to achieve sustainable growth, a firm needs to continuously explore new opportunities. One of the explorative strategies, for example, is market diversification. A firm either modifies current products to meet new market opportunities or develops new products to serve existing markets better. No matter which approach a firm selects, understanding current customers' latent needs and potential customers' expectation is extremely critical for achieving superior performance effects from diversification. In addition, customer insights can help firms make the best choice on selecting and qualifying desired supply chain partners. In line with this reasoning, we believe that the synergy of CRM and SCM leads to superior performance of a firm's explorative activities. Better the performance of explorative activities, better is likely to be the firm's market performance and financial performance. Thus, we posit

H_{3a}: The synergy between CRM and SCM positively contributes to market position.
H_{3b}: The synergy between CRM and SCM positively contributes to financial position.

Synergy among all CRM, NPD and SCM. Srivastava et al (1999) suggest that the synergy among the three core processes, CRM, NPD and SCM, may likely yield superior performance for firms than simply maximizing the outcomes of individual processes or the synergy effects among any two of them. In addition, O'Reilly and Tushman (2004) also observe that few companies have the capability to integrate all three processes well. It is not surprising that integration of all three processes may provide competitive advantages that are much harder for competitors to imitate (Ramaswami et al 2009). Consistent with the literature, we posit

H_4: The synergy among all CRM, NPD and SCM positively contributes to a firm's market position and financial position.

Methods

Sample

Data for this study was collected with the help of the Zyman Institute of Brand Sciences (ZIBS). A random sample of 400 firms from the ZIBS data base was generated. The sample firms were contacted through the ZIBS newsletter and a brand conference that was organized by the institute. The key informant was identified as the CMO of a firm (or the marketing manager in case there was no CMO). A survey prepared for the study was mailed to CMOs/marketing managers of the sample firms. To increase response rates, participating firms were promised a descriptive report summarizing how assets were being utilized across firms and their impact on firm performance. Of the 400 firms contacted, responses were obtained from 121 firms, yielding a response rate of 30 percent. After accounting for missing data, the final sample for the study was 82, giving an effective response rate of 20.5 percent. Although this number is low, it compares favorably with response rates obtained in most academic studies in recent years.

Measures

Market orientation (α=.84). We followed Narver and Slater's (1990) procedure to assess the extent of an organization's market orientation. This scale includes 8 items to assess the extent of a firm's customer-orientation and competitor-orientation. The Cronbach's alpha coefficient of the 8 item scale is .84 - exceeding the .70 threshold recommended by Nunnally (1978) for the test of scale reliability. (All survey items are reported in Appendix.)

Performance of CRM (α=.87). We used 4 items to measure this construct. These items capture the performance of knowledge usage and leverage in CRM process. Knowledge of customers can enhance the CRM process' ability to provide higher value to customers than

competitors as well as increase the scope of relationship with customers by identifying and addressing their needs across products. The Cronbach's alpha coefficient of the 4 item-scale is .87.

Performance of NPD (α=.86). We used 3 items to measure this construct. These items capture the performance of knowledge usage and leverage in NPD process. Intellectual assets relating to the NPD process can help firms develop more new and differentiated products that are successful in the market place. The Cronbach's alpha coefficient of the 3 item-scale is .86.

Performance of SCM (α=.89).We used 3 items to measure this construct. These items capture the performance of knowledge usage and leverage in SCM process. Intellectual assets in the SCM domain enable companies to understand market demand dynamics better and thereby contribute to reducing end-to-end costs that can either offer price-reduction potential or profit-increasing potential for the firm. The Cronbach's alpha coefficient of the 3 item-scale is .89.

Performance measures (α=.840, 0.880). We measured market position using subjective perceptions of market performance on sales and market share indicators and financial position using similar measures of profitability and ROA. The Cronbach's alpha coefficient for market position is .840, and .88 for financial position.

Control variables. We include firm size (number of employees) and firm type (B2B vs. B2C) to control their effects on a firm's market position and financial position. In addition, we also use the size of marketing area (number employees in marketing area) as a control variable to the performance of CRM.

Common Method Bias

Common method bias could be a potential problem as we gather information on the study's constructs from a single informant. Hence, we undertook preventive mechanisms at the research

design and estimation stages (Podsakoff, McKenzie, Lee, and Podsakoff 2003). Specifically we use the following methods a) Harmon one-factor test, b) a latent factor-analytic approach to Harman's one-factor test (McFarlin and Sweeney 1992; Sanchez and Brock 1996), c) questionnaire ordering, d) common variance between non-hypothesized pairs of constructs, e) a full mediation test, and f) interaction effects.

If common method bias poses a serious threat to the analysis and interpretation of the data, a single latent factor would account for all manifest variables (Podsakoff and Organ 1986). In our case, we got a considerably worse fit for a single dimensional model than for the measurement model. In addition, we had a similar failure of the one factor model using principal components analysis. Additionally, in the questionnaire design ordering of dependent construct items was interspersed with those of independent variables so that conclusive perceptions could not consistently influence respondents' answers. During estimation of the model freeing of additional inter-construct covariance amongst non-hypothesized relationship didn't improve overall model fit. Further, the presence of full mediation (performance of CRM) suggests that the single informant per firm reliably captured significant effects of the phenomena without bias. If there were bias due to the common method or instrument, it would persist through partial direct paths (mediation) neither which was observed in this study (Blalock 1964). Finally, significant interaction effects between CRM and NPD/SCM provide further evidence that common method bias was unlikely to be a serious concern.

Analysis

Table 1 provides the correlations, descriptive statistics, and psychometric properties of the constructs used in the study. The complete conceptual model represented in Figure 1 was estimated using partial least squares (PLS) using *SmartPLS* 2.0 software (Ringle, Wende, and

Will 2005). PLS is a variance-based structural equation modeling (SEM) technique that maximizes the explained variance of the endogenous latent constructs. It is a distribution free non-parametric test based SEM that relies on bootstrap standard errors to test the statistical significance of parameter estimates. Review of PLS SEM is beyond the scope of this article and readers are referred to Hair, Ringle, & Sarstedt (2011) and Hair et al (2012) for a thorough treatment of this topic.

Why PLS (and not CB-SEM)? The primary reason for using PLS SEM over covariance-based structural equation modeling (CB-SEM) is that our study's model focuses more on theory development and prediction of direct and synergistic effects of market-based capabilities on firm performance outcomes. Specifically, market-based capabilities (Srivastava, Shervani, and Fahey 1999) theory has remained mainly conceptual and to our best knowledge there is only one empirical work (Ramaswami, Srivastava, and Bhargava 2009) that directly tests the relationship between the three organizational capabilities (namely CRM, SCM, and NPD) and firm performance. However, in their original conceptualization Srivastava, Shervani, and Fahey (1999) not only argue for the independent direct effects of these three capabilities, but also provide arguments in support of how these capabilities could come together in a dynamic fashion that subsequently guarantees competitive advantage for the firm. So we attempt to validate these conceptual propositions by trying to predict the synergistic impact of these capabilities on market and firm performance. PLS-SEM provides a powerful environment to test the predictive relevance of these causal relationships and also to verify the predictive validity of the overall conceptual model of market-based capabilities. Apart from these conceptual and empirical advantages over CE-SEM, our consideration of PLS is also relevant considering the sample size

restriction (N = 82), many multi indicator latent constructs, and multiple latent variable interactions. Such complexities make CB-SEM models inadmissible and non-identifiable.

Estimation. The estimation was carried out by running the complete structural model simultaneously with all the hypothesized effects in *SmartPLS* 2.0. First, the outer or the measurement model was evaluated, and second the inner or structural model was evaluated. Measurement model was evaluated by checking the composite reliability, average variance extracted, indicator loadings and discriminant validity of the latent constructs (Fornell and Larcker 1984; Hair et al, 2012). Table 1 shows that the composite reliability values of the constructs ranged between .89 - .94, the AVE ranged between .53 - .89, and the Cronbach's-α ranged between .84 - .89. Further all the standardized factor loadings were significant at $p < .01$ and the AVEs were greater than the squared correlations between the constructs. Overall the measurement model fit indices show strong psychometric properties of the constructs used.

Structural model evaluation was carried out in a series of steps. First, to check whether the parameter estimates were free from collinearity issues, we extracted the latent variables scores and assessed the variance inflation factor (VIF). The VIF values ranged between 1.48 and 2.56, well below the threshold level of 5 thus providing evidence that collinearity might not be an issue. Second, we checked the R^2 values of the endogenous constructs. The results suggest that R^2 values were moderately high. Next, the statistical significance of the parameter estimates was tested using bootstrapping. We ran bootstrapping using 5000 samples with no sign changes option. The *t-values* derived using bootstrapping is reported in the results in table 2. We discuss the significance of the parameter estimates in the results section.

Next, we validate the predictive relevance of the model by assessing Stone-Geisser Q^2 using the blindfolding procedure (Gotz, Lierhr-Gobbers, and Krafft 2010). Using the default

omission distance of 7, we applied blindfolding to the two performance variables financial performance (FP) and market performance (MP) separately. The results of the cross-validated redundancy showed that the Q^2 values were considerably above zero for FP and MP with.62 and .45 respectively thus showing strong predictive relevance. Next, we checked for the effect sizes by calculating f^2. f^2 is calculated as the change in R^2 values after re-estimating the model without the key exogenous variables. In this study CRM is the key antecedent to market and financial performance. f^2 values were .13 and .38 for FP and MP respectively showing moderately high impact of CRM on the performance variables. Finally, unlike CB-SEM there is no global fitness of index measure to evaluate the model; hence we calculated the goodness of fit (GoF) measure suggested by Tenenhaus et al. (2005). GoF was calculated as the square root of the product of average communalities and average R^2 and the value was .582 indicating moderately high overall goodness of fit.

In sum, diagnostics measures from evaluation of measurement and structural model provide strong evidence of measurement and structural integrity of the study's model. Having established the validity of the inner and outer models we next report the results of test of our hypotheses.

Results

We test the importance of CRM as the intermediate channel through which market orientation of the firm impacts its market and financial performance. We test the significance of these effects by assessing three indirect paths through CRM using bootstrapped standard errors (Preacher and Hayes 2008). Specifically, we test whether the indirect pathways MO→CRM→MP, MO→CRM→FP, and MO→CRM→MP→FP are significant. Results show significant indirect effects for the impact of MO on MP via CRM at .39 (standard error SE .096, $p < .01$) and for the

impact of MO→CRM→MP→FP at .27 (.08, $p < .01$). Thus CRM seems to play a critical role in intervening between a firm's market orientation and its performance consequences. To further validate that the effects are completely mediated, we ran several addition model, model only with direct effects (MO→MP and MO→FP) and model with both direct and indirect effects. The results show that by adding the CRM as a potential mediator, the direct effects MO→MP and MO→FP are changed from significant to nonsignificnat, providing some evidence to support the full mediating effect of CRM.

Overall, the standardized estimates of H_{1a} (MO→ performance of CRM; β=0.65; t=8.75), H_{1b} (performance of CRM→market position; β=0.59; t=4.91), H_{2b} (CRM*NPD→financial performance; β=0.19; t=1.90 significant at 90% level). In addition, our results partially support H_4 because we found the positive impacts of the interaction among CRM*NPD*SCM on market performance (β=.12; t=.19 significant at 90% level), but not on financial performance (β=.03; t=.73). However, we failed to support H_{1c} (performance of CRM→financial performance), H_{2a} (CRM*NPD→market position) and H_{3a} (CRM*SCM→market position). Surprisingly, we found significant negative impact of CRM*SCM on firm performance (β=-0.24; t=2.15).

Additional Analysis

Response Surface Approach. To uncover more complex relationship in the synergistic impact of CRM with the other two processes on financial position, we conduct a polynomial regression based response surface analysis (RSA) (Edwards 2002).

Results from RSA have significant managerial relevance from a resource allocation perspective. Specifically RSA helps answer questions such as 1) how does consistency in resource allocation among processes impacts firm performance (e.g., CRM and SCM have similar resources allotted); 2) how does discrepancy in resource allocation among processes

impact firm performance; 3) What is the optimal way of allocating resource across processes for better profitability?

Response surface of CRM vs. SCM on financial position. General form of RSA is represented in the polynomial regression form as:

$$FP = b_0 + b_1\ CRM + b_2\ SCM + b_3\ CRM^2 + b_4\ CRM*SCM + b_5\ SCM^2 + e, \quad (1)$$

Where, FP is financial position. First we conduct a lack of fit test to establish that the above second order quadratic model is adequate to represent the relationship between predictors (CRM and SCM) and the response variable (FP). The lack of fit diagnostic index was insignificant with F-value 2.07 ($p = .2126$; $df = 71$) thus showing evidence that the polynomial model was adequate. Further the model showed evidence of significant linear ($F = 34.94$, $p < .001$; $R^2 = .47$) and cross-product ($F = 2.97$, $p = .08$; $R^2 = .02$) effects while insignificant quadratic effect ($F=.25$, $p = .78$). These results were consistent with the PLS model results obtained. Next, we test for the significance of the individual parameters estimates in equation (1) using bootstrapped standard errors to be consistent with our PLS estimation of the overall model. As seen from table 3 (Panel A) parameters b_1, b_2, b_3, and b_4 were significant.

Using the estimated parameters we construct the three dimensional response-surface as shown in figure 2. Interpretation of the surface is based on (a.) the alignment between the two processes CRM and SCM along the 'line of congruence' and (b.) the discrepancy between the two processes along the 'line of incongruence' (Shanock et al 2010). The surface is examined by analyzing the slope and the curvature along these two lines to answer questions regarding CRM-SCM fit (misfit) and how it favors (hinders) financial position. Following standard recommendations of using RSA (see Edwards 2002 for derivations) the slope and curvature are calculated using estimated from equation (1) as:

Line of perfect agreement or congruence or fit (i.e. setting 'CRM = SCM' in Equation 1):

$$\text{Slope } a_1 = (b_1 + b_2); \text{ Curvature } a_2 = (b_3 + b_4 + b_5) \quad (2)$$

Line of perfect incongruence or misfit (i.e. setting 'CRM = - SCM' in Equation 1):

$$\text{Slope } a_3 = (b_1 - b_2); \quad \text{Curvature } a_4 = (b_3 - b_4 + b_5) \quad (3)$$

Table 3, panel B reports the calculated values, standard errors, and the significance. The results show that slope (a1) along the line of fit and the curvature (a4) along the line of misfit are both positive and significant. There are two key takeaways from these results interpreted along with the response surface in figure 2. First, under the condition of fit, defined as similar performance of CRM and SCM (shown as a solid line in the surface floor of the figure 2), simultaneously improving the performance of both CRM and SCM positively leads increasing financial performance in a linear way (as the curvature a2 is insignificant, we don't have evidence to support the non-linear relationship). Second, under condition of misfit, defined as the performance of CRM and SCM are not similar (shown as a dotted line in the surface floor of the figure 2), continuously increasing the performance discrepancies between these two processes will improve financial performance in a curvilinear way. As seen from the figure 2, it appears that maximum financial outcome is achieved when the performance of CRM is highest while the performance of SCM is lowest. We conduct a ridge analysis to determine that maximum financial leverage occurred at CRM=2.2 and SCM=-0.58 (where the average performance is defined as 0). At first glance, these two findings seem to contradict to each other, the implications for managers are further discussed in detail in the discussion section.

Response surface of CRM vs. NPD on financial position. For the response surface of CRM vs. NPD on financial position, the lack of fit indices was still significant at F = 6.49 (p = .0124) and the overall model showed significance only for the linear effect. Hence we didn't

construct a response surface. However the significant lack of fit indicates that the quadratic polynomial model with the existing predictors may not be sufficient to represent the synergies between CRM and NPD. This might signal relevance of other potential variables or a more complex polynomial model to represent the fuller complexities of CRM and NPD synergies.

Discussion

The three key motives of this study are to examine 1) the role that CRM plays in shaping the MO-firm performance relationship; 2) the synergy effects of CRM with NPD/SCM on firm effectiveness and firm efficiency; 3) the synergy effect among all three CRM, NPD and SCM on firm performance. Overall, we found that market orientation leads to superior market performance through superior performance of CRM. Importantly, our data shows that CRM may fully mediate the MO-market performance linkage even after controlling for the intervening influences of the other two core business processes, NPD and SCM. In addition, we found that the synergy between CRM and NPD/SCM has significant impacts on firm efficiency (e.g., profit, ROA); however, we didn't observe the similar synergy impacts on firm effectiveness (e.g., market share, sales); more interestingly, we observed that CRM positively moderates the NPD-financial position relationship, but negatively moderates the SCM-financial position relationship. Last, our results confirm the notion that the synergy among all three CRM, NPD and SCM positively leads to superior financial performance.

Theoretical Implications

Linking market-based assets literature with another rich stream of literature on MO, this study provides the following contributions to enhance our understanding on the phenomena related to market orientation, CRM and various types of firm performance.

Contributions to market orientation literature: Our study reveals a general CRM-based mechanism which mediates the impact of market orientation on firm performance. Because market orientation increases a firm's exploitation of customer information, high market-oriented firms are more likely to create suitable advertising, promotion, sales and customers service programs to improve customers' perception and experience than competitors. Firms with superior customer experience are more likely to create competitive advantage by providing superior value than competitors. As such, the performance of CRM is not only the direct consequence of market orientation but also a very critical strategic antecedent to firm effectiveness. Such a mediating effect still holds even after taking into account the intervening effects of the other two business process, NPD and SCM. Firms may use different structures, platforms or types of assets in their business processes; however identifying how the structure, platforms or assets vary across firms is beyond the scope of this study; by capturing the performance impact of whatever structures, platforms or assets used by firms and their variability across firms, we illustrate the full mediating role played by CRM in intervening between market orientation and firm effectiveness.

Contributions to market-based assets literature. As an important market-based asset, CRM has received increasing attention from researchers. Further exploration of CRM and its related phenomena was not only warranted, but also desperately needed (Zablah, Beuenger and Johnston, 2003). Following this call, our paper contributes to the market-based assets literature in the following ways. First, we retest Srivastava et al's (1999) assertion that synergies among core business processes contribute to firm performance. Specifically, we focus on the synergy between CRM and NPD/SCM on firm performance. To the best of our knowledge, since Srivastava et al proposed their framework, only one study (Ramaswami et al 2009) empirically

tested the integrated role of CRM on firm performance. Different from Ramaswami et al (2009) study, this study separates firm performance into effectiveness (e.g., market share and sales) and efficiency (e.g., profitability and ROA) dimensions and investigates the integrated role of CRM on both types of firm performance. The study results, however, did not find support for synergistic impact between CRM and NPD/SCM on firm effectiveness. Considering the strong main effect of CRM on firm effectiveness (e.g., market share), one plausible explanation of this unexpected finding is that CRM is a sufficient determinant of sales and market share, and NPD/SCM are business processes that contribute more to efficiency than effectiveness. Consistent with our prediction, our finding confirms the positive synergy effect of CRM and NPD on superior firm efficiency. Moreover, surprisingly, we find negative synergy effect between CRM and SCM on firm efficiency. This finding implies that the goals of CRM and SCM may be in conflict with each other. Attempting to maximize the goals of CRM may come at the expense of maximizing the goals of the SCM. To uncover the complex relationship in the synergistic impact of CRM and SCM, we conducted response surface analysis. Our additional analysis shows that under situations of symmetric investment in CRM and SCM, increasing investment for both processes at the same time may lead to superior financial performance; however, under situations of asymmetric investment in CRM and SCM, high CRM and low SCM may maximize a firm's financial performance. Last, it is widely acknowledged that CRM, NPD and SCM may intertwine and exhibit synergistic effect. Our study provides some empirical evidence to support the notion.

Managerial Implications

This study also provides several relevant implications for managers. First, managers may believe that market orientation is like a magic trick, which can automatically improve firm performance.

However, it may not be true. Our findings show that without superior performance of CRM, market orientation does not guarantee superior market performance. Therefore, a firm needs a strategic plan for the creation, development and leverage its knowledge to improve its CRM performance. Second, there is an implicit belief that CRM involves huge expenditures without accountability and that it is difficult to show its value for the firm. On one hand, our results show that CRM has strong main effect on firm effectiveness even after controlling for the intervening effect of NPD and SCM. On the other hand, the synergy of CRM with other processes helps a firm minimize risks associated with customers and markets and reduce costs of activities through superior loyalty and referral programs. Overall, our findings confirm the view that CRM is better treated as an investment rather than a cost. Therefore, the findings of this study can be used by marketing managers to suggest that marketing adds value to the firm by enhancing the performance of CRM and its synergy with other core business processes. Moreover, this study has drawn managers' attention on the issues of investment trade-offs. Although CRM, NPD and SCM are all required for value-creation and value-appropriation, a firm may face a trade-off among them due to the limited budget. Specifically, our finding on positive synergy of CRM with NPD indicates that a firm can improve its financial performance by improving the performance of either CRM or NPD or both. In addition, surprisingly, we find negative synergy effect of CRM with SCM on financial performance. To make this finding more relevant to managers, we generate two scenarios to help managers diagnose their possibility of improving financial performance. The first scenario is under the condition of similar performance of CRM and SCM. Under this condition, a firm can improve its financial performance by two means: 1) equally improve the performance of both processes since we find that simultaneously improving the performance of both processes will increase a firm's financial performance in a linear way; 2)

increase the performance of one process thus increase the discrepancy between CRM and NPD (the same as scenario 2). The second scenario is under the condition of discrepancy of CRM and SCM. Our results show that 1) increasing the discrepancy between CRM and SCM improves a firm financial performance in a curvilinear way; 2) the situation of highest investment in CRM and lowest investment in SCM may maximize a firm's financial performance. Last, by showing the positive synergy effect among all CRM, NPD and SCM on financial performance, we encourage a firm's investment in communication and cooperation among three departments, marketing, new product development and supply chain.

Limitations and Directions

Despite its contributions, the implications of the study have to be tempered based on the study's conceptual and methodological limitations. First, even though the response rate obtained in this study was similar to those in most academic studies in recent years, the relatively small sample size is likely to limit generalizability of its findings. More research is needed to test the monological model proposed in this study using larger samples. Another concern in our study is that it relies exclusively on subjective measures of performance of CRM, NPD and SCM. Future research is warranted to develop and use objective non-financial metrics to assess the "effective performance" of core business process. In addition, future research may need to identify the sub-processes of CRM and how these sub-processes interact with other core business processes to better understand the role of CRM within a firm.

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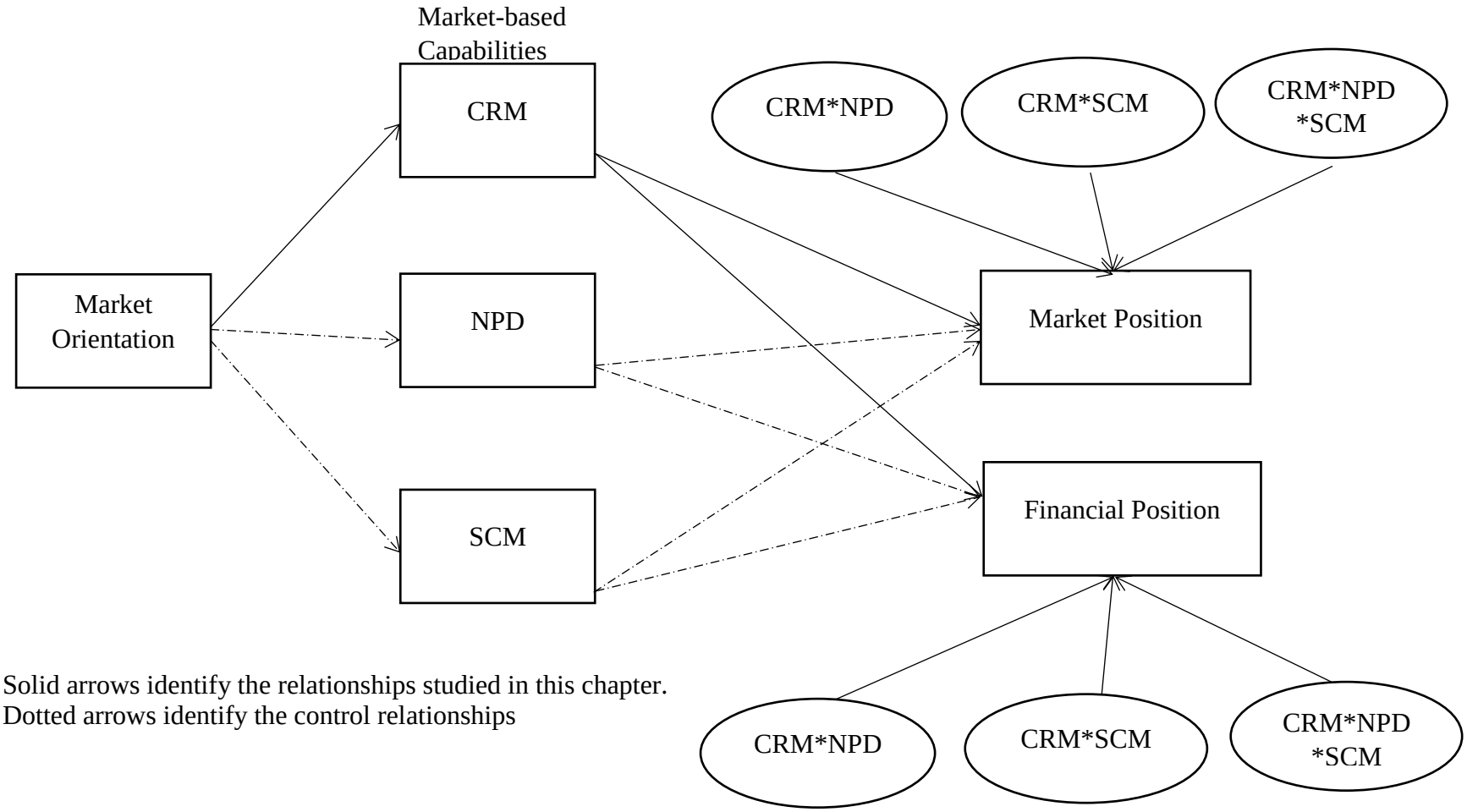


Solid arrows identify the relationships studied in this chapter.
Dotted arrows identify the control relationships

Figure 1
Theoretical Framework and Results

Table 1
Correlations, Summary Statistics, and Construct Validities

Variables	1	2	3	4	5	6	7	8
1. MO	1							
2. CRM	.627	1						
3. NPD	.469	.562	1					
4. SCM	.528	0.589	.402	1				
5. Market Position	.466	0.683	.470	.465	1			
6. Financial Position	.445	.660	.356	.532	.782	1		
7. MKT size	.040	-.109	-.079	-.027	-.086	-.123	1	
8. Firm Size	.012	-.097	-.045	.129	-.062	.000	.170	1
9. B2B/B2C	.168	.050	.011	.102	-.098	.072	.112	.060
Construct Validity								
Cronbach Alpha	.840	.870	.860	.890	.840	.880		
Composite Reliability	.890	.910	.920	.930	.920	.940		
Average Variance Extracted	.530	.730	.790	.820	.860	.890		

Notes: Sample based on n=82 firms. Entries on the diagonal demote the square root of the average variance extracted; “N/A” single-item constructs.

Table 2
Synergy among Business Processes

	Model	
	β(SE)	t-value (5000 Bootstrapping)
Market orientation →CRM performance	.65 (.1024)	8.75**
Market orientation → NPD performance	.49 (.0775)	5.60**
Market orientation→ SCM performance	.54 (.0914)	6.03**
CRM performance → Market position	.59 (.1001)	4.91**
NPD performance → Market position	-.15 (.0885)	1.72
SCM performance → Market position	.11 (.0869)	1.72
CRM performance→Financial position	.13 (.0920)	1.04
NPD performance →Financial position	-.14 (.0854)	1.67*
SCM performance →Financial position	.13 (.0974)	1.44
Market position→Financial position	.69 (.0757)	6.56**
Interactions		
CRM*SCM→Market position	.18 (.1092)	.85
CRM*NPD→Market position	-.15 (.1017)	.75
CRM*NPD*SCM→Market position	.12 (.0869)	1.9*
CRM*NPD→Financial position	.19 (.0798)	1.9*
CRM*SCM→Financial position	-.24 (.0865)	2.15**
CRM*NPD*SCM→Financial position	.03 (.0991)	.73

**p<.05; *p<.10

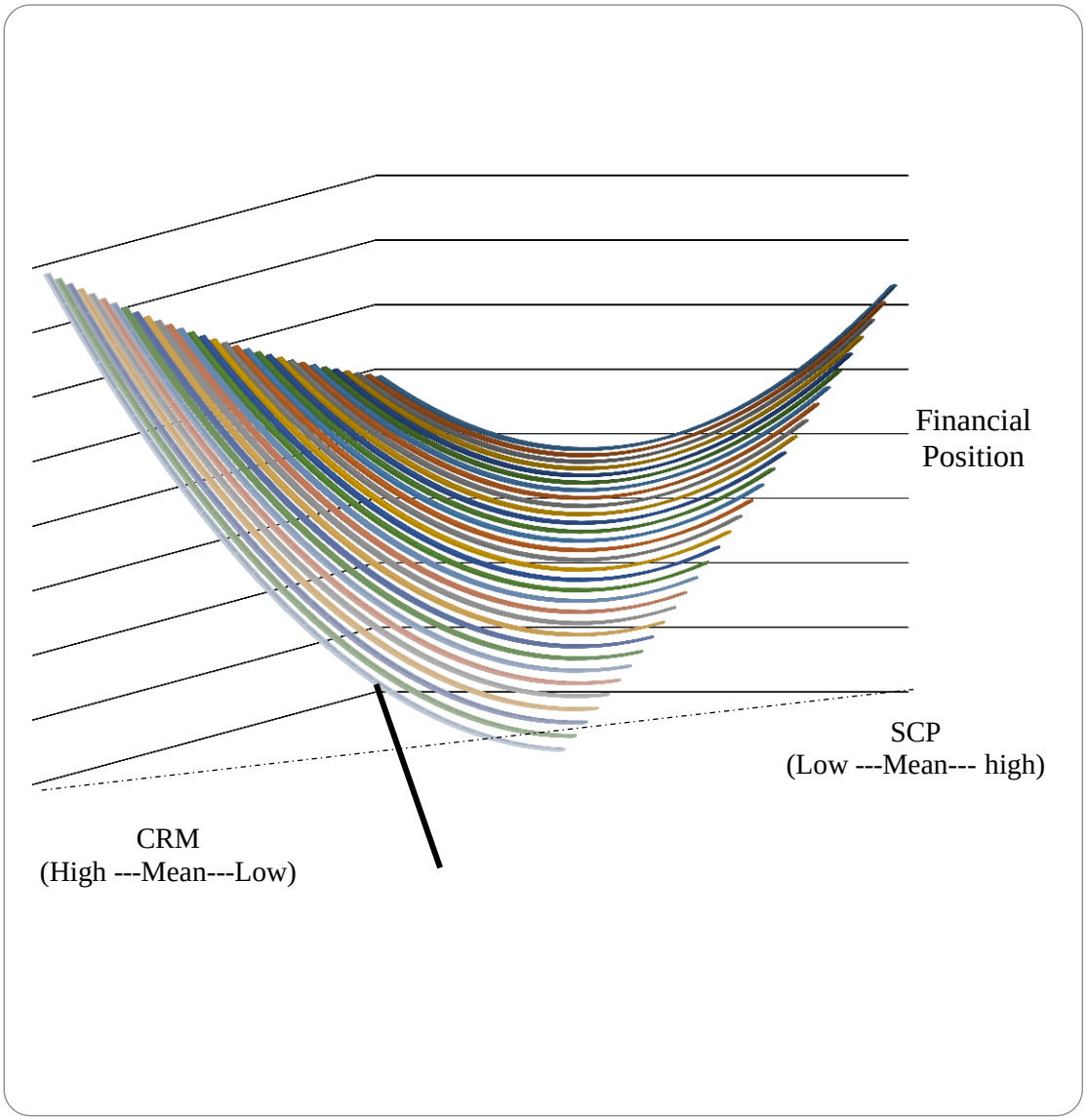
Table 2
Panel A. Polynomial Regression - Response Surface Analysis

Dependent Variable = FP		Estimated Parameters	Std. Error	Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper
Intercept		-.075	.110	.503	-.281	.152
CRM	(b_1)	.496	.106	.002	.333	.733
SCP	(b_2)	.235	.136	.068	-.094	.441
CRM^2	(b_3)	.195	.111	.078	-.023	.417
CRM*SCP	(b_4)	-.244	.151	.072	-.519	.081
SCP^2	(b_5)	.025	.101	.780	-.209	.211

Notes: Standard errors were calculated from 5000 bootstrapped samples.

Table 2
Panel B. Calculation of Slopes and Curvatures of Response-surface

	Coefficient	Standard Error	*t*-value	*p*-value
Line of Congruence (CRM = SCP)				
Slope a_1	0.73	0.10	7.143	0.000
Curvature a_2	-0.02	0.05	-0.481	0.632
Line of Incongruence (CRM = -SCP')	0.26	0.19	1.406	0.164
Slope a_3				
Curvature a_4	0.46	0.22	2.065	0.042



Notes: Dotted line identifies the line of incongruence (CRM=-SCM)
Solid bold line identifies the line of agreement (CRM=SCM)

Figure 2
Three Dimensional Response-surface for CRM and SCM

CHAPTER 4: IMPACT OF SUPPLY CHAIN AND NEW PRODUCT PROCESS DECISIONS ON CRM CAPABILITY AND FIRM PERFORMANCE

A paper to be submitted to Journal of Business Research

Abstract

Due to competitive and customer pressures, most organizations have bought into the idea of becoming customer-centric. To support their customer-centric strategies, organizations are slowly adopting a process structure as a substitute for the functional structure. Using resource-based view (RBV) theory, this study attempts to capture the inter-relationship among three key business processes, namely, customer relationship management (CRM), supply chain management (SCM), and new product development (NPD), in the context of building customer capability. The study examines how organizational actions relating to the SCM and NPD processes affect firms' capability with respect to the CRM process and subsequently their financial performance. The actions examined are network leadership and outsourcing within the SCM process, and innovation investment and customer co-creation within the NPD process. Results show that network leadership contributes to CRM capability because it enables a firm to form a common vision of customers among the supply chain network members and obtain their buy-in to enhance market responsiveness of the network. More importantly, this study found a strong combined effect of network leadership and outsourcing on CRM capability, suggesting that if a firm can leverage "customer ownership" in negotiating with its outsourcing vendors, it can further enhance the firm's CRM capability. However, this study failed to find a similar link between decisions taken within the NPD process and CRM capability of firms. The message is that firms could develop capabilities in these two processes independent of each other.

Introduction

In the last two to three decades, most organizations have bought into the idea of becoming customer-centric. Changes in the business landscape along with competitive and customer pressures are primary drivers of this phenomenon (Sheth et al., 2000). The customer-centric movement gained momentum with the advent of the internet and the development of new technologies and a new approach for managing customer relationships (Tseng et al., 2011). Companies are now aligning technology tools and strategic approaches to develop stronger relationships with their customers, as well as attain higher profitability.

From a structure perspective, organizations are slowly adopting a process structure as a substitute for the functional structure that they had used for a long time to support their customer-centric strategies. Srivastava, Shervani, and Fahey (1998) identify three main processes that capture the most important activities of the firm—customer relationship management process (CRM), new product development process (NPD), and supply chain management process (SCM). Although other processes such as information management and investor management may be important, our focus in this study is on the three primary processes discussed by Srivastava et al. (1998).

CRM process focuses on improving organizational insights into customer needs and expectations as a means to deliver superior products, services and customer experiences. Because insight generation and need fulfillment come at a cost, organizations concentrate their effort on customers that have the potential to provide them higher value. SCM processes aim to offer the right product at the right time to the right customer within the constraint of minimizing cost of order fulfillment and maximizing speed of order delivery and customer satisfaction. In most firms, supply chain operations have been governed more by efficiency considerations and less by

the customer satisfaction goal. NPD processes focus on developing new products that are relevant to customers and have superior commercialization potential. Using RBV theory as the basis, we suggest that firms will use their heterogeneous resources to build distinctive capabilities in each of the three business processes.

The primary objective of the present study is to capture the inter-relationship among the three processes, in the context of organizations building customer capability for achieving superior firm performance. Specifically, the study addresses the following question: to what extent do organizational decisions relating to the SCM and NPD processes affect a firm's capability with respect to its CRM process and subsequently its financial performance? This question is analogous to integration problems observed in extant research among functional areas of business. Like business functions, business processes also have a tendency to work in silos and focus more on maximizing their respective objectives—customer satisfaction in the case of CRM, efficiency of operations in the case of SCM, and innovativeness in the case of NPD. Many studies have noted that these objectives are conflicting in nature and any effort to improve one may come at the expense of the other (e.g., Treacy and Wiersema, 1993). However, in recent years, SCM and NPD processes have made efforts to become more customer-focused in their activities and goals, such as supply chains that are driven by customer demand and new product processes that use customers as co-creators of value.

We specifically examine the premise that decisions taken in the supply chain and new product development processes to support efficiency and innovativeness goals respectively may go against (support) the philosophy of customer-centricity and interfere with (may be consistent with) firm's deployment of CRM resources and thus result in lower (higher) CRM capability. Two strategic actions relating to each process that arise from respective process objectives and

market pressures are considered in this study. These are outsourcing and network leadership in the case of the supply chain process, and innovation investment and customer co-creation in the case of the new product process. Many organizations have outsourced (or have been forced to outsource for efficiency and competitive considerations) billing, payroll, claims processing, product support, customer contact and manufacturing to other companies that may or may not be customer-centric themselves. This action can potentially weaken the customer-centricity capability of these firms. For example, cultural differences, language difficulties, and time delays impacted customer servicing capability of Dell in the early 2000's. On the other hand, some organizations have taken a leadership role within their supply chain network to tap into and use the resources of the network to develop value-added customer solutions. This type of action can support customer-centric efforts of the firm. Additionally, firms that exhibit network leadership may be able to influence outsourcing firms to be more customer-centric and support the CRM capability of the firm. The key point to emphasize is that actions of firms relating to SCM and NPD processes, whether forced or intentional, can and do impact their CRM capability.

A secondary objective of the present study relates to measurement of CRM capability. The capabilities literature relating to resource-based view (RBV) posits that it is not just possession of resources, but effective deployment of resources that provides firms with superior performance (Helfat et al. 2009). Effective deployment, also called a 'capability,' captures the degree to which a firm is able to convert input resources into relevant outputs (Barney, 2001). We examine if the varying performance of firms on CRM is due to the fact that they are not equally effective in deployment of CRM inputs (because of their process goals and actions). We use data envelopment analysis (DEA) for estimating relative CRM capability of firms based on a relevant set of CRM inputs and customer outputs and then show that variation in firm

performance can be attributed to variation in CRM capability. The DEA method has been used in previous studies to estimate both marketing capability and marketing efficiency (Dutta, Narasimhan, and Rajiv 1999; Donthu et al. 2005). Most CRM studies thus far, however, measure components of CRM capability from an input perspective, such as relationship capability, loyalty capability, etc. (Coltman, 2007; Wang and Feng, 2012). In our view, measuring inputs, rather than both inputs and outputs, provides only a partial picture of the degree to which firms have been able to build their CRM capability.

From a managerial perspective, the realized performance for the CRM process suggests mixed results and signals that CRM implementation is at best a work-in-progress in most organizations. For example, a large number of studies have suggested that more than 50 percent of CRM implementations can be considered as failures (e.g., Reinartz et al., 2004; Bard et al., 2005). We agree that there is a clear performance variance across firms in their CRM processes, and propose in this study that part of the reason for that variance may be the decisions taken by managers in response to industry trends and process goals in the SCM and NPD processes that may not fully support the intent of the CRM process.

From a theoretical perspective, the study addresses an important dilemma that organizations face. Using RBV theory, Allred et al. (2011) noted that (a) decision makers are primarily concerned with helping their firms achieve differential performance, and (b) we know little about the process through which firm resources are transformed into distinctive capabilities. The dilemma that we address is that different business processes are involved in building distinctive capabilities that are relevant for their process, but that may interfere with capability building in other processes.

Conceptual Model

In today's business world, organizational activities and performance are influenced by two important yet seemingly opposing forces—namely, focus on customers and focus on efficiency. Consideration of customers as assets of the firm (Srivastava, Shervani, and Fahey, 1999) and intensity of competition have both hastened the need for companies to be customer-focused. Companies have been aided in this quest by technological advances such as CRM and ERP systems, which provide them with better insights on customer attitudes and behaviors. However, anecdotal stories have suggested that CRM use has not benefitted all firms equally (Bard et al. 2005). Some firms have developed superior CRM capability and done better than others in realizing higher market and financial performance. From a resource based (RBV) perspective, because CRM capability is not easily imitable by competitors, we postulate that firms endowed with such capabilities should perform better than their competitors.

At the same time, there also has been increasing pressure on companies to become lean and efficient. Higher efficiency is expected to translate into higher profitability, thus making resources available for other strategic purposes of the firm (Swink et al. 2005). However, in some firms, higher efficiency is used as a means to satisfy short term performance requirements of the investor market. To become efficient, companies are using a variety of strategies, including outsourcing, encouraging the supply chain network to commit and use resources for serving the firm's customers, building lean manufacturing systems through sophisticated just in time (JIT) approaches, and so on. However, when firms cede control of part of the operations that they were responsible for previously to outsourcers and suppliers, performance of their customer-centric strategy will likely suffer. Some of the practices like outsourcing may be unavoidable from a cost perspective. Any negative impact brought about by such practices will need to be countered by strategies that support the firm's customer-centric focus, thereby

ensuring minimal impact on its CRM capability and financial performance (Huang and Wang 2013). One such practice is encouraging use of the extended supply chain network to share their resources and skills toward development of better solutions for the firm's customers. This strategy is consistent with the goal of advanced supply chains to be demand-driven rather than cost-driven.

While development of value-laden offerings are helped by a firm's supply chain partners, the primary push for it has to come from the firm's new product practices. We identify two practices that have a direct impact on customers' perceptions of value—namely, R&D intensity and product co-creation. R&D intensity signals the extent to which a firm is willing to spend its resources on technology and science in order to develop better and faster solutions to changing customer needs. The open innovation opportunity available to firms has raised an issue about how much of the innovation has to be done in-house. Additionally, firms are buying into the concept of co-creation of value. Co-creation involves customer participation in solutions development, which raises the level of connectedness between customers and the solutions developed for them. Both of these practices are likely to increase CRM outputs for given inputs and thus CRM capability of firms.

In summary, the present study addresses two questions relating to antecedents and consequences of a firm's CRM capability: (1) does CRM capability contribute to firm performance?; and (2) how do current SCM and NPD decisions affect CRM capability of firms? The model testing these two questions is illustrated in Figure 1.

Literature Review

CRM Process

The basic theme of customer relationship management (CRM) is to become more customer-centric to understand customers well, to give them outstanding service, and to anticipate their wants and needs. When companies do these things well, increased revenues and profits are likely to follow; however, CRM may mean different things to different people. It can be viewed as data-driving marketing (Kutner and Cripps, 1996), a term for methodologies, technologies and ecommerce capabilities used by companies to manage customer relationships (Stone and Woodcock, 2001), and the process of development and maintenance of long-term, mutually beneficial relationships with strategically significant customers (Buttle, 2001). In this study, we take a broader perspective of CRM, which is viewed as an enterprise-wide initiative that belongs in all areas of an organization (e.g., Swift, 2000; Singh and Agrawal 2003). Swift (2000) defines CRM as an enterprise approach to understand and influence customer behavior through meaningful communication to improve customer acquisition, customer retention, customer loyalty and customer profitability.

CRM capability

Day (1994) presents capabilities as competencies or 'complex bundles of skills and accumulated knowledge, exercised through organizational processes that enable firms to coordinate activities and make use of their assets' (p. 38). In a similar vein, Dutta, Narasimhan and Rajiv (1999) define a capability as the ability of a firm to deploy the resources available to it to achieve desired organizational outcomes or ends. The more efficient the firm is able to deploy its strategic inputs for achieving superior outputs, the higher the capability (Dutta et al. 1999).

Based on these thoughts, we define CRM capability as the ability of firms to deploy customer-related resources and activities to achieve strategic customer outcomes.

The input-output approach has been used in previous studies to measure a firm's capabilities. For example, Dutta, Narasimhan and Rajiv (1999) use this approach to measure three types of firm capabilities—namely, marketing capability, operational capability, and R&D capability. Murthi, Srinivasan, and Kalyanaraman (1996) capture marketing efficiency by using product quality, price, marketing expenses, image and direct costs as inputs and ROI and market share as outputs. We follow suit and adapt the input-output approach to measure a firm's CRM capability. A well-managed CRM process should be able to improve customer related outcomes by controlling the input factors.

Outputs of CRM Capability. Payne and Frow (2005) suggest that CRM is concerned with "creating improved shareholder value through the development of appropriate relationships with key customers and customer segments" (p. 168). In addition to creating value to the firm, Payne and Frow also mention that CRM should also create value to the customer. To create customer value, the firm has to choose the most appropriate customers, understand their needs holistically and meet the needs at the individual or at least the segment level. These activities will enable customers to be served with customized offerings, resulting in enhanced satisfaction and loyalty perceptions among customers. Higher customer outcomes will also be associated with higher firm outcomes. When customers are satisfied, the firm may be able to increase the scope of its relationship with them and may also be able to charge a price premium for its customized offerings. We thus consider customer satisfaction, customer retention, scope of customer relationship, price premium and customization as important outcomes of CM processes of firms. Our DEA output selection is also consistent with Swift's (2000) perspective of CRM, that is, the

objectives of CRM are to achieve multiple outcomes including customer acquisition, customer retention, customer loyalty and customer profitability.

Inputs of CRM Capability. Generally speaking, two broad categories of resources can be deployed by a firm to achieve the above outputs of CRM process: resources to understand customers' behavior and resources to educate customers (Swift, 2000). Firms must possess market intelligence that enables them to develop customer (current and potential) knowledge and adapt their behavior using that knowledge. In addition, research has shown that the most effective way to build and maintain long-term relationships with customers is to be responsive to their changing needs (Kohli and Jaworski, 1990; Narver and Slater 1990). To do the above activities well, firms need to prioritize customers according to their value and offer higher quality services to the more valuable customers. Therefore, being able to identify high value customers, respond to customers' need and develop and utilize market intelligence are the key inputs to better understand customers' behavior. Furthermore, we also include customer education as a key input of CRM capability. Efforts made to educate customers have been perceived as a valuable augmentation to a firm's selling process (Burton, 2002; Lengnick-Hall, 1996; Levitt, 1980) and are likely to contribute to increased customer efficiency, which is associated with higher customer levels of repeat purchase (Xue and Harker, 2002). For example, Sharma and Patterson (1999) find that increased communication effectiveness of investment advisors is associated with increased customer trust in the organization and commitment to the relationship. Based on these effects, we include market intelligence, market responsiveness, focus on high value customers, and customer education as key inputs to drive the CRM outcomes.

Based on the above discussion, we operationalize CRM capability as the following efficiency frontier:

CRM outcomes (customer satisfaction, customer retention, premium prices, scope of relationship, performance on customization) = f (market intelligence, market responsiveness, focus on high value customers, customer education).

Theoretical Framework

Supply Chain Decisions and CRM Capability

The objective of this study is to understand how decisions/actions in a firm's SCM and NPD processes impact its CRM capability and thereby its financial performance. Each process has its goals and objectives, over and above organizational goals. Some of the decisions taken by each process in pursuit of its goals may sometimes conflict with the goals of another process, while others may be supportive. In this section, we discuss the impact of two strategic decisions taken in the management of a firm's supply chain on the CRM process: outsourcing and network leadership.

Outsourcing: One of the most visible changes in the last two decades within supply chain processes is the business decision to outsource a firm's manufacturing and service activities. Outsourcing is defined as an "act of moving some of a firm's internal activities and decision responsibilities to outside providers" (Chase et al., 2004). The outsourcing phenomenon grew significantly in the 1990s (Bryce and Useem, 1998) and is now accepted as a part of corporate strategy. For instance, close to 60 percent of the production value of an automobile for American car manufacturers is outsourced today (Mohammed, Shankar, and Banweet 2008). The objective to cut costs through outsourcing has been fueled to a degree by changes in the internal labor markets of firms (Walsh and Deery, 2006). A general benefit perceived by firms for outsourcing is that they can acquire certain capabilities they do not possess, while focusing on core

competencies that they possess (e.g., Adler 2000; Antonucci et al., 1998; Muscato, 1998; Kakabadse and Kakabadse, 2000; Blumberg 1998; Large 1999; Jennings 2002; McFetridge and Smith, 1998). Yet, outsourcing has a lot of hidden costs (Williamson 2008). The outsourcing firm is placing a part of its destiny in the hands of firms that are themselves trying to maximize profitability (Mohammed et al. 2008) and that may have conflicting objectives (Lacity and Hirschheim, 1995). Outsourcing firms can encounter supplier management problems that can impose a cost in its relationship with customers. Additionally, firms run the risk of losing the skills that they outsource, becoming overly dependent on the provider, and losing control over their responsiveness to market changes (Quinn, 1999). Walsh and Deery (2006) noted that outsourcing can often result in the supply of poorer or degraded services at a time when front-line service is critical to organizations that compete on customer loyalty (Frenkel et al., 1999; Heskett et al., 1997). Further, outsourcing can increase the risk of imitation by competing firms and dilute resources that could have created competitive advantage for the outsourcing firm (Gainey and Klaas, 2003).

We believe that outsourcing may erode CRM capability for the following reasons. First, outsourcing can erode the skills needed for the development of new business and core capabilities (Lei and Hitt, 1995). Too much of outsourcing negatively impacts the firm's knowledge base, as well as its ability to learn new technologies and capabilities. Given that knowledge and skill-development is a path-dependent process (Barney 1991), organizational ability to learn decays and firms lose their skills to address customer requirements at the pace that is needed in competitive markets. Second, outsourcing diverts capital and time investments away from internal processes and toward management of external relationships (Weigelt, 2009). Third, in this age of customization, outsourcing manufacturing operations will lower the ability

of the firm to customize and any effort in that direction will require significant additions to cost, defeating the purpose of outsourcing. Customization efforts will involve frequent product revisions and renegotiation of contracts, as new knowledge about customer preferences is discovered (Weigelt, 2009). Finally, outsourcing introduces an extra layer between the firm and its customers, which may come in the way of the firm's ability to attend to customer requirements effectively and in a timely fashion. Overall, due to the extremely high cost to win back customers, outsourcing may decrease the efficiency of CRM activities. Moreover, outsourcing may decrease a firm's flexibility to adjust to dynamic changes in market. The outsourcing vendor only provides the level of service specified in the contract. Unless specifically spelled out in the contract, a firm may lost the flexibility to address the dynamic changes in the market. Lack of capability to address customers' changing needs may impair a firm's CRM capability. As such, we hypothesize that

H_1: The greater the use of outsourcing arrangement, the lower a firm's CRM capability.

Network Leadership: A second decision facing firms today is the network leadership role that they need to play within their supply chain network (Li et al., 2006). Because of the global economy, there has been a rapid proliferation in alliances, partnerships and other cooperative agreements among companies in a supply chain. These alliances have now created what is called as "strategic network competition" (Hunt and Morgan, 1994; Spekman et al., 1994), where competition is now not between firms, but between the networks of firms. This new order has made coordination of activities of the network of firms a prime source of competitive advantage (Spekman, Kamauff, and Myhr, 1998). According to Min and Zhou (2002), the ultimate success of a firm will depend on its ability to coordinate the network of business relationships among supply chain members. Coordination provides two benefits: reduced cost and potential for

leveraging the skills, expertise, and capabilities of firms within the network for responding quickly to marketplace changes.

The question of relevance for CRM practice is the degree to which a firm wants and is able to take a network leadership role in bringing about coordination benefits which increase the value offered to end-customers. One deterrent appears to be skepticism about the benefits afforded by such leadership as well as the responsibilities that it entails. Another deterrent is conflicting goals of network partners and difference of opinions on the benefits of being in a network. A third deterrent may be the challenges associated with extending the concept of customer-centricity to (and its adoption by) the entire supply chain network. Finally, leadership may impose several expectations on the firm: facilitating the formation of a common vision of the customer, transferring demand information more quickly to supply chain partners and obtaining their buy-in to enable increased responsiveness (Min and Zhou, 2002), improving partners' support for revenue-enhancing strategic initiatives such as new product development, etc. (Spekman et al., 1998). If these expectations are met, they can contribute to increased customer satisfaction and retention (Trevile et al., 2004).

Overall, network leadership can enhance the market responsiveness of the network. It also can ensure that responses are based on good demand-side data that the leader firm has had a role in gathering and disseminating throughout the network. These customer-centric values will also guide the organization's attitude toward implementation of CRM activities in an efficient and effective way (Day, 2000; Jayachandran et al., 2005). As such, we hypothesize that network leadership in supply chain positively impacts CRM capability.

H_2: The greater the network leadership of a firm within the supply chain network, the greater its CRM capability.

Joint Impact of Network Leadership and Outsourcing: When firms outsource part of their operations, they can expect some amount of dilution in the impact of their efforts to be customer-centric. Outsourcing firms have seen results that fall far short of expectations and many have brought some of the outsourced activities back in-house (Greenberg and Canzoneri, 1997). If taken too far, it is possible that the outsourcing firm may lose know-how in critical areas to outsiders and lose a sense of their own business. That is, they may no longer possess the cutting-edge knowledge to either understand their customers (if information and customer databases are outsourced) or create innovative products and services for their customers. Further, employees of the vendor firm may not display the same commitment and dedication to customer goals of the firm as much as the firm's employees (Bryce and Useem 1998). Outsourcee firms may have goals and attention that are relevant to the success of their enterprise and may not pay heed to the requirements of the outsourcing firm. The outsourcing firm may then need to spend increasing energy on convincing vendors of appropriate actions that support the firm's goals (Conner and Prahalad, 1996).

What can companies do to perform successful outsourcing operations? Although literature has identified some high-level approaches (Heywood 1994; Jennings 1996; Foster 1999), there is little empirical research that investigates strategies that can be adopted to enhance the performance of outsourced operations. We are interested in this study to evaluate how outsourcing can help with (at least not dilute) a firm's intent with building its CRM capability. Activities that are outsourced typically have implicit interdependencies with activities that are not outsourced (Kogut and Zander 1992; Grant 1996). Interdependent activities need ongoing communication, knowledge exchange, and mutual adjustment between the outsourcing firm and the vendor firms (Weigelt 2009). In other words, firms need to coordinate outsourced activities

with in-house activities and processes. Both RBV and knowledge-based view (KBV) arguments imply that whether outsourcing benefits or hurts a firm's effort to build CRM capability depends not only on gaining access to quality vendors, but also on whether a firm can integrate the activities of these vendors with internal processes (Weigelt, 2009). The coordination challenge is similar to the experience companies face when coordinating in-house activities across functions and processes. This challenge becomes critical particularly for activities that impact skills or capability development in key areas of business. In this study, we offer network leadership as a mechanism that can be used to achieve better coordination with outsourcing vendors.

The basic premise of network leadership is that a firm which takes on a leadership role among its supply chain partners (including outsourcing vendors) to find solutions that are of value to its customers will benefit more than a firm that does not. The goal of such leadership is to leverage the strategic and operational capabilities of individual supply chain partners to help achieve significant ongoing benefits (Li et al., 2006). However, unless outsourcing companies willingly choose to follow and work with the leader, conflict may arise and supply chain performance may suffer as a result (DeFee 2007). The literature on leadership suggests that followers show greater willingness to cooperate with firms that are transformational. In a supply chain context, transformational leadership is associated with organizations that are intent on achieving holistic goals that benefit all members. The holistic goal of focus in this study is improved customer centricity of the leader firm which benefits both the leader and the followers. Offering value to the customer often translates into expedited activities throughout the supply chain (Lambert and Cooper 2000). Part of the leadership role is therefore to handle interdependency and coordination needs and expedite activities of the chain toward meeting the changing requirements of the customer base. Following may not be a problem in the context of

the study, as the customer-centric movement has been strong and has affected companies of all sizes and across industries.

H_3: Network leadership is likely to reduce the negative impact of outsourcing on the CRM capability of the firm.

New Product Development Decisions and CRM Capability

We focus on two decisions relating to new product development in firms. These are investments in R&D, which is reflective of the focus on innovation of firms and co-creation of value, which is based on organizational decision to allow customers to participate directly in value creation.

R&D Intensity: The resource-based view of the firm proposes that a firm's performance is determined by the set of unique resources/capabilities it possesses. The R&D capacity of a firm is one such resource. The belief is that development of "internal scientific and technological capabilities through investment in R&D" can enhance a firm's innovative output (Deeds, 2001; p. 30). Mizik and Jacobson (2003) observed that firms engage in R&D to generate superior products and improvements in the production and distribution process. Investments in R&D can bring about new solutions for existing customer problems as well as meet new needs of existing and new customers (Gatignon and Xuereb 1997).

However, the innovation output of a firm needs to be relevant to the external market. For this to happen, the firm must be able to link R&D investments and activities to future customer requirements. If it is able to do so, Ramaswami, Srivastava and Bhargava (2009) noted that a natural outcome of developing more innovative products is that customers get better products. In our context, the implication is that R&D enhances CRM capability of a firm. The problem is that R&D is more interested in radical breakthrough projects and exciting products (Gupta, Raj and Wilemon 1986). They may be striving for technical performance for performance sake, but this may not lead to products that the market desires.

Further, the two groups have to deal with differences in cultures and thought-worlds between innovation-generating R&D function and customer value generating marketing function (Griffin and Hauser, 1996). The R&D function is focused on value creation in the long-term, while the marketing/CRM process is focused on short-term value (Gupta, Raj and Wilemon 1986). The difference in time orientation between the two groups may have an effect on the degree of integration achieved by them (Lawrence and Lorsch 1969)., R&D focus can contribute to evaluating needs at the periphery and putting money into opportunities that may be exciting for newer customers of the firm.

Another challenge identified by Treacy and Wiersema (1993) is that firms may not be able to excel in all three business processes and may have to choose to excel in one. Their argument puts forth the possibility that higher R&D intensity, implying greater focus on innovations, may divert organizational attention away from customer intimacy, an associative condition for CRM. A logic put forward for this non-association is that product innovators often do not link technological and market issues, and often do not collaborate across departments (Dougherty, 1992). The absence of collaboration implies that spending on R&D need not correlate with customer need fulfillment.

Based on the above arguments, we hypothesize that:

H_4: There is a negative association between R&D intensity and CRM capability.

Co-creation of Value: One of the propositions of the service dominant logic proposed by Vargo and Lusch (2004) is that the customer is always a co-creator of value. Under the traditional model, the supplier produced goods and services, and the customer purchased those goods and services. In the S-D model, customers participate in the product design and delivery process facilitating an interactive process of "learning together" (Ballantyne, 2004). It is also sometimes

called as collaborative product design wherein customers participate as decision helpers, inventors and problem solvers (von Hippel, 2005). The underlying argument for customer involvement is that they are used as a means to develop and market products that are superior in meeting customer needs (Kristensson et al., 2004). Because a customer is involved in the process, she is more likely to build commitment to the resultant offering by the firm (Jaworski and Kohli, 2006), and create bonds of integrity with the firm. As a result, customer trust is increased through the process of collaborative product design (Chan, Yim and Lam 2010). The literature has shown that trust can improve a firm's long-term success in marketing efficiency and effectiveness (Payne and Frow, 2005; Sharma et al 1999, Storbacka et al, 1994). In addition, through collaborative product design, companies can turn just-in-time knowledge from customers into just-in-time learning for the organization. Just in time learning helps firms reallocate their resources in various CRM activities and thus improve a firm's CRM efficiency. Furthermore, co-creation activities require a firm being customer centric (e.g., Gloor and Cooper, 2007; Owen et al., 2008), which is a necessary condition for successfully implementing CRM projects and improving CRM efficiency (Jayachandran et al., 2005). We therefore hypothesize that co-creation of product design positively impacts CRM capability because it fosters a favorable environment for CRM activities.

H_5: Co-creation of customer value is positively associated with a firm's CRM capability.

Joint Impact of R&D Intensity and Co-Creation of Value: In the past, R&D expenditure was a valuable strategic asset and a formidable entry barrier in many markets. Greater investment in R&D enabled firms to work on more number of development projects, which in turn, contributed to meeting more of the needs of their customers. However, organizations have had to deal with two issues relating to money spent on R&D activities. First, competition and globalization trends have contributed to resource scarcity, including those allocated for R&D activities. Companies

must balance optimization (whose focus is on existing business) and innovation (which involves strategic investment in new businesses). Second, R&D investment productivity has declined rather sharply in recent decades. Because of these factors, organizations are looking for alternative ways to manage their innovation process, including open innovation and crowdsourcing to bring in external players who can add to their innovation resources, and customer participation to make R&D investments work better in their pursuit of new and valuable customer solutions. Greater opportunity for customer participation and co-creation will enable organizations to work on development projects that are relevant for their customers. Together, co-creation and R&D investments have the capacity to improve the CRM capability of firms.

Customers may want to participate in a firm's developmental activities for many reasons: they want to help design the products and services they use; they want an ongoing conversation with the firms they do business with; and they want their voices heard (Ramaswamy and Gouillart 2010). Prahalad and Ramaswamy (2004) noted that value is increasingly created jointly by the firm and the customer, rather than created entirely inside the firm. Co-creation reduces the risk of a firm's R&D investments. It increases the capacity of firms to generate insights which is then used to direct and/or increase the relevance of R&D investments. A co-creative platform allows firms to generate new ideas rapidly based on direct customer inputs, develop products and services based on those inputs, and experiment with new offerings quickly. R&D investments without customer input may not always result in offerings that customers value; customer input without follow-through is wasted; however, customer input and follow through R&D efforts can contribute to greater acceptance of the firm's offerings and greater satisfaction of customers.

One of the core questions of co-creation relates to the stage at which user involvement should take place in the NPD process. Traditionally, customer involvement took place in later stages of the NPD process such as product test and launch. More modern practice is to involve customers in the fuzzy front end of innovation as well as on the design and development itself. Greater involvement of customers through the entire process leads to a continuously learning organization that makes better choices of R&D projects and better implementation of those projects.

H_6: Customer co-creation reduces the negative impact of R&D intensity on CRM capability of firms.

CRM Capability and Firm Performance

We argue next that CRM capability can induce superior firm performance. Zablah et al. (2012) noted that a firm's CRM capability is likely to affect its long-term performance. We suggest that CRM capability is likely to accelerate cash flows, increase the residual value of cash flows, and lower the volatility and vulnerability of cash flows. Gruca and Rego (2005) find that customer satisfaction (one of the outcomes of CRM capability) is a strong determinant of future cash flow growth. They also find a robust negative association between satisfaction and future cash flow variability across a variety of industry sectors. Aksoy et al. (2008) reasons that this positive effect arises because a satisfaction-inducing capability enables stronger relationship with the firm's customers; in turn, stronger relationship is recognized as an important determinant of firm performance (Rust, Lemon and Zeithaml 2004). This capability can also shape customers' purchase intentions (Bolton and Drew 1991), share of wallet (Cooil et al. 2007), and advocacy behaviors (Anderson 1996). Finally, superior CRM capability leads to superior firm performance by increasing the residual value of cash flows. Residual value reflects the expected value of the business beyond the planning horizon (Srivastava et al 1998). Residual value can be enhanced by

increasing the number of products or related products/services purchased by customers and customers' referring products to other potential users. Verhoef, Franses and Hoekstra (2002) provide evidence that a relationship-based portfolio is positively related to customer referrals and the number of services purchased. A good deal of evidence suggests that firms with superior CRM capability can do well against competition. Such a capability, once built, is not easily imitated or transferable because it is firm-specific and based on a high level of tacitness. Based on the above arguments, we hypothesize that CRM capability is likely to have a positive impact on firm performance.

H_7: CRM capability is likely to have a positive impact on firm performance.

Research Methods

Sampling Method

A sampling frame of 200 firms was developed for four big cities in the mid-western and southern parts of the country.[1] Of the firms selected, 84 were public and 116 were private companies and sole proprietorships. The key informant was defined as a top manager from the marketing function—VP, Director, or Manager. In firms without a separate marketing department, the manager in charge of marketing was identified as the key informant. We first attempted to identify a contact person in each firm. This contact person was given a detailed explanation of the survey questions in a face-to-face meeting. Where the contact person and the key informant were the same (n = 25), that person was asked to complete the survey and mail it back in a self-addressed stamped envelope. Where the contact person and the informant were not one and the same (n=63), the former took responsibility for conducting a personal interview on behalf of the researchers. The choice of the personal interview method was based on the strategic focus of the study and the need to use top managers as key informants. A simple t-test of the mean values of

[1] The starting value for the sampling frame is low because of the decision to obtain data using the personal interview method of data collection.

key study variables did not show any significant difference across the two modes of data collection.

Using the above process, a total of 190 contacts were made. Of these, complete survey responses were obtained from 88 firms, yielding a response rate of 46%. We tested nonresponse bias by comparing the responding firms against a sample of non-responding firms on sales, net income, market value, and ROA (for the time period covered by the study). This evaluation was feasible only for publicly-listed firms in the sampling frame. The p-value for the four comparisons was 0.45, 0.49, 0.24, and 0.75, respectively, indicating the lack of difference between responding and non-responding firms.

The sample profile of responding firms is reported in Table 1. Respondents are primarily in B to B firms (56.8%) that have a separate marketing department (92%). These firms are large in size with 65.5% employing more than 1,000 employees and have been around for more than 15 years (71.6%). The profile variables of size, type of firm—B2B/B2C and presence of a separate marketing department are used as control variables in the analytical models used to test the proposed hypotheses.

Measurement

Table 2 includes a complete description of the measures used in the study. Similar to the procedure used by Moorman and Rust (1999), if the organization had only one strategic business unit (SBU), respondents were asked to focus on the overall firm when providing responses.

CRM Capability. We use data envelopment analysis (DEA) to compute CRM capability. We believe that the DEA method is appropriate to measure CRM capability for three reasons. First, DEA is particularly suitable for analyzing processes that involve transformation of multiple inputs into multiple outputs (Charnes et al, 1985; Zhu, 2000). Swift (2000) defines CRM as the

process to convert a firm's effort on understanding and influencing customer behavior to improve customer acquisition, customer retention, customer loyalty and customer profitability. Second, DEA uses a mathematical programming model to estimate best-practice frontiers without a prior underlying functional form assumption. When no a priori information is available on the trade-offs or relationships among various measures, DEA is particular useful. In our study context, the underlying functional weights among various inputs and outputs of the CRM process are unknown. Third, DEA input and output measures can be either subjective measures or objective measures (Luo and Donthu, 2006; Narasimhan et al., 2001; Bendolov et al., 2009). In our study, both the input and output measures are based on subjective perceptions of managers.

Appropriate selection of inputs and outputs is a key facet that impacts usefulness of the DEA efficiency score. In this study, we rely upon past CRM research to identify inputs and outputs of the CRM process. After a comprehensive literature review, we focused on four inputs of the CRM process which capture a firm's ability to target the right (high value) customers, generate and utilize market information to understand and fulfill needs of those customers and enable customers to recognize the value of the firm's offerings. We also identified from the literature five key CRM outputs that relate to the firm's performance on customization, customer satisfaction, customer retention, increasing number of relationships with customers and ability to charge a price premium. Using these inputs and outputs, we calculate the CRM capability of each responding firm with the help of MaxDEA 6 algorithm. DEA estimates a set of weights for each sample unit that maximizes a weighted sum of variables, with the constraint that no units have a weighted sum larger than one (Ogawa and Ishii, 2003). As a result, each firm in the sample receives a score between 0 and 1. The range of efficiency scores for the sample firms was between 0.436 and 1.0.

Outsourcing. Outsourcing is practiced by firms for two reasons: find partners that are specialists in manufacturing required parts and components and free up resources for more effective use in high value operations. Three items were used to capture these reasons for using outsourcing. They are "we actively identify outsourcing partners who can produce needed components faster than we can", "we actively identify outsourcing partners who can produce needed components cheaper than we can" and "we view outsourcing as a way to free up assets that can be utilized more effectively in other parts of our business". The items show good reliability. (alpha=.814)

Network leadership. This concept captures the degree to which a firm is able to take a network leadership role within the supply chain network in bringing about coordination benefits which increase the value offered to end-customers. Firms can be customer-driven in their own operations; they also can facilitate development of a supply chain network that is customer focused via network leadership. Firms have a choice when it comes to choosing supply chain partners; they can choose partners that are either customer-focused or are malleable to become customer-focused. Once relevant partners are chosen, the firms in the network can work together to create value for end-customers. We adopt Ramaswami et al's (2009) measures and use three items to capture a customer-driven supply chain: 1) formation of strategic alliances with supply chain partners to enhance the value of products and services for the customer; 2) integrating products and services across vendors in developing customer solutions; and 3) leveraging "customer ownership" in negotiating with other members (suppliers, distributors, and complementors) of the value chain for creating customer value. The three items show good reliability (alpha= .771)

R&D Intensity. R&D intensity has been measured in multiple ways in the literature, such as the average percentage of total expenditure spent on the R&D process, and the ratio of R&D expenditure to firm sales. In this study, we used the latter method to measure R&D intensity.

Co-value Creation. This concept captures the degree to which a firm facilitates customer participation in the product design and delivery process (Ballantyne, 2004). Participation can come in many forms: as decision helpers, inventors and problem solvers (Wikstrom, 1995; von Hippel, 2005). We follow Ramaswami et al's (2009) measures on customer-driven development. Items used are "we typically co-design our products with customers", "We typically rely on the user to help us define and clarify the user's needs in developing our new products", and "we proficiently review customer reactions to early product design. The items show good reliability (alpha=.771)

Firm performance. The study adapted a measure used by Moorman and Rust (1999) for measuring subjective firm performance relative to stated objectives. The measure has the following components: (1) sales, (2) profitability; (3) market share; (4) net operating margins, and 5) return on assets (ROA). Together, the items show good reliability (alpha=.908).

Control variables. We use firm size (expressed as number of employees), firm age (expressed as the length of existence), and type of business (business to business or business to consumer) to control for firm performance and the presence of a separate marketing department to control for CRM capability of firms.

Common method variance

A critical issue in survey research is 'common method variance' which can have a substantial effect on observed relationships between measures of different constructs. We used Harman's single-factor test to check for common method variance (CMV). This test requires loading all the

study measures into an exploratory factor analysis; CMV is indicated if a single factor accounts for the majority of covariance among the measures. The factor analysis result indicated that less than 25% variance was extracted and half of the items suffered from poor factor loadings (below 0.5). We can conclude based on this test that CMV is not a significant issue in the data set. Another remedy recommended by the literature is psychological separation of measurement, where the researcher makes it appear that the independent and dependent variables are not related via a cover story or other means (Podsakoff et al 2003). In our case, we separated dependent and independent variables using filler questions which are unrelated to this study.

We tested our model using the partial least squares (PLS) approach, which is a variance-based, distribution-free structural equation modeling (SEM) technique that maximizes the explained variance of the endogenous latent constructs. It is sometimes referred to as a form of "soft modeling" (Falk and Miller 1992), as it does not require a multivariate normal assumption for the model variables. As computation of CRM capability was using DEA, which is non-parametric, it is consistent to use PLS rather than parametric covariance based SEM techniques for estimating the structural paths. A PLS model is usually specified by two sets of linear relations: the outer model (similar to a measurement model), in which the relationships between the latent and manifest variables are specified, and an inner model (similar to a structural model), in which the relationships between the latent variables are specified (O'Cass and Julian 2003).

PLS-SEM was chosen over covariance based SEM (CB-SEM) in this study, for several reasons. First, PLS is the recommended approach when the research objective is variance explanation (Hair et al 2011, 2013). Since our study attempts to reveal the variance of CRM capability that can be explained by actions in supply chain and new product development processes, use of PLS-SEM is appropriate. Second, PLS-SEM provides a powerful environment

to test the predictive relevance of model predictors and verify the predictive validity of the overall conceptual model. Third, PLS is relevant because of our study's small sample size (N = 88) and use of multiple items for each latent construct. To sum up, the choice of PLS-SEM is appropriate considering the characteristics of our study.

The research model was analyzed in two stages, following Hulland's (1999) recommendations. In the first stage, the measurement model was tested; in the second, the structural paths were evaluated. In the absence of indices comparable to those available in covariance-based SEM to assess global model of fit, PLS model goodness of fits rely on an examination of reliability, convergent and discriminant validity of the measurement model and predictive capacity of the structural model.

Results

The measurement model Because goodness-of-fit criteria are not available in PLS-SEM, fit statistics are derived from the discrepancy between the observed (in the case of manifest variables) or approximated (in the case of latent variables) values of the dependent variables and the values predicted by the model in question (Hair et al. 2013). As a consequence, the goodness of measurement model results in PLS-SEM builds on a set of nonparametric evaluation criteria.

Reliability of study measures is reported in Table 3. The study measures are robust in terms of their internal consistency reliability as indexed by Cronbach alpha and composite reliability. The Cronbach alphas are .91 for firm performance, .77 for network leadership, .81 for outsourcing, .75 for co-creation and .72 for SCM performance, which all exceed the recommended threshold value of .70 (Nunnally 1978).

Convergent validity assessment is based on the average variance extracted (AVE) value as the evaluation criterion (Fornell and Larcker. 1981). The AVE values, reported in Table 3, are 0.68

for network leadership, .70 for outsourcing, .62 for co-creation and .68 for firm performance, all greater than the recommended threshold value of 0.5 (Fornell and Larcker 1981). In addition, for each construct, the composite reliability value is greater than the AVE value, providing evidence of good convergent validity.

Discriminant validity was examined using Fornell and Larcker criterion and the cross-loadings comparisons. The elements in the diagonal in Table 3 represent the square root of the AVEs. They are greater in all cases than the off-diagonal elements in their corresponding row and column, supporting the discriminant validity of our scales. In addition, discriminant validity is established when an indicator's loading on a construct is higher than all of its cross loadings with other constructs. All items loaded on their respective latent constructs from a lower bound of .7 to an upper bound of .9. Furthermore, each item's factor loading on its respective construct was highly significant, as indicated by the t-statistics of the outer model loadings in PLS output. These values ranged from a low of 3.58 to a high of 50.42.

The structural model Structural model evaluation was carried out in a series of steps as suggested by Hair et al. (2013). Before running the structural model, we checked for the presence of collinearity among the predictors. VIF value ranges from 1.0 to 1.769, all below the threshold level of 5 which suggests that collinearity was not an issue. Then we used structural models to obtain the path coefficients and their significance. To determine the significance of a coefficient, we estimated its standard error by using the bootstrapping method (Hair et al 2013). We chose bootstrapping with 5000 samples.

As shown in Table 4, after controlling for firm size, age, and type of industry, CRM capability has a significant positive impact on firm performance (β = 0.260; t = 2.39). As expected, network leadership has a positive impact on CRM capability (β = 0.258; t = 2.62).

However, our data failed to obtain support for individual direct impact of outsourcing, R&D intensity and co-value creation on CRM capability. The coefficients for outsourcing and co-creation of value are, however, in the right direction.

With regards the interaction effects, the joint impact of outsourcing and network leadership is significant and positive (β = 0.315; t = 3.11). The other interaction effect is non-significant. These results

Finally, we also calculated the effect size, f^2. Cohen (1988) specified f^2 values of 0.02, 0.15 and 0.35, respectively, to indicate small, medium and large effects (Cohen 1988) of the exogenous latent variable. Our data shows the effect size of CRM capability on firm performance is 0.25 with 95% confidence interval [.06, .52]. The effect size of network leadership on CRM capability is 0.30 with 95% confidence interval [.10,.60] and effect size of combined effect of network leadership and outsourcing on CRM capability is 0.33, with 95% confidence interval [.12, .64].

Discussion

The primary objective of the present study is to capture the inter-relationship among the three processes, in the context of organizations building customer capability for achieving superior firm performance. It is a fact that companies are spending significant investments in customer-related technologies in the last 15 years. It is also true that the change toward a process structure, although taking care of integration requirements at the process level, have not gone far enough to bring about integration across processes. An important theme of the study is that these processes are intertwined and any strategic decisions taken in one process is likely to impact the performance of other processes. The empirical results show some evidence to the cross-process effects, particularly between supply chain process and customer management process. A

secondary objective of the study is to develop a metric for capturing CRM capability of firms. We now discuss the theoretical and managerial implications of our results.

Theoretical Implications

This study extends CRM research in two important ways. First, we investigate cross-process impact by examining the linkage between strategic decisions taken in the SCM and NPD processes and a firm's CRM capability. Several major trends in the business environment have impacted organizations in a strategic manner in the last 10 to 15 years. In an effort to become lean and efficient, organizations have been outsourcing non-core activities to vendor firms that enjoy cost, quality and knowhow advantages. However, this puts a strain on an organization's customer servicing capability as there may be a gap in customer-orientedness of the outsourcing firm and the vendor firm. Similarly, organizations have used collaboration with suppliers and distributors as a tool for designing integrated supply chains. This has contributed to joint innovation efforts and greater speed of order fulfillment and thus added to CRM capability of firms. Both outsourcing and supply chain integration are strategic decisions in the supply chain process. Awareness of their impact on a sister process within the firm can bring about better appreciation for the need to integrate processes just like the need to integrate functions. This study looks at the firm's decisions relating to the supply chain and new product development processes and their influence on its CRM capability. Specifically, this study found that network leadership contributes to CRM capability because it allows a firm to form a common vision of customers, transfer information more quickly to supply chain partners, and obtain their buy-in to enhance the market responsiveness of the supply chain network. In addition, even though our data failed to support the direct impact of outsourcing on CRM capability, we found a strong combined effect of outsourcing and network leadership on CRM capability. The important

implication of this finding is that if a firm can leverage "customer ownership" in negotiating with other members in its outsourcing activities, it can enhance its CRM capability. In other words, leadership within the network including vendor firms can enhance a firm's ability to address customers' requirement at the pace that is needed in competitive markets.

The study did not find a similar link between strategic decisions taken within the NPD process (R&D spending and customer co-creation of value) and CRM capability of firms. One possible explanation for this finding is that the NPD process is future-oriented and focuses on value requirements of existing and new customers in the future, while the CRM process is oriented toward servicing the value requirements of existing customers in the present time period. With regards customer participation, our expectation was that co-creation of value would contribute to a better understanding of customer requirements and in turn enable firms to manage customer relationships effectively. The argument is that passive treatment of customers in the innovation process leads to a limited understanding of customer knowledge and limited scope to refine and enhance ideas (Sawhney, Verona, and Prandelli 2005). On the other hand, a strong sense of belonging that co-creation brings to play enables strong social relationships, which increases customers' willingness to share their knowledge with the firm. However, our result should not be interpreted to mean that co-creation has no value; it is possible that there may be other benefits. It may be important from a strategic perspective to gain access to customers and increase the success rates of new product projects. With regards R&D intensity, our study joins the long list of previous studies that have yielded results that are inconclusive from a performance perspective.

RBV theory postulates that organizations use their heterogeneous resources for developing differential performance. Srivastava et al. (1999) and Allred et al. (2011) note that

differential performance is typically achieved through building distinctive capabilities within key business processes. However, each business process has its own distinctive capabilities that they focus on—customer relationships and intimacy in the case of CRM, efficiency in the case of SCM and product innovation in the case of NPD. The dilemma that organizations face is that these capabilities may not be synergistic in character; on the other hand, they may weaken capability building in the other processes. We addressed this dilemma in the study and found that it is present between CRM and SCM, but not between CRM and NPD. Study of the CRM/SCM dilemma can be extended by separating organizations into high and low customer-oriented supply chains and examine if the dilemma is accentuated in the organizations that have supply chains that are not customer-oriented.

Second, the study uses an input-output approach to conceptualize and operationalize the concept of CRM capability. By taking into account both inputs and outputs of the CRM process simultaneously, this approach provides a better capture of a firm's CRM capability. In prior literature, CRM capability has been measured using input resources such as customer integration capability and relationship upgrading capability[2]. Such measures, however, may not be able to capture how a firm uses process activities to generate desirable customer outcomes (Dutta et al, 1999). Ray, Barney and Muhanna (2004) suggest that resources can only be a source of competitive advantage if they are exploited through business processes. The bottom line is that capabilities can be captured only if input resources are linked to business process outputs (Porter 1991; Stalk, Evans, and Shulman 1992). In line with this thinking, we introduce an input-output perspective of CRM capability and develop an efficiency-based measure of this concept. Specifically, we define CRM capability as the efficacy of a firm in converting CRM process

[2] Although these variables are called capabilities in prior studies, they capture a firm's competence rather than capability.

inputs into desired customer-related outputs. Drawing from marketing literature, the outputs of CRM process identified are customer satisfaction, customer retention, scope of customer relationship, price premium and performance on customization; the key inputs are market intelligence, market responsiveness, focus on high value customers and customer knowledge creation. Consistent with RBV notions that heterogeneity in firm performance could be attributed to firm capabilities, our results reveal a significant and direct relationship between CRM capability and firm performance.

Managerial Implications

This study also provides several relevant implications for managers. First, it addresses the concern that managers have regarding return on investment of resources expended on CRM efforts in firms. It benchmarks the process activities used by the firm in pursuit of customer outcomes such as satisfaction and loyalty. It shows that this benchmark metric has a strong positive impact on firm performance. The results of the benchmarking exercise can provide guidelines for managers on how to allocate resources to achieve desired customer outcomes. For the less efficient firms, it identifies the characteristics of the most effective set of firms that they can follow with the goal of improving performance. In addition, the finding of the positive impact of CRM capability on firm performance can bring about greater levels of credibility and legitimacy for the process among senior managers as well as other functional and process areas. Overall, our findings confirm the view that CRM is better treated as an investment rather than a cost.

Second, our study seeks to draw attention of the top management team regarding how their decisions in supply chain management may influence a firm's CRM capability and thereby its financial performance. The outsourcing phenomenon grew significantly in past two decades

and now is accepted as a part of the firm strategy. However, managers should be aware of the risks associated with diluting customer relationships. As such, managers should not only focus on efficiency in their decision making on partner selection. Instead, they should select partners who can enhance the value of their products and services to their customers. Our study shows customer-focused outsourcing activities can help a firm improve its CRM capability and thus lead to superior firm performance. In other words, network leadership (customer value oriented) is not only a key driver of a firm's CRM capability, but also a lever to leverage the impact of outsourcing on CRM capability.

Limitations and Directions

The study looks at the critical connection between the three business processes of firms (CRM, SCM and NPD) and shows that they are linked more than what managers believe or are willing to admit. Specifically, this study proposed that decisions/actions in a firm's SCM and NPD processes can impact a firm's CRM capability. Despite its contributions, the implications of the study have to be tempered based on the study's conceptual and methodological limitations. First, the relatively small sample size is likely to limit generalizability of its findings. More research is needed to test the nomological model proposed in this study using larger samples. Another concern in our study is that it relies exclusively on subjective measures. Future research is warranted to develop and use objective metrics. Third, our study failed to support the relationships between R&D intensity and co-creation in new product development process and CRM capability. More studies are needed to investigate these relationships and the potential contingent factors. Fourth, how the synergy of actions across different business processes can contribute to CRM capability warrant further research

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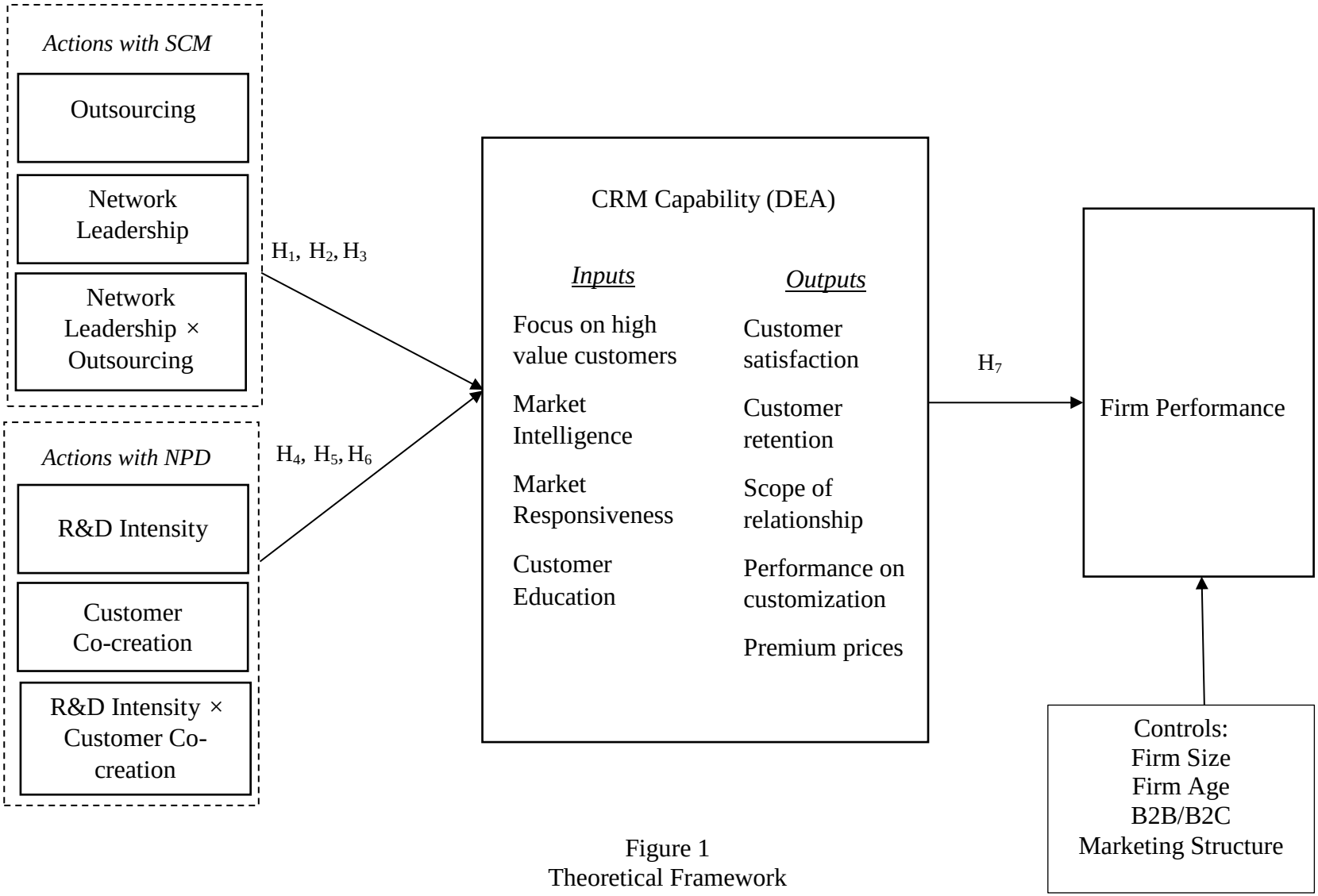

Figure 1
Theoretical Framework

Table 1
Sample Description

	Number	Percent
Type of firm		
Retail	5	5.7
B-to-B	50	56.8
Consumer	23	26.1
Others	10	11.4
Size		
<50	5	5.7
50-250	13	14.9
251-500	6	6.9
501-1000	6	6.9
>1000	57	65.5
Length of existence		
<1 year	1	1.1
1-5	9	10.2
6-15	15	17.0
>15	63	71.6
Marketing structure		
No marketing department	7	8.0
Marketing department	36	92

Table 2
Descriptive Statistics

Variable	Mean	Standard Deviation
CRM Capability (DEA Index)		
Firm activities (Inputs)		
Market intelligence	3.27	.78
Market responsiveness	3.20	.73
High value customer	3.35	.69
Customer education	3.63	.76
CRM achievement (Outputs)		
Customer satisfaction	4.78	1.40
Customer retention	4.49	1.39
Scope of relationship with customers	4.07	1.45
Price premium	4.11	1.57
Network leadership	3.42	.87
Outsourcing	3.32	.88
R&D intensity	2.92	1.69
Co-creation	3.37	.91
Firm performance	3.40	1.21
Controls		
Firm size	4.58	1.70
Firm age	3.93	1.02
Marketing structure	2.42	.64
B2B/B2C	0.57	.50

Table 3
Correlations

Variables	1	2	3	4	5	6
1. Network leadership	1					
2. Outsourcing	.255	1				
3. R&D intensity	-.063	.079	1			
4. Co-creation	.079	.079	.243	1		
5. CRM capability	.093	-.084	.059	.044	1	
6. Firm performance	.305	.124	-.024	.169	.212	1
Construct Validity						
Cronbach Alpha	.771	.814	*	.751	.908	*
Composite Reliability	.862	.872	*	.820	.927	*
Average Variance Extracted	.677	.700	*	.616	.680	*

* CRM capability is an index value; R&D is single-item variable; Construct validity metrics do not apply to CRM capability and R&D intensity

Table 4
CRM capability: Antecedents and Consequences

	Model 1		Model 2	
	β(SE)	t-value	β(SE)	t-value
CRM capability→Firm performance	.261(.1042)	2.44*	.260(.1061)	2.39*
Actions of supply chain				
Network leadership →CRM capability	.283(.0880)	2.95*	.258(.1019)	2.62*
Outsourcing→CRM capability	-.147(.0837)	1.12	-.167(.1053)	1.24
Actions of new product development				
R&D intensity→CRM capability	-.081(.0619)	.39	-.085(.0643)	.18
Co-creation→CRM capability	.163(.0865)	1.07	.128(.0886)	.20
Interactions				
Network leadership × Outsourcing→CRM capability			.315(.0869)	3.11*
R&D × Co-creation→CRM capability			-.1561(.0902)	1.60
Control Relationships				
Marketing structure→CRM capability	.102(.0697)	1.15	.097(.0700)	1.19
Firm size→Firm performance	-.099(.0747)	.21	-.098(.748)	.21
Firm age→Firm performance	.166(.1094)	1.23	.165(.1106)	1.22
B2B/B2C→Firm performance	-.095(.0695)	.25	-.096(.0709)	.24

*p<.05

CHAPTER 5: SYNERGY BETWEEN CRM PROCESS AND SUPPLY CHAIN PROCESS

A paper to be submitted to Journal of Marketing

Abstract

Despite a widely acknowledge of the importance of synergy among key business processes, the literature reflects remarkably little effort to develop a framework for understanding it. Thus, this chapter attempts to addresses the following questions: (1) what does the term synergy mean in the context of business processes; (2) what are the key dimensions; (3) how can we measure it; and (4) what are the consequences of synergy. Via in-depth interviews, this chapter identifies five dimensions: relationship embeddedness, shared cognition, customer-centric management, employee engagement and top management mandate. Synergy is operationalized as the extent to which these dimension are present in the relationship between the CRM and SCM processes weighted by the salience of each dimension for inducing synergy effects. The value of synergy is called synergy index value. Furthermore, this chapter examines the potential consequences of synergy index value. The empirical findings show that synergy has a direct impact on a firm's market position evidenced by customer satisfaction and retention, but an indirect impact on a firm's financial position evidenced by profitability and ROA via improved process capability and improved process performance. Managerial implications of this research are discussed.

Introduction

Customers' definition of the concept of value has changed over time. In the past, customer value was based on some combination of price and quality. Nowadays, it is more broad-based and includes aspects related to their expectation on delivery, service, ease of transaction, and relationships. In response, industrial organizations have shifted slowly from a functional structure to a process structure for managing activities of the firm so that they can offer these values to customers.

The functional structure still being used by a majority of organizations has been criticized for the fact that functions tend to operate in silos. Different functional areas not only do not talk to each other, they in fact complain about each other a lot. For example, marketing people complain about losing credibility with accounts because of delivery mix ups, late deliveries and outright failures; supply chain people complain about the instances in which marketing "overpromises" and logistics/distribution can't meet what they perceive to be unreasonable delivery schedules, unbelievably complex order configuration, and other time consuming customized dealing (Stank, Daugherty and Ellinger, 1999).

To overcome the silo problem, many firms have begun to transition from a functional structure to a process structure during the past two decades. Srivastava, Shervani and Fahey (1999) discussed the new structure around key value creating processes in the firm such as the customer relationship management (CRM), supply chain management (SCM) and product development process (PDP). They proposed that the process structure enables traditional functions to work together in delivering better value to customers. There is also a strong belief in

the literature that these key business processes can deliver superior firm performance if they worked together in a synergistic manner than if they worked separately (e.g., Srivastava et al 1999).

But do the processes themselves work in silos? Is it possible? It seems that the shift from function structure to process structure has fallen short of expectations to achieve better integration and cooperation. Researchers observed that few companies have the capability to integrate these processes well (e.g., O'Reilly and Tushman, 2004). In an empirical study, Ramaswami et al (2009) shows that synergy among business processes is not a given, but has to be built over time.

To answer the questions whether processes themselves work in silos and what key differentiating factors contribute to differences in the degree of silo-ness between processes, we conducted field interviews with 27 firms. In our in-depth interviews, we focused on two major business processes identified by Srivastava et al (1999): customer relationship management process (CRM) and supply chain management process (SCM). The performance of CRM and SCM processes are intertwined. Without an effective CRM team who can bring and translate customer voice into useful information for the SCM process, the SCM organization would not meet its objectives relating to cost, efficiency and customer satisfaction; similarly, without the effective manufacturing, inbound and outbound logistics activities from the SCM process, CRM process initiatives and efforts may come to naught.

As expected, our interviews show that even though the process structure can bring a better level of integration and cooperation than a functional structure, CRM and SCM process tend to work in silos, just as functions do. Achieving synergy among processes is still a big challenge faced by firms today.

Given the widely acknowledge of the importance of synergy, one might ask why some firm can do better work than others in terms of integrating CRM and SCM processes? One might expect the concept of process synergy have a clear meaning, a rich tradition of theory development, and a related body of empirical findings. On the contrary, a close examination of the literature reveals a lack of clear definition of synergy at the process level. In the literature, synergy has been studied at various levels, such as resource-level, unit-level, function-level, and strategic action level (e.g., Nevo and Wade, 2010; Benkatesh and Bala, 2012; Karim and Kaul, 2014; Tantalo and Priem, 2014), but not at the process-level (except for two studies, Srivastava et al., 1999; Ramaswami et al., 2009)

Interestingly, Srivastava et al (1999) assume that synergy can occur spontaneously among processes since firms do a better job of inter-functional integration in a process structure. However, their postulates are purely conceptual and have not been tested to date. Building on Srivastava et al's (1999) theoretical framework, Ramaswami et al., (2009) empirically test the interactions of business processes on firm performance and show that synergy may not occur magically inside firms. They conclude that achieving synergy is a journey and firms need to work on it.

This research builds on both Srivastava et al (1999) and Ramaswami et al's (2009) contributions and seeks to provide a foundation for studying systematically the development of synergy between CRM and SCM processes. The purpose of this article is to delineate the domain of the process synergy construct, provide an operational definition, develop a framework and empirically test the consequences of process synergy.

In summary, to open up the black box of synergy, we attempt to address the following research questions:

1. What does synergy mean in the context of relationship between CRM and SCM processes?
2. Does synergy exist or happen automatically?
3. What are the facilitators and barriers of synergy?
4. How can we operationalize the definition of synergy?
5. Does the presence of synergy enhance firm performance? If yes, how and to what extent?

Conceptual Background

Business processes

Business processes can be thought of as the routines or activities that a firm develops in order to accomplish business objectives (Nelson and Winter, 1982; Porter, 1991). One of the key business objectives from a customer perspective is the creation of customer value. Srivastava et al., (1999) identified three core processes as being crucial to the creation of customer value. These are customer relationship management (CRM), supply chain management (SCM) and new product development (NPD). A CRM process manages identification of customers, the creation of customer knowledge, the shaping of customer perceptions of the organization's image, the building of customer relationships through rich and satisfactory experiences, and the maximization of customer responses for optimal revenue and profit growth; a SCM process manages the acquisition of physical and informational inputs and their conversion into customer solutions in an efficient and effective manner; a NPD process manages creation of solutions that customers need and want.

According to Srivastava et al (1999), these three business processes have some common attributes. First, each process addresses fundamental but common business tasks that are critical

to the achievement of organization goals; second, each process contributes to customer value creation; and third, each process is interdependent on others for effective functioning.

In this study, we focus on the interdependent relationship between CRM and SCM processes and investigate the potential for synergy between them.

Synergy between CRM and SCM Processes

Past literature has acknowledged that the marketing process and the supply chain process may be interdependent. Flint (2004) argued that effective marketing strategy implementation requires effective SCM, because the latter influences the role of distribution in creating customer value. Similarly, Sheth, Sisodia and Sharan (2000) argued that in markets with increasing diversity in customer needs and wants, "companies will have to rapidly adjust their supply to meet demand, that is, practice demand-driven supply chain" (p.61). Kumar et al. (2000) suggest that successful firms not only offer superior customer value propositions, but also have a unique business system—the configuration of activities required to create, produce, and deliver the customer value proposition—to support them. Srivastava, Shervani, and Fahey (1999) argue that the role of marketing is to connect the core business processes including SCM to generate and sustain customer value.

From a supply chain perspective, Lambert and Cooper (2000) define SCM as the integration and management of key business processes, including CRM, customer service management and demand management. Reflecting on the "market mediating role" of a supply chain, Fisher (1997) suggests that a supply chain needs to ensure that the "variety of products reaching the marketplace matches what consumers want to buy" (p.107). Juttner, Christopher and Godsell (2010) emphasize the importance of integrating marketing and supply chain

strategies, and specified four integration levels: corporate integration, strategic customer integration, strategic supply chain integration and marketing and pipeline strategy integration. Christopher and Ryals (2014) argue that the supply chain is also a demand chain and question the practice of marketing and supply chain management as stand-alone activities.

Overall, there is a strong case to be made for the activities of demand creation (e.g., CRM) and demand fulfilment (e.g., SCM) to be inextricably linked. They should be managed as closely coupled or integrated processes rather than as "separate and distinct" functions; however, the CRM and SCM processes seem to drift apart over time (Svensson, 2002). One plausible reason for this drift may be due to the fact that synergy between CRM and SCM is depicted at a highly abstract level in the literature. Both researchers and managers have only a faint idea of the drivers behind it.

Using both qualitative and quantitative research methods, we attempt to provide some guidance on achieving synergy between CRM and SCM processes and investigate the role it can play within a firm. Next, we will discuss the findings on drivers of CRM-SCM synergy from the field interviews.

Field Interviews

The field research consisted of in-depth interview with 25 managers in the US. Because the purpose of the interview was theory construction (i.e., elicitation of constructs and propositions), it was important to tap a wide range of experiences and perspectives in the course of data collection. Therefore, we used a theoretical sampling plan (Glaser and Strauss, 2009) to ensure that the sample included senior managers either from the CRM process or the SCM process in industrial, consumer and service industries. Care was also taken to sample large as well as small organizations.

Of the 25 individuals interviewed, 13 are from the CRM process and 12 are from the SCM process; 7 marketed consumer goods, 15 marketed industrial products, and 3 marketed services. In terms of size, the organizations ranged from 20 employees to several tens of thousands. The sample thus reflects a diverse set of organizations and hence is well suited for obtaining richer insights into the main topic of interest—synergy between CRM and SCM processes. The companies we interviewed and the titles of the interviewees are summarized in Appendix A.

A standard guideline was followed for the interview. After a brief description of the research project, each interviewee was asked about the following issues:

1. What does the term 'synergy' mean to you in the context of relationship between a CRM process and a SCM process?
2. How would you characterize the motivation, willingness and capability of CRM and SCM processes in your organization to help each other to improve their respective process goals?
3. What are the barriers to achieving a synergistic relationship?
4. What are the facilitators to foster a synergistic relationship?

These questions provided a structure for each interview, but it was frequently necessary to explain and clarify some of the questions, as well as probe deeper with additional questions to elicit examples, illustrations, and other insights. Specific questions are listed in the appendix B.

The personal interviews typically lasted between 45 to 60 minutes and were audiotaped unless the interviewee requested otherwise. The information obtained from these interviews afford novel insights into the meaning, causes and consequences of building synergistic relationships within a firm. Though a large number of new insights emerged from the study, we focus on the more "interesting" ones and those with the greatest potential for stimulating future research.

Why functions work in silos

Out of the 25 senior managers we interviewed, 24 believed strongly that CRM and SCM processes tend to work in silos. They also felt that synergy can't happen automatically inside the firm and that building synergy is challenging in their organizations for the following reasons.

First, a major contributing factor for the inability of processes to achieve synergy is the fact that each process' activities are governed by varying and sometimes conflicting objectives. For example, CRM focuses on improving organizational insights into customer needs and expectations as a means to deliver superior products, service and customer experiences. Mentioning three goals for the CRM process, one manager stated:

> We have three categories of goals: one, business development: we find opportunities with customers. We actively record, track and develop those opportunities. The idea of business development comes primarily from conversation with customers. Two, customer satisfaction, this is the key measure our board of directors use to determine compensation. Three, issue resolution: sometimes things may go wrong. We use CRM tool as an opportunity to capture those issues whether it is tactical or strategic issues.

Because insight generation and need fulfillment come at a cost, organizations concentrate their effort on customers that have the potential to provide them high value.

SCM aims to offer the right product at the right time to the right customer within the constraint of minimizing cost of order fulfillment and maximizing speed of order delivery and customer satisfaction. In most firms we interviewed, supply chain operations have been governed more by efficiency considerations and less by customer satisfaction goals. As one of the managers stated:

> We want information that will enable us to make timely decisions and to make the right decisions. The objective of making the right decision, let's say, for my production plant, would be to increase efficiency and reduce cost.

It was clear through the interviews that managers are aware that the efficiency objective of supply chain may conflict with customer-based objectives of CRM. As a senior marketing manager observed:

> From management structure perspective, we have competing objectives. The operation team has goals to meet the service plan, but they also have very important goal providing the service at the least service cost. They clearly provide 100% service every day without fail. But we could not afford them to do that. On the marketing-sales, obviously, we were the one interpreting where the customers are; how the customer sees our value and most customers are not willing to pay for 100% reliable service. If you want package or mail delivered tomorrow morning, there are companies who will do that for you but you will pay lots of money. Conversely, if you are less concerned about that, you manage your inventory pipeline in a way that allows for a certain amount of inconsistency in the service product, it may be ok with you that the cars may be delivered the day later. That's the cost of the trade-offs customer got to do. From marketing-sales perspective, our job is to constantly deal with the customers on that side of the situation. There is the trade off what level of service products actually required in order to keep the customers happy enough that they want to keep doing business with us and recognize value we provide to them.

Second, professionals from different sides have different level of motivations, willingness and capability to work with each other. The conflicting objectives may cause many disagreements over technical, strategic and resource-related issues such as specification, schedules, budgets, reporting methods and performance evaluations. Such conflicts can lower the motivation, willingness and capability of processes to work with each other. As a senior supply chain manager recalled:

> CRM and SCM may not have the intent to work together. You know, for example, different monetary motivation, time-driven/deadline-driven operations within each group may lead to the goal conflicts and sub-culture conflicts.

Third, our in-depth interview revealed that the lack of system or structure for data integration can hinder the synergy. For many firms, the ability to make coordinated, organization-wide responses to today's business problems is thwarted by the lack of data integration or commonly defined data elements and codes across different sources (Goodhue, Wybo, and Kirsch, 1992). Many firms haven't done their due diligence in the area of integration to make sure they have the right solutions for the right customers. When the quality of data

integration is poor, individual functions may be reluctant to participate in synergistic relationships. The following statement by a senior marketing manager describes this type of barrier.

> One of our leader actions was supposed to be to overcome silos. The thing that we don't have, to break down the barriers, which I think we have everything else in place to put it, would be the infrastructure and support. We have the foundation, which is the database and I think we're doing a good job of data governance. We have customer information in contact management. We have customer information in our closed feedback system. We have customer information in our marketing area that we're doing direct marketing and so forth. We have customer information in our credit delivery area. But these are not integrated, not at the application level, not at the interaction level.

A manager from the energy industry was also concerned about the lack of visibility of operational data to the CRM employees.

> A lot of our inventory data is in a separate system of sophisticated excel sheets that we developed internally, so there is not perfect communication between our CRM and our supply chain in particular regarding inventory management. So, that's an error we need to address going forward.

Potential facilitators of synergy (overcoming silos)

For synergy to happen, the recipe is obvious - overcome the silos and break the silo mentality. While this is easier said than done, the qualitative interviews that we conducted indicated that firms are making progress. The in-depth interviews revealed 10 potential facilitators: relationship embeddedness, employee engagement, top management team (TMT) mandate, customer data integration, share cognition, mimetic pressure, CRM sophistication, goal understanding, customer-centric management, and using customer-based evaluation metrics. To narrow this list and identify the top facilitators for synergy, following the in-depth interviews, we asked 12 academics (from marketing and supply chain departments in a Midwestern university) to rank these factors according to their importance for facilitating synergy. We selected five factors for further study based on 1) the frequency mentioned in the in-depth interviews and 2) the ranking of the factors from professors. These factors suggest that companies will have to go through not

just a cultural transformation, they also need structural facilitators that will bring about greater levels of coordination among processes.

From a cultural perspective, the overall message is that there needs to be a central or driving force that everyone can believe in as being necessary for synergy to happen. Customer-centricity is the force that most companies identified as the driving force. As mentioned earlier, it is true that most companies are going through this transition at this time. This transition could contribute to shared-understanding of the key mission of the enterprise that everyone can work toward. From a structural perspective, achieving the desired outcomes from the cultural transformation is dependent on three internal forces: top management mandate for coordination, employee engagement and dyadic relationship embeddedness. We next discuss each factor.

Customer-centric management. Customer-centric management refers to the enterprise-wide management system that focuses on providing a positive customer experience in order to drive profits and gain competitive advantage. The management system represents the organizational climate, which comprises the structure and incentives that motivate behaviors consistent with a culture (Slater and Narver, 1995). As such, a customer-centric management system reflects the design of organizational actions that are driven by customer needs and not by the internal concerns of functional areas (Jayachandran, Sharma, Kaufman and Raman, 2005). If this climate governs the thought-world of individual processes within the enterprise, it is likely to contribute positively to building synergy between CRM and SCM. For example, one of the managers mentioned:

> The only way to start to work on those synergies was to bring the supply part and the enablement piece and the infrastructure closer to the customer. Otherwise, you don't have synergy. You can't jump into synergy right away.

Shared cognition. Shared cognition refers to the sharedness and/or congruence of knowledge structures that may exist at different levels of conceptualization within a group (Swaab, Postmes

and Beest, 2007). We extend this definition to the inter-process context, where it refers to two or more processes sharing a similar perspective or interpreting cues in a similar manner, making decisions that are compatible and taking appropriate actions (Cannon-Bowers and Salas, 2001). Shared cognition enables individual process to coordinate their behavior without the need to communicate (Cannon-Bowers and Salas, 2001). Overall, when two groups have a high level of shared cognition, they hold similar or compatible knowledge and use this knowledge to guide their operations and activities in a coordinated manner. Several previous studies have noted that shared cognition increases coordination and cooperation among groups (e.g., Marks, Sabella, Burke and Zaccaro, 2002; Marks, Zaccaro and Mathieu, 2000; Swaab, Postmes and Beest, 2007). As one of the managers mentioned:

> Individual groups have different norms and values. They define things differently and have different attitudes on sharing. For example, our group has an open culture where people share similar values and everything is shared. Therefore, we would like share data with the other group. However, some group likes to share our data but don't want to share back. They may also don't have similar cooperative value. This is a problem (in the synergistic relationship).

Another manager pointed out a strategy that was used in his firm to bring about shared cognition among employees across business processes:

> We laid out the greatness agenda several years ago. Everybody bought into it and supports it, so everybody understands what their piece of the greatness agenda is. You have to believe in it, which is really important.... and the results so far have shown it is working. I think the greatness agenda is one of the reasons why we are relevant.

In another interview, the manager stated the following:

> How, to your question, how can this relationship improve? I am a strong believer in objectives and objectives which are meaningful, which are reviewed not just for the board. And I see in my team, I have a very diverse team: logistics and a planner and engineers for the configuration. But there is a way to work on objectives which insure that people are looking at the ultimate goal of the company in the same way, not just slogans. You know, you could have plenty of them. To me this is a way. So, shared objectives and the other one is to insure these people are exposed one to the other.

Mandate from TMT with enhancing customer experience. Webster (1988, p.37) states: "[C]ustomer-oriented value and beliefs are uniquely the responsibility of top management. Only the CEO [chief executive officer] can take responsibility for defining customer and market orientation as the driving forces." Senior leaders must articulate organizational aims in terms that are harmonious with enhancing customer experience and empower employees to work toward achieving these aims. As such, mandate from TMT help mitigate goal conflicts and thus foster synergy. One respondent working for a banking institution stated that:

> A lot of it comes down to the leader I think….if they build a clear vision and communicate that vision and get people on board, you are far ahead of getting past the silo mentality. You have to have someone driving the big picture that your goal as an employee is to take care of the customer needs and to drive them.

As one of the managers mentioned in our interview, synergy does not happen spontaneously, it has to come from the top.

> The reason why I don't see them (refers to CRM and SCM groups) working better together is because there has been nothing put in place to make them work better. So it is not going to happening spontaneously. It has to come from the top.

Talking about changes that have occurred in this Fortune 100 Company, a manager responded to a question on the need for top management support in the following manner:

> Oh, quite a bit. And that is what I would say has changed, that happened about two years ago, the lights went on and we realized we'd been on the CRM journey and we need to bring it mainstream, now there is visibility all the way up to our highest level of executive leadership on CRM.
>
> Having your leadership in top down, be engaged in it, and saying how we are going to do business, that's what drives employee behaviors.

Relationship embeddedness. Relationship embeddedness refers to the degree to which organizational processes have formal and informal connections with each other (Halbesleben and Wheeler, 2008). As the number of such connections increases, it also increases trust in each other to pursue a long-term relationship. Increased number of connections increases familiarity

between groups as well as provides more opportunities to understand each other's goals better. These, in turn, make the relationship stable and able to manage conflicts that arise in day-to-day operations (Forsgren et al., 2005).

Relationship processes may involve meetings, workshops, and personal conversations which enable communication between members of the organization. For example, in a leading company in the construction equipment area, CRM and SCM sides come together and discuss strategy:

> I was in meetings last week, a couple of day workshops …. where the CRM side and the supply chain side came together and discussed strategy, where we need to go in the future and where do we want to be. We call this our Blue Dot strategy.

Echoing this thought was another manager from the railroad industry:

> Inside the company, there is conversation between sales and marketing and operation team. We need better service. Whatever problems you get, we need to find a way to fix. There is an ongoing, very active dialog within the company about the areas our service products may not meet customers' needs. We have daily dialogs, meetings to fix problems.

A senior sales manager illustrated an interaction between store salespeople and shipping department:

> There was a lot of communication back-and-forth on a daily basis on what goods were sitting out in the water, what goods were at the port, what goods were trying to clear customs, and we were providing them data on our priority…. goods that we needed to get on a priority basis. The most important thing for me is making sure that they have the staffing and the infrastructure that will get those goods into our stores in a very quick manner. So we communicate, we spend quite a bit of time, I want them to understand our expectations.

Beyond expectations, both sides need to know what the other side knows. This knowledge will not only set reasonable expectations, it also may enable each process to do its job better because the other side had relevant information which might not be passed on if they didn't relate to each other. For example, one manager in the gas industry had the following to say:

> We as salespeople weren't aware of a lot of things that SCM knew about our clients. They know what customers think about our service, they know what complaints they have about everything about our brand. So we gathered feedback from the SCM side and that enriched the whole panorama of our business. In a sense, SCM became our intelligence source.

Conversely, if a firm cannot generate positive team interactions and instead develops conflicts in the relationship, individuals may be reluctant to participate in the relationship. The above sales manager went on to say that all is not well in the relationship and sought improvements that can help in the future:

> Just sharing the knowledge within this big organization, because you've got so many people involved in the supply chain operation and beyond….communication is something that can be improved a lot.

Another manager in the energy industry commented on the physical closeness of employees from the two functions which contributes to better relationships.

> The sales and marketing teams that are directly dealing with these national accounts as well as our supply chain folks, are on the trading floor literally within 10 to 15 yards of each other. So, if a customer flags an issue when I'm on the telephone, I'll flag my supply chain guy that's in charge and say we have got this issue facing us immediately. .. I can talk to my counterpart at supply chain and then he can advise his or her team on any changes that they need to make, but that's how most of our on the fly decisions are made.

Sometimes, relationship embeddedness occurs because of an interface structure. In this structure, there is an intermediate unit that acts as an interface or a conduit between the CRM customer-facing end and the supply chain back-end. This unit represents both sides, although it may reside in one side of the equation. In a leading semiconductor firm, one manager noted this arrangement and had the following to say:

> It is exactly the middle between supply chain and sales. In this role, you have to develop knowledge of customers: customer base, customer demand, and at the same time have to be able to translate this to your supply chain who are cost-driven, who don't like options. You are on the other side of the fence. They appreciate your insight..this is a key point, they know that when I'm talking to sales, I'm wearing the division hat.

Talking further about the advantage of this set-up, this manager stated:

> I think that we are able to improve communication between customer-facing employees and the division, we are able to open the door and contribute to the conversation… take in more inputs, take in more perspectives on whatever topic you are discussing.

Supply chain employee engagement. The concept of employee engagement refers to a state where supply chain employees find meaning in taking care of pain points experienced by customers and devote discretionary effort and time to enhance customer experience. A growing body of empirical research has demonstrated that customer-focused employee engagement is a good predictor of customer-related outcomes such as customer satisfaction and loyalty (e.g., Stock and Hoyer, 2005; Susskind, Kacmar, and Borchgrevink, 2003). As such, customer-focused engagement mitigates the goal conflicts between CRM and SCM processes. For example, one manager mentioned

> [To achieve synergy] It is important to make it everybody's responsibility versus just sales and marketing to take care of pain points experienced by customers. And internally we wanted to improve the engagement score around customer focus. That's across the board whether you are talking about customer relationship management or supply chain functions management or anybody.

Getting employee engagement may not, however, be easy. It requires significant amount of effort and sweat, according to a manager in the construction industry.

> The best thing we can do that I've found is sharing and exposing the vision of where we are going and what we will be able to do is gonna be a lot more than where we are today. It is all about knowing and overcoming employee resistance. We've talked it far better than others.. The toughest part is getting people, changing people, and getting people to use it, but we've had success promoting it, sharing it, letting people be aware of it.

Discussing how they get past this problem, the manager went on to state:

> We get more of our supply chain people to visit a customer site, and somewhat on a regular basis, so they understand. This is needed especially when you have such a large organization, and things are moving and changing…when you don't have that regular exposure, you're not aware of that change.

Synergy Index Value

We discussed five major facilitators of synergy between CRM and SCM processes in the last section: customer-centric management, shared cognition, relationship embeddedness, mandate from TMT and supply chain employee engagement. Using these dimensions, we operationalize synergy based on the degree to which these dimensions are present in the relationship between

the CRM and SCM processes weighted by the salience of each dimension for inducing synergy effects. The synergy index can be represented by the following equation:

$$S_i = \sum_{k=1}^{n} (D_{i,k} * W_{i,k})$$

Where,

S_i is the synergy index for firm i;

$D_{i,k}$ is the position of the relationship between CRM and SCM processes on dimension k for firm i;

$W_{i,k}$ is the salience of dimension k for inducing synergy for firm i;

This definition of synergy assumes a compensatory structure in which a good value on one attribute can compensate for a poor value on another for inducing synergy between the CRM and SCM processes. Since our in-depth interview revealed five major dimensions, the synergy index can be future represented by the following equation:

$$S_i = D_{i,RE} * W_{i,RE} + D_{i,SC} * W_{i,SC} + D_{i,CC} * W_{i,CC} + D_{i,EE} * W_{i,EE} + D_{i,MT} * W_{i,MT}$$

Where,

S_i is the synergy index for firm i;

$D_{i,RE}$ is the position of the relationship between CRM and SCM processes on the dimension of *relationship embeddedness* for firm i;

$W_{i,RE}$ is the salience of *relationship embeddedness* for inducing synergy perceived by managers in firm i;

$D_{i,SC}$ is the position of the relationship between CRM and SCM processes on the dimension of *shared cognition*;

$W_{i,SC}$ is the salience of *shared cognition* for inducing synergy perceived by managers in firm i;

$D_{i,CC}$ is the position of the relationship between CRM and SCM processes on the dimension of *customer-centric management*

$W_{i,CC}$ is the salience of *customer-centric management* for inducing synergy perceived by managers in firm i;

$D_{i,EE}$ is the position of the relationship between CRM and SCM processes on the dimension of *supply chain employee engagement*

$W_{i,EE}$ is the salience of *supply chain employee engagement* for inducing synergy perceived by managers in firm i;

$D_{i,MT}$ is the position of the relationship between CRM and SCM processes on the dimension of *TMT mandate*

$W_{i,MT}$ is the salience of *TMT mandate* for inducing synergy perceived by managers in firm i;

The development of the synergy index in this study is compatible with multi-attribute utility theory. In a product context, the multi-attribute utility model (MAUM) assigns an overall utility value to each product alternative based on the utilities of individual attributes of the product. For example, in consumer decision making, the consumer assigns a weight W_j to each attribute j, and sums the product of the weight times the rating of the product on each attribute Vij ($\sum(V_{ij} * W_j)$). Similarly, in the context of synergistic relationship between the CRM and SCM process, managers assign a weight to each dimension of synergy (representing how

important the dimension is to achieve synergy) and sums the product of the weight times the value of each dimension.

This synergy index value captures the variation across firms in the state of the relationship between CRM and SCM processes; it also allows us to capture the variation between processes on the importance managers assign to each facilitating dimension of synergy.

In addition, our in-depth interviews also revealed that synergy is believed to occur when it can enhance both process-performance (CRM and SCM performance) and the overall firm performance. As one of the managers mentioned:

> Each group has its own objectives to achieve; synergy occurs if it can help the individual group achieve its objectives. I believe synergy can help. I will talk in terms of production being front-end and selling being back-end. Lead time on ordering and correct forecasting of future sales must work in line with production. If this does not occur, we can't meet our sales goals. I think the key is lead time, the time a product is planned for the market and the time it arrives ready for distribution.

We next discuss the consequences of process synergy. We draw on the marketing literature, the supply chain literature, and the findings from the field interviews for developing research hypotheses relating to outcomes of synergy.

Consequences of Synergy

Our in-depth interviews revealed that synergy is likely to add value to a firm at two levels: process-level and firm-level. In other words, synergy can enhance the performance of both CRM and SCM processes, as well as the performance of the firm. Figure 1 is a conceptual framework for the following discussion. Briefly, the framework comprises of two sets of hypotheses which capture the impact of synergy on both process performance and the overall firm performance.

Synergy and Process Capability

The presence of synergy implies that the relationship between SCM and CRM is defined by the following characteristics: focus on customers and their needs, sharing of knowledge about

customers, having a close working relationship, top management mandate for customer activities, and buy-in from employees to enhance customer experience. These conditions are likely to bring improvements in the respective process activities that CRM and SCM functions engage in for achieving their goals.

The focus of CRM is on the customer and extraction of value from customers. Toward this end, CRM attempts to identify high-value customers and maximize value offered to such customers through customization and individualization. Such activities are at odds with the focus of a traditional supply chain function that is geared toward achieving operational excellence (Shankar, 2001; Juttner, Christopher, and Baker, 2007). However, the goals of supply chain operations have shifted in recent years driven by the transition that most organizations are going through to become more customer-driven. Consequently, modern supply chains face the challenge of satisfying dual objectives that may be potentially conflicting: operational excellence versus customer satisfaction.

Operational excellence is based on achieving cost efficiency, product quality, speedy order fulfillment, and on-time delivery (Kaplan and Norton, 2000). Supply chains need to understand customer requirements with regards to quality, service and delivery and coordinate resources internally and externally to meet these operational goals while maintaining efficiency. Customer satisfaction adds additional pressure on the efficiency goal since it requires an expanded set of customer value propositions such as value-added services, high-quality relationships and exceptional service that can potentially increase the cost of the firm's offerings. Further, these added value propositions may come in the way of providing competitive pricing and speedy order fulfillment. Shankar (2001) notes that "companies simply do not have the resources to simultaneously respond in real time, reduce manufacturing costs, keep zero

inventories, and provide excellent service for each and every customer" (p. 78). The solution most firms adopt eventually in managing this conflict is to achieve operational excellence, while meeting minimum standards on delivering customer value and achieving customer satisfaction.

However, we believe that organizations that have synergy between CRM and SCM processes will be better suited to address this conflict. Such organizations will have an integrated demand and supply chain management system. Mithas et al (2005) suggests that an integrated system enables the CRM function to do well in 1) offering customized solutions to high value customers; 2) discovering innovative solutions to customer problems and 3) bringing increased organizational attention to important customer issues. In other words, given that these are primary CRM activities, we can infer that an integrated system contributes to the capacity of the CRM process to pursue its goals effectively. The success of customer relationship programs at Saturn, Dell, and Southwest has been attributed to their excellence in supply chain integration (Beth et al., 2003). Similarly, Mobil uses its operational excellence to serve high-value customers identified and targeted by the CRM process (Kaplan and Norton, 2000). Juttner et al. (2007) note that the supply chain function can design innovative service delivery package options to support the value strategy adopted by marketing and other customer-facing functions. In one of the few empirical studies on this topic, Ellinger (2000) found that cooperation between marketing and logistics has a positive impact on a firm's ability to customize service offerings to customer needs.

The same synergy conditions are also likely to enhance supply chain capabilities (SCC) of the firm. SCC is defined as the ability of firms to identify, utilize, and assimilate both internal and external resources and information in their pursuit to offer the right product at the right time to the right customer (Wu et al., 2006). In today's environment, supply chains have to understand

customer requirements and coordinate activities with supply chain partners so that they can reduce response time in meeting those requirements. In this regard, CRM function can provide valuable information to the supply chain function relating to customer requirements, key customer segments and how requirements change across segments, demand forecasts by product, planned promotions and customer feedback (Juttner, Christopher, and Baker, 2007). Such data can be used to reduce demand uncertainty and provide efficient flow of products and materials throughout the supply chain. In particular, providing reliable demand information can enable the supply chain function to plan inventory levels better and avoid costly stock-out situations. Compaq, for example, lost between half a billion and a billion dollars of sales in 1994 because of stock-out situation for one of their top selling products. Further, customer data at the individual level can provide information on total supply costs, including cost of add-on services that vary according to customers. It also can inform the supply chain function of customers that should get preferential treatment. At a more strategic level, CRM process enables micro-segmentation based on customer needs, preferences and profitability. A better understanding of segments and their varied expectations can help the supply chain function develop differentiated supply chain capabilities.

Further, Juttner et al. (2007) noted that what matters is not just the communication of customer information; instead, a shared understanding of the information and the ability to act on it is critical. The shared cognition between processes, one of the pillars of synergy, can enable supply chain functions to not only understand what constitutes value from a customer perspective, but also contribute to it in an informed way while paying heed to meeting its operational metrics.

In summary, we expect a positive impact of synergy on both the CRM and SCM capabilities of the firm. As the discussion above points out, increased coordination and relationship quality between CRM and SCM processes can help organizations provide better experiences for their customers. Thus, we hypothesize that

H_1: Synergy between CRM and SCM processes has a positive impact on a firm's CRM and SCM capabilities.

Process Capability and Process Performance

Process capabilities are not only the building blocks of process performance, but also a source of competitive capability that drives firm success. This study assumes that improved process capabilities should first lead to superior process performance before they can enhance firm performance. Based on past research, CRM capability depends on organizational ability to (a) select high-value customers (Zhou et al., 2005; Ramaswami, Srivastava, and Bhargava, 2009), (b) capture and use knowledge about such customers to develop customized offerings and personalized communication (Day 1994, 1999), and (c) nurture them by increasing the value of their relationship with the organization (Mathis and Capon, 2003). Previous studies have shown the positive impact of these dimensions of CRM capability on customer relationship performance. For example, Hong-Kit, Anderson, and Swaminathan (2004) show that focusing on key customers has a positive impact on customer satisfaction and retention. Venkatesan and Kumar (2004) reveal that marketing resource allocation based on customer lifetime value (CLV) leads to superior customer relationship performance than does a status quo allocation. The goal of customized offerings and nurturing customers is to deepen the relationship in such a way that the selling firm becomes indispensable to its high value customers (Vandermerwe, 2004). In a deep relationship, the firm designs one-to-one marketing efforts to fully understand and satisfy

customers' needs on an ongoing basis (Sheth, Sisodia, and Sharma, 2000). Based on these findings, we hypothesize that improved CRM capability is likely to lead to improved CRM performance (expressed as customer satisfaction, retention and lifetime value).

H_{2a}: Improved CRM capability is associated with improved CRM performance

Supply chain performance refers to how well a firm performs on operational indicators such as cost efficiency, service level, product quality and demand responsiveness in relationship to its stated objectives (Gunasekaran et al., 2001). Supply chain capability (SCC) refers to the ability of the supply chain process to understand customer requirements and coordinate internal and network resources to meet those requirements in a timely manner, while also meeting cost requirements. We can expect firms that enjoy a synergistic relationship to be higher on this ability, and thereby, also enjoy higher supply chain performance. Higher SCC implies increased understanding of customers and their requirements and sharing of this information throughout the supply chain. Increased demand visibility, in turn, reduces the potential for the bullwhip effect. Chen et al. (2000) noted that although demand visibility does not completely remove the problem of variability amplification, it can significantly reduce it. Lack of visibility, on the other hand, contributes to poor service levels, high inventories, and frequent stock-outs (Holweg et al., 2005). Smaros et al. (2003) suggest that even partial demand visibility can increase inventory management and production efficiency. Similarly, Vickery et al. (2003) noted that better understanding of customer requirements enables firms not only to be more responsive in meeting those requirements, but also to enhance their operational effectiveness and efficiency. Christopher and Ryals (1999) noted that superior logistics service (in terms of reliability and responsiveness) can strengthen customer loyalty. Armistead and Mapes (1993) found that improved information sharing with supply chain partners can lead to quality consistency, faster

delivery lead times, and lower price. On the other hand, poor coordination can cause weaker operational performance characterized by higher inventory costs, longer delivery times, and lowered customer service (Lee et al., 1997). In an industry study conducted by AMR Research, better demand information (which is one of the by-products of having a good CRM process) resulted in 15% less inventory, 17% stronger order fulfillment, and 35% shorter cash-to-cash cycle times. Therefore, we hypothesize that improved SCM capability leads to improved SCM performance.

H_{2b}: Improved SCM capability is associated with improved SCM performance

Impact of Improvements in Process Performance on Firm Performance

We examine two types of firm performance: market performance and financial performance. Following Moorman and Rust (1999), our definition of market performance includes customer satisfaction, customer retention, customer lifetime value and net promoter score. Financial performance is defined in terms of sales, profitability, market share and return on assets (ROA).

CRM performance plays a critical antecedent role to firm effectiveness and efficiency. On the one hand, CRM performance, as evidenced by customer satisfaction and customer loyalty, helps generate a stable customer base (e.g., Noordeweir, John and Nevin 1990; Mittal and Kamakura 2001) and improve a firm's customer-learning capability (Tuli, Kohli and Bharadwaj 2007). A firm with stable customer base and strong capability of learning enjoys a competitive advantage since it can design superior customer value propositions vis-à-vis competitors. Further, superior CRM helps a firm reduce the costs of activity such as marketing-related costs, inventory costs and customer services costs etc. For example, customer loyalty and word of mouth enhance a firm's advertising and promotional efficiency and thus reduce marketing-related costs (e.g., Luo and Homburg, 2007). In addition, superior CRM performance helps a firm better adjust its

production cycle according to customer demand patterns to lower the mismatch between firm inventory and customer orders and thus improve its financial performance (e.g., Bharadwaj, Bharadwaj, and Bendoly, 2007). Furthermore, superior CRM performance helps a firm reduce its customer service that might occur because of the rejection of unsuitable offerings as a result of a poor understanding customer requirement (e.g., Anderson, Fornell and Lehman, 1994). Overall, improved CRM performance is more likely to build up sustained differential advantages and accordingly superior firm performance (Wang, Lo, Chi and Yang, 2004). Thus, we posit that improved CRM performance positive associate with superior firm performance in terms of market position and financial position.

H_{3a}: Improved CRM performance has a positive impact on 1) firm market position and 2) financial position.

Improved SCM performance can be evidenced by improved operational efficiency, lower cost and resilience of supply chain. Prior literature has shown that these dimensions of SCM performance can improve firm performance. Using a large sample of observations for the years 1976-2008, Baik, Chae, Choi and Farber (2012) provide robust evidence that operational efficiency changes are positively associated with a firm's current and future profitability changes, even after controlling for fundamental signals. In other words, firms that can improve performance of their supply chain processes have the potential for positive profitability changes in future years. This study also showed that efficiency changes in the current period are positively related to firms' future profitability. In addition, Chen et al. (2004) found that a strategic vision for achieving synergistic benefits through improved collaboration may generate "managerial rents" and superior firm performance. The relational contracting approach implicit in a synergistic CRM-SCM relationship could potentially lead to reduced inventory management

costs (Trevelen, 1987), reduced lead times, reduced logistical costs (Bozarth et al., 1998), and better customer service and penetration (St. John and Heriot, 1993). Conversely, Hendricks and Singhal (2003) showed that severe supply chain disruptions are likely to cause substantial negative consequences for the health of the affected firms.

From a customer responsiveness perspective, time-based competition has elevated its importance for superior firm performance. It describes the ability of a firm to respond promptly to customers' needs and requirements. This characteristic of firms has been considered by some as a source of competitive advantage (Cusumano and Yoffie, 1998; Jayaram et al., 1999). Responsiveness has been associated with increased customer loyalty and willingness to pay more for the firm's offerings and improved financial performance of the firm.

Finally, discussing operating efficiency issue for SMEs, Wolff and Pett (2006) noted that improvements in operational processes can stretch a firm's resources and facilitate learning curve effects, which in turn can contribute to higher firm growth. We therefore hypothesize that:

H_{3b}: Improved SCM performance has a positive impact on a firm's 1) market position and 2) financial position.

However, there is an alternate argument to this hypothesis. It is a fact that the market environment has greater levels of uncertainty than ever before. In such an environment, revenue gains and reduced coordination costs can be nullified by increased costs associated with attempts to improve process efficiencies and enhance product quality (Reed, Lemak and Montgomery, 1996). Ebben and Johnson (2005) stated that organizing to meet fluctuating demand is very complex and costs may go out of control.

Direct Effect of SCM/CRM Process Synergy on Firm Performance

In the earlier sections, we posited that (a) synergy among processes will enable the processes to conduct their activities better (i.e., improve their capability), and (b) improved capabilities in turn can lead to higher firm performance.

In this section, we posit that there could be alternative explanations for the synergy-firm performance relationship over and above the improved capability explanation. We draw upon resource based view arguments to suggest that if synergy among processes is unique to the firm and not an industry-wide occurrence, it can be a source of competitive advantage for the firm and thus enable the firm to extract more of the value that is created. The logic is based more on what competing firms are not doing—competing firms are less efficient in using resources that are available to them and hence put themselves at a disadvantage as compared to a firm that is improving its synergy profile. The theoretical literature also indicates that synergy between CRM and SCM can be a valuable source of competitive advantage (e.g., Srivastava, Shervani, and Fahey, 1999), which can drive both market performance and financial performance. Thus, we posit that:

H_4: Synergy between CRM and SCM processes has a direct positive impact on 1) market position and 1) financial position

Methodology

We used a business directory maintained by a mid-western university as the sampling frame for the study. Members are included in the directory on the basis of their past and current affiliation with the University (for example, university alumni, executive MBAs, distinguished speakers, advisory committee members, and dean's committee members). If a member is a manager in either the CRM process or the SCM process, this person was solicited to participate in our study. If the member is not a manager (e.g., CEO, CFO), we requested the individual to nominate a manager from her/his organization affiliated with either the CRM process or the SCM process.

After the names were nominated, we followed up with these individuals and requested them to participate in our study.

Using the above process, a total of 100 members were selected. Data was collected in two waves at two different points in time. The data collection involved a survey and an experiment, and the survey data was collected before the experimental data. We conducted experimental data collection and survey data collection at different times in order to minimize common method bias. If a respondent completed one but not the other, that individual was dropped from further consideration. The final sample size is 60, yielding a response rate of 60%. To increase the response rate, we promised respondents a descriptive report summarizing the relative importance of factors that can increase synergy between the CRM and SCRM processes in their firm and an overall assessment of how synergy contributes to their firms' performance. We also promised that we would be willing to present these results at an appropriate time to their organizational leaders.

Of the 60 individuals, we dropped two cases due to a large number of missing values, resulting in a final sample size of 58. Of the 58, 25 are associated with the CRM process and 33 are associated with the SCM process. The average tenure of informants with their organizations is 4.20 years for managers associated with the CRM process and 3.32 years for managers associated with the SCM process.

The sample includes 32 organizations that can be categorized as business to business and 22 that are business to consumer. In terms of size, the responding organizations ranged from 20 employees to several tens of thousands. Thus, the sample reflects a diverse set of organizations, departments and positions. The sample profile of responding managers and firms is reported in Table 1.

Conjoint Experiment

We requested respondents to send us their mailing address and mailed the experimental cards with detailed instructions. We also called on the respondents to explain the procedure. The conjoint experiment is selected for several reasons. First experimental manipulation enables researchers to draw conclusions on causal effects; second, a conjoint experiment enables researchers to make multiple measures per respondent, which increases power and enables researchers to control for heterogeneity in preferences; third, an experiment may be less subject to post hoc rationalizations than a retrospective study that asks respondents to evaluate their actual relationships (Wuyts, Stremersch, Van den Bulte and Franses, 2004). Nevertheless, a conjoint design also has drawbacks because it can't easily accommodate a large number of variables.

Conjoint scenarios and measures

The conjoint scenarios described relationships between CRM process and SCM processes using the relationship dimensions identified earlier. Three basic assumptions are made in conjoint analysis:

1. Each relationship dimension that contributes to synergy can be expressed at different levels; for example, embeddedness between processes could be low, medium or high.
2. The relationship between two entities can be described as a combination of levels of a set of such relationship dimensions
3. Some relationship profiles are better at contributing to synergy among processes than other.

Three of the relationship dimensions are expressed at three levels each and two relationship dimensions are expressed at two levels each, yielding a $3^3 2^2$ design. The total number of possible combinations in this design is 108. To reduce the number of combinations or possible scenarios, we used a fractional factorial design. This design enabled us to reduce the

number of scenarios from 108 to 18. Each scenario involved development of a relationship profile using different levels of all the five dimensions. We then asked respondents to rank the 18 full profiles from 1- 18 in terms of their potential for yielding synergistic benefits to a firm. For this task, we instructed respondents to use their functional affiliation to define their parent process (CRM or SCM) and then assess how the relationship described in the scenario would enable synergy with the other process for a hypothetical firm in their industry.

To avoid cognitive or task overload, we provided detailed instructions for respondents to follow. First we asked respondents to allocate each profile or scenario to one of five groups that defined different levels of potential for synergy: strong yes, somewhat yes, maybe, somewhat no and strong no. Then we asked respondents to spread out the cards allocated to each individual group and rank them from the best to the worst in terms of their potential for yielding synergy benefits. Our pretest indicated that respondents did not suffer from cognitive or task overload when performing this task.

Table 2 presents the preference scale and the five factors we manipulated. The five factors in the conjoint task are relationship embeddedness, shared cognition, top management mandate, employee engagement and customer-centric management. The levels of a factor are coded as +1 for the higher level, and -1 for the lower level. For a three-level factor, the intermediate value is coded as 0.

Data derived from the above task is used in a regression procedure to yield estimates or weights that capture the importance of a dimension (and a level within it) for providing synergy benefit to the firm.

Survey

All constructs included in the survey were measured using multi-item scales drawn from prior studies. The response categories for each scale were anchored by 1 (strongly disagree) and 5 (strongly agree), with the exception of scales that captured improved capability of CRM and SCM processes, improved performance of CRM and SCM processes, and firm performance. Improved capability of CRM and SCM processes and improved performance of CRM and SCM performance used anchors of 1 (very little extent) and 5 (very great extent). Firm performance used anchors of 1(much lower) and 5 (much higher). In addition, we also asked respondents about the status of the relationship between CRM and SCM processes in the firm, along the five dimensions of synergy.

Appendix C and D contains all of the measures and their sources. Improved CRM capability was operationalized by measuring the extent to which the involvement and contribution of the SCM process improved the ability of the CRM process, over and above its own effort to increase its capability to build and nurture customer relationships. Improved SCM capability was operationalized by measuring the extent to which the involvement and contribution of the CRM process improved the ability of the SCM process, over and above its own effort to increase its capability to respond to and service customers. Measures for improved CRM process performance, improved SCM process performance, market position and financial position were drawn from Moorman and Rust (1999). In addition, we include multiple control variables. Data integration and access was measured using items reported by Jayachandran, Sharma, Kaufman and Raman (2005), competitive intensity and demand uncertainty were operationalized using items reported by Gatignon and Xuereb (1997), market dynamism used items reported by Homburg, Artz and Wieseke (2012) and technology turbulence used items reported by Jaworski and Kohli (1993).

Although each of the scales have been reported in literature, a scale validation procedure was accomplished using (1) the analysis of item correlations, (2) the analysis of item-total correlations; (3) exploratory factor analysis (EFA), and (4) confirmatory factor analysis (CFA). The purpose of this stage of the analysis was to identify and eliminate poorly performing items for the reflective measures. Means, standard deviations, and Cronbach's alphas for each construct appear in Table 3. The correlations among constructs are presented in Table 4.

Results

Synergy index

In this study, synergy is presented by:

$$S_i = \sum_{k=1}^{n} (D_{i,k} * W_{i,k})$$

Where S_i is the synergy index for firm i; $D_{i,k}$ is the position of the relationship between CRM and SCM processes on dimension k for firm i; and $W_{i,k}$ is the salience of dimension k for inducing synergy for firm i;

Conjoint analysis allows us to evaluate the relative importance of the five dimensions for inducing synergy at both an aggregate level across all firms and the individual firm level. At the aggregate level, our results showed that all five factors contribute significantly to building synergy between the CRM and SCM processes. The most important factor is shared cognition with a weight W_{SC} =2.424, followed by relationship embeddedness with weight W_{RE} =2.141, followed by top management mandate with weight W_{MT} =1.818. The last two factors, employee engagement and customer-centricity, have similar weights for inducing synergy, W_{EE} =1.225 and W_{CC} =1.141.

At function level, CRM mangers have a slightly different perception than SCM mangers regarding the salience of each synergy driver. For CRM managers, the most important factor is shared cognition (W_{SC} =2.481), followed by top management mandate (W_{MT} =1.874) and relationship embeddedness (W_{RE} =1.837), followed by customer-centric management (W_{CC} =1.149) and employee engagement (W_{EE} =1.212). For SCM managers, the most important factors are shared cognition (W_{SC} =2.368) and relationship embeddedness (W_{RE} =2.327), followed by top management mandate (W_{MT} =1.771) and followed by employee engagement (W_{RE} =1.226) and customer-centric management (W_{CC} =1.164).

To link synergy index to firm performance, we first calculated the importance weights for synergy factors for each frim separately. Doing so enables us to capture the variation in the relative importance of the synergy factors across firms. For example, the conjoint analysis results show that for firm A, the relative important weights are 2.79 for top management mandate (W_{MT} =2.79), 2.77 for shared cognition (W_{SC} =2.77), 1.91 for employee engagement (W_{EE} =1.91), 1.62 for customer-centric management (W_{CC} =1.62) and 1.29 for relationship embeddedness (W_{RE} =1.29). Our survey data showed that for firm A, the relationship between CRM and SCM processes is characterized by low relationship embeddedness (coded as -1), moderate shared cognition (coded as 0), moderate customer-centric management (coded as 0), high employee engagement (coded as +1) and high top management mandate (coded as +1). Thus, the synergy index for firm A is -4.83[3]. For another firm B, the relative important weights are 2.15 for

[3] Since we are interested in the absolute level of synergy, the regression's intercept term was added. The regression intercept for firm A is -8.241.

relationship embeddedness (W_{RE} =2.15), .99 for customer-centric management (W_{CC} =.99), 2.58 for shared cognition (W_{SC} =2.58), 1.70 for top management mandate (W_{MT} =1.70) and 2.95 for employee engagement (W_{EE} =2.95). The relationship between the CRM and SCM processes in this firm is characterized by high relationship embeddedness (coded as +1), high shared cognition (coded as +1), high customer-centric management (coded as +1), high employee engagement (coded as +1) and high top management mandate (coded as +1). Thus, the synergy index for firm B is 2.13[4]. Across the 58 observations, the average value of synergy is -4.84, with the range from -16.53 to 2.40. Only 7 out of 58 have positive synergistic index value, thus providing evidence that very few companies have achieved synergy between CRM and SCM processes at this time.

Test of Hypotheses

To test the role synergy plays within a firm, we ran a series of multiple regression equations using SPSS[5]. Our results show that higher value of synergy index is associated with improved CRM capability (β=.273, p=.048) and SCM capability (β=.235, p=.092). Thus H_1 is supported. In addition, improved CRM capability is positively related to superior CRM performance (β=.505, p=.000), which in turn, is associated with superior market position (β=.278, p=.031) and firm position (β=.542, p=.001). Thus, H_{2a} and H_{3a} are supported. On the other side, improved SCM capability is positively related to improved SCM performance (β=.535, p=.000), Thus, H_{2b} is supported. However, our results failed to support H_{3b}, that is, improved SCM performance contributing to superior market position and financial position.

[4] Since we are interested in the absolute level of synergy, the regression's intercept term was added. The regression intercept for firm B is -8.24

[5] Due to the small sample size at this stage, we only run regressions instead of the SEM model

Regarding to the direct impact of synergy index value on firm performance, we found significant positive impact on market position, but not financial position. Thus, H_4 is partially supported. The regression results are shown in Table 5.

Hierarchical Cluster Analysis. To determine whether synergy is achieved by firms via different routes, we applied cluster analysis, which is a popular tool for segmenting a population (Hair et al., 2005). We conducted a hierarchical cluster analysis followed by a k-means analysis. The actual synergy achieved was utilized as a cluster variable for both the hierarchical cluster analysis and a k-means analysis. We calculated the distances between the clusters using the Euclidean distance measure, and we aggregated the clusters through Ward's procedure. To reflect the true structure of the data set, we used the elbow criterion to determine the number of clusters. Overall, by following the typical criteria to generate effective segments with relationship embeddedness, shared cognition, customer-centric management, employee engagement and top management mandate, we found that two clusters were distinct from one another, were large enough to be managerially useful, and provide operation data that were practical usable, and readily translatable into strategy (Weinstein, 1987).

Once the clusters were identified, we used a discriminant analysis to check the cluster groupings, which revealed significant differences among the group characteristics, as shown in Table 6.

Based on the variables from which they were derived, the two clusters can be described as follows.

Cluster 1: This cluster formed 75.86 percent of the sample. Firms of this group showed strong emphasis on two dimensions of synergy: customer-centricity management and relationship embeddedness.

Cluster 2: This cluster formed 24.14 percent of the sample. Firms of this group showed strong emphasis on three dimensions of synergy: TMT mandate, shared cognition and employee engagement.

The cluster analysis provided two interesting insights: First, a majority of firms believe that synergy can be attained by improving relationship embeddedness and fostering customer-centric management. The story line appears to be that this group of firms would tap into synergistic benefits by attempting to be more customer-centric and by enabling individual processes to increase their coordination capacity through social connections. They are not overtly concerned about different units needing to have shared values and thoughts about how best to service customers. Second, a smaller group of firms seems to believe that synergy requires a mandate from top management, shared values between the SCM process and the CRM process, and increased customer engagement from SCM employees. This group appears to place the onus for synergy at the hands of top managers and the supply chain employees.

Interestingly, the second group has a higher synergy index (-2.42) as compared to the first group (-5.65), signaling the importance of involvement of top managers and supply chain process for creating synergy potential across business processes.

Discussion

Theoretical implications

Although marketing literature has emphasized the importance of synergy between CRM and SCM processes (e.g., Srivastava et al., 1999; Ramaswami et al., 2009), there has been little effort to conceptualize and operationalize this important concept. An important contribution of this dissertation study is that it offers a working definition and a measurement method for capturing synergy between the two processes.

The qualitative part of our study identified five major facilitators of synergy between CRM and SCM. Synergy is facilitated by the amount of emphasis top managers place on enhancing customer experience through continual reminders to employees that it is critical for them to be sensitive and responsive to their customers and by a firm's customer-centric management systems or configuration, that is consistent with its customer-relationship orientation and reflects the design of the organization's structure and incentives to influence implementation of customer-centric culture.

While top management mandate and customer-centric management are important, it appears that inter-process dynamics also plays a very important role in determining the level of synergy. Three inter-process factors that affect synergy are shared cognition, relationship embeddedness, and employee engagement. Sharing a similar perspective or interpreting cues in a similar manner allows individual processes to work together even without communication. If some level of communication is needed to manage conflict situations, the processes can engage in formal and informal connections. In addition, encouraging supply chain employees to engage themselves more in enhancing customer experiences and taking care of pain points experienced by customers could potentially build a better understanding of value creation for customers.

Based on these five facilitators, in this study, we operationalized synergy as the degree to which they are present in the relationship weighted by the salience of each factor for inducing synergistic effects. This operation is superior to proxy measures of synergy (e.g., interaction of process performance) because it allows us to capture not only the variation across firms in the state of the relationship between CRM and SCM, but also the variation on the importance of each factor for building synergy.

In addition, this is the first study to empirically test several hypotheses advanced in the literature regarding consequences of synergy. Our findings show that the synergy index value directly contributes to a firm's market position—that is, its performance on outcomes such as customer satisfaction, retention and lifetime value. Beside the direct impact, we also reveal the potential mechanisms via which synergy adds value to firm performance. Importantly, our framework draws greater attention on building and enhancing process capabilities. For example, our findings indicate that synergy may not directly contribute to financial position such as sales, profitability and ROA. Instead, the fostering synergy between CRM and SCM requires both processes to develop and enhance their own process capabilities; improved process-capability can enhance process performance and eventually lead to superior financial position. This finding is also consistent with Srivastava et al's., (1999) argument that business processes represent resources that firms can tap into in driving shareholder value. However, their arguments have not been empirically tested to date and we fill this gap.

Managerial implications

Our paper has several managerial implications. First, our research suggests that most companies are struggling to build and foster synergy between their CRM and SCM processes. Second, the research clearly delineates the factors that can be tapped into to foster synergy between CRM and SCM processes. These factors are largely controllable by a firm and its top management team and therefore can be altered to improve the synergy inside the organization. Third, this study demonstrates the value of synergy to senior managers and investors.

Synergy can't Occur Spontaneously

We provide a working definition of synergy between CRM and SCM processes and operationalize the concept at the individual firm-level. A frequency distribution of the synergy

index values for the 58 firms participating in the study shows that 51 have not achieved any level of synergy and only 7 have achieved some level of synergy between the CRM and SCM processes. Our results signal clearly that business processes still tend to work in silos, just as functions used to do. Only a few companies have the capability to integrate them well. The bottom line message is that synergy among processes is not a spontaneous outcome of shifting from a functional to a process structure in firms, as believed by some academics (cf. Srivastava, Shervani, and Fahey, 1999); instead achieving synergy requires a strategic plan.

Fostering Synergy inside an Organization

Our research provides very specific suggestions about the factors that foster or discourage synergy between CRM and SCM processes in organizations. These factors, some relating to organizational culture and others to inter-process dynamic factors, luckily are controllable by senior managers. Therefore, improving synergy is possible if a firm plans well.

Some inexpensive ways to manage these antecedents include (1) physical closeness of employees from CRM and SCM functions which contributes to better relationships, (2) personal connection such as inter-departmental lunches or sports leagues that require mixed-department teams, which enable communication between members of the organization, (3) cross-process meetings and workshops which help both sides understand each other's needs and what the other side knows. More advanced efforts include (1) exchange of employees, for example, getting supply chain people to visit a customer site on a regular basis, (2) fostering customer-centric culture via training and restructuring systems such as performance evaluation system and reward system, (3) adding interface structure by hiring professionals with extensive experience in both marketing and supply chain fields, who can translate and communicate the values well to both sides, and (4) openness of senior managers, wherein they are able to open the door, take in more

inputs and perspectives from executives in other departments. Such efforts can foster better understanding of the personalities of managers in other departments, their culture, their values and their specific expectations.

The Value of Synergy

Our results reveal that synergy helps improve firm financial performance, but not for every firm, only for those firms that take advantage of synergy to build and enhance their process capabilities. Synergy is not a destination, but a journey. A firm needs to learn how to enhance its process capabilities in the journey. On one hand, synergy requires lots of investment; but on the other hand, it is full of opportunities. How to take advantage of these opportunities becomes the key to successful synergy.

Limitations and future direction

There appears to be several areas in need of further research. Perhaps the most important relates to an assessment of the facilitators of synergy. Our in-depth interviews revealed ten potential facilitators; however, due to methodological limitations, we could not include all of them in our conjoint experiment. It seems desirable to assess the importance of other drivers in influencing the synergy between CRM and SCM processes. For example, does level of CRM sophistication help or hinder synergy?

Second, data in this study were obtained from senior managers in either CRM process or SCM process. It would be useful to obtain a sample of managers from both CRM and SCM processes in a firm. It would be interesting to compare perceptions of managers at different

processes of a firm and account for differences in perceptions, if any, concerning the synergistic relationship between CRM and SCM processes.

Third, this study provides important insights on the facilitators of synergy; however, it does not shed much light on the change processes involved in improving synergy index value. For example, a relative low level of synergy may in fact lead managers to alter certain factors such as reward systems which may increase the level of employee engagement, which, in turn, leads to a higher level synergy. In this regard, it would be interesting to engage a few organizations in the change process to better understand the factors that influence the initiation and implementation of change efforts directed at improving synergy.

Fourth, we believe that common method bias is likely to be minimal because the data were collected using multiple methods. However, it would be useful to obtain a larger sample and examine the impact of process synergy on objective performance in future studies.

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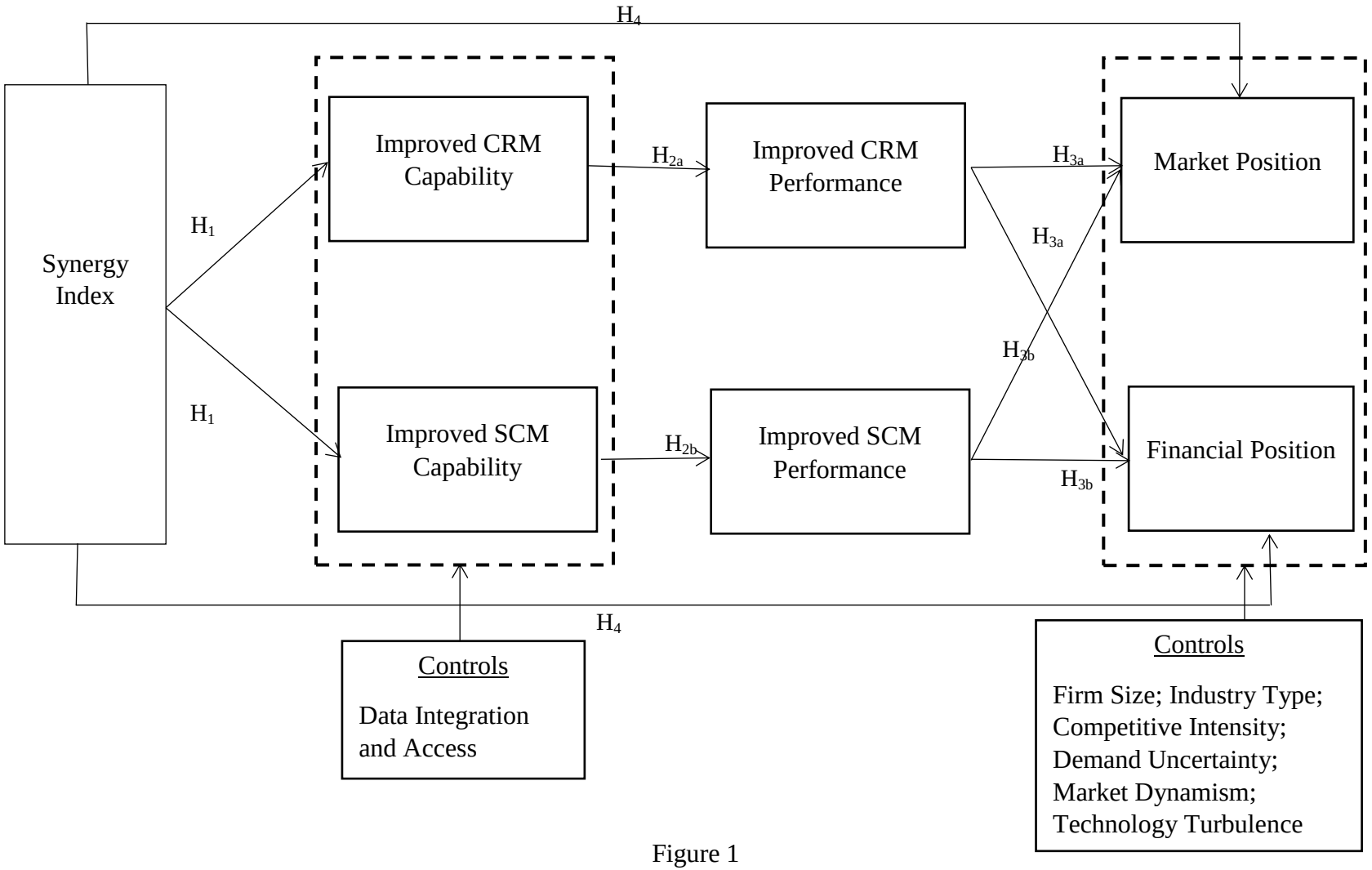

Figure 1
An Integrative Framework of Synergy between CRM and SCM Processes

Table 1
Sample Description

	Number	Percent
Type of firm		
Retail	7	12.07%
B-to-B goods	21	36.21%
B-to-B services	11	18.97%
Consumer goods	14	24.14%
Consumer Services	8	13.79%
Firm size (# of employees)		
<50	3	5.17%
50-250	5	8.62%
251-500	2	3.45%
501-1000	11	18.97%
>1000	37	63.79%
Firm Age		
<20 years	11	18.97%
21-50	7	12.07%
>50	40	68.97%
Process responsibility		
CRM processes	25	43.10%
SCM processes	33	56.90%
Average year of informants with the organization		
CRM informants	4.2	
SCM informants	3.3	

Table 2
Dependent Variable and Conjoint Attribute Levels

Dependent Variable: Synergy Ranking		
Manipulated Attributes: Levels		
1	Relationship embeddedness	The CRM and SCM processes in this firm: +1: not only share all available knowledge on customers, suppliers, operations and inventory but also have a close relationship with each other 0: share all available knowledge on customers, suppliers, operations and inventory but do not have a close relationship with each other -1: do not share all available knowledge on customers, suppliers, operations and inventory and do not have a close relationship with each other
2	Shared cognition	The CRM and SCM processes in this firm: +1: not only share similar values with respect to the importance of meeting customer needs, but also speak the same language that each can understand 0: Share similar values with respect to the importance of meeting customer needs, but do not speak the same language that each can understand -1: do not share similar values with respect to the importance of meeting customer needs, and do not speak the same language that each can understand
3	Top management mandate	+1: There is a strong mandate from top management team with enhancing customer experience. -1: There is a weak mandate from top management team with enhancing customer experience
4	Employee engagement	+1: supply chain employees are fully invested in using the customer information communicated to them for taking care of problems and plain points experienced by customers -1: supply chain employees do not show much interest in using the customer information communicated to them for taking care of problems and pain points experienced by customers
5	Customer-centric management	+1: Firm activities are driven by customer needs and not by the internal concerns of functional areas 0: Firm activities are driven somewhat by customer needs, but also driven by internal concerns of functional areas -1: Firm activities are driven by the internal concerns of functional areas

Table 3
Descriptive Statistics

Variable	Mean	Standard Deviation	Cronbach Alpha
Synergy Index	-4.84	4.6	Single item
Improved CRM Capability	3.42	.79	.867
Improved SCM Capability	3.53	.71	.852
Improved CRM Performance	3.5	.81	.810
Improved SCM Performance	2.99	.83	.824
Market Position	3.67	.74	.862
Financial Position	3.36	.60	.841
Controls			
Data Integration	3.15	.67	.830
Competitive Intensity	3.58	.76	.774
Demand Uncertainty	3.24	.51	.796
Market Dynamism	3.29	.59	.690
Technology Turbulence	3.40	.71	.683
Firm Size	38738	77524	Single item
Industry Type	B2B or B2C		Single item

Table 4
Correlation Table

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Synergy Index	1												
2. Improved CRM Capability	.334	1											
3. Improved SCM Capability	.288	.484	1										
4. Improved CRM Performance	.326	.505	.444	1									
5. Improved SCM Performance	.191	.464	.535	.465	1								
6. Market Position	.272	.316	.223	.441	.221	1							
7. Financial Position	.019	.262	.238	.514	.264	.450	1						
8. Data Integration	.316	.274	.222	.355	.213	.029	.306	1					
9. Competitive Intensity	-.018	-.116	-.064	-.111	.080	-.420	-.252	.266	1				
10. Demand Uncertainty	.269	.164	.207	.191	.306	.084	-.060	.159	-.065	1			
11. Market Dynamism	-.222	.047	-.004	.082	.095	.089	.135	.143	.322	-.284	1		
12. Technology Turbulence	-.099	-.065	.022	-.028	-.022	.168	.225	.161	.169	-.144	.447	1	
13. Firm size	.125	.106	-.115	.146	-.011	-.151	.120	.280	.000	.110	.065	.153	1
14. Industry Type	.093	-.069	.015	-.064	.027	-.042	.044	.052	.174	.046	.085	.104	.268

Table 5
Consequences of Synergy Index

	Model 1 (DV: Improved CRM Capability)		Model 2 (DV: Improved SCM Capability)		Model 3 (DV: Improved CRM Performance)		Model 4 (DV: Improved SCM Performance)		Model 5 (DV: Market Position)		Model 6 (DV: Financial Position)	
	β(SE)	p-value	β(SE)	p-value	β(SE)	p-value	β(SE)	p-value	β(SE)	p-value	β(SE)	p-value
Synergy Index	.273	.048**	.235	.092*					.297	.021**	-.131	.349
Data Integration (*control*)	.191	.165	.167	.227								
Improved CRM Capability					.505	.000**						
Improved SCM Capability							.535	.000**				
Improved CRM Performance									.278	.031**	.542	.001**
Improved SCM Performance									.081	.543	.061	.680
Controls												
Competitive Intensity									-.488	.000**	-.254	.056*
Demand Uncertainty									-.022	.857	-.088	5.38
Market Dynamism									.234	.103	-.078	.622
Technology Turbulence									.174	.182	.328	.027**
Firm Size									-.293	.014**	.010	.940
Industry Type									.061	.601	.094	.473

*p<.05; **p<.10;

Table 6
Cluster Analysis

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound
Relationship Embeddedness	1	44	2.72	1.17	.18	2.37	3.08
	2	14	1.08	1.36	.36	.29	1.87
	Total	58	2.33	1.4	.18	1.96	2.69
Shared Cognition	1	44	.69	.79	.12	.45	.93
	2	14	2.55	1.49	.4	1.69	3.41
	Total	58	1.14	1.27	.17	.8	1.47
Customer-centric Management	1	44	3.14	.93	.14	2.86	3.42
	2	14	.13	.91	.24	-.39	.65
	Total	58	2.41	1.59	.21	1.99	2.83
Employee Engagement	1	44	1.46	1.08	.16	1.13	1.79
	2	14	2.28	1.62	.43	1.35	3.22
	Total	58	1.66	1.26	.17	1.33	1.99
TMT Mandate	1	44	.93	.93	.14	.65	1.21
	2	14	2.06	1.43	.38	1.24	2.88
	Total	58	1.2	1.17	.15	.9	1.51

Appendix A: Companies and Titles of Interviewees

No	Title of the Interviewee	Company
1	Material manager	A global manufacturing and technology company
2	Vice president - Marketing	A transportation company
3	Marketing manager	A banking company
4	President	A beer distributor
5	Customer experience manager	An electronic systems and components manufacture
6	Coordinator – marketing and supply chain	An insurance company
7	Wind service site manager	A engineering company
8	Vice President	A multinational mass media and entertainment company
9	Market Intelligence Manager	A heavy equipment engines manufacture
10	Vice president, divisional planning manager	A Retailer
11	Vice president - marketing	An advanced biofuels producer and developer of renewable chemicals
12	Sales Manager	A heavy equipment engines manufacture and financial service
13	Quality manager	A window and door manufacturer
14	Process manager	An equipment engines manufacture
15	Customer relationship manager	An industrial and agricultural equipment manufacturer
16	Marketing Director	An industrial and agricultural equipment manufacturer
17	Business development manager	An equipment engines manufacture and financial service
18	Analytics manager	An insurance company
19	Director of marketing	An equipment Manufacture
20	Operations manager	An equipment service and software development
21	Senior sales manager	A civil engineering company
22	Regional product manager	An equipment service and software development
23	Operations manager	A consumer electronic manufacture
24	Industrial engineer	An integrated system of technology and service provider
25	Head of sales	A gas supplier

Appendix B: In-depth Interview Questions

1. Do you have a CRM process in your firm?
2. What are the primary goals of this process?
3. Who are the primary players within the CRM process?
4. Who are the support players in this process?
5. How satisfied are you with the CRM process? What can this process do better?

6. Do you have a SCM process in your firm?
7. What are the primary goals of this process?
8. Who are the primary players within the SCM process?
9. Who are the support players in this process?

10. How satisfied are you with the SCM process? What can this process do better?
11. How does the CRM and SCM process get along? Do they communicate with each other? Do they experience conflict? Give me an example of a conflict situation.
12. What, in your opinion, is synergy between the CRM and SCM process? What does the term mean for you when thinking about these two processes?
13. Do you have synergy for these processes in your firm? Why or why not?
14. What, in your mind, can facilitate synergy within your firm?
15. What, in your mind, are barriers to synergy within your firm?

16. What would be your understanding if your CEO/President tells you in a meeting that he expects the CRM process and the SCM process to work "synergistically"? What can your process do to be synergistic with the other process?
17. If SCM process becomes more customer-focused, what impact would you see in the outcomes of the CRM process? Be as specific as you can be in listing the outcomes that can be strengthened by this action/transformation of the SCM process.
18. Conversely, how can the CRM process help improve SCM outcomes? Again, focus on specific CRM actions and specific SCM outcomes that can result from those actions.
19. What are the components of the CRM process in your firm? That is, what tools/applications do you use? When did you adopt these applications (please provide a timeline)?

Appendix C: Survey for Construct Measurement

Independent and Dependent Variables

1. Improved CRM capability (New Scale)

Please indicate the extent to which the involvement and contributions of the supply chain functions have improved the ability of the customer facing functions, over and above the customer facing functions' own efforts, to:

- Identify new customer value propositions
- Offer customized solutions to high value customers
- Discover innovative solutions to customer problems
- Serve customer better
- Bring increased organizational attention to important customer issues

2. Improved SCM capability (New Scale)

Please indicate the extent to which the involvement and contributions of the customer facing functions have improved the ability of the supply chain functions, over and above the supply chain functions' own efforts, to:

- Understand customer needs
- Address customization requests of high-value customers
- Respond to customer inquiries in a timely manner
- Reduce response time across the supply chain

3. Improved CRM process performance (Moorman and Rust, 1999)

To what extent have the supply chain functions contributed to improvement of the customer facing functions in the following areas:

- Customer satisfaction
- Customer retention
- Customer lifetime value
- Net promoter score

4. Improved SCM process performance (Li et al., 2006)

To what extent has the customer facing functions contributed to improvement of the supply chain functions in the following areas:

- Product quality
- Delivery speed
- Operational efficiency
- Per unit cost of the product
- Inventory cost
- Resilience of the supply chain

5. Market position (Moorman and Rust, 1999)

Relative to your firm's main competitors, how is your firm performing in the following areas:

- Customer satisfaction
- Customer retention
- Customer lifetime value
- Net promoter score

6. Financial position (Moorman and Rust, 1999)

Relative to your firm's main competitors, how is your firm performing in the following areas:

- Sales
- Profitability

- Market share
- Return on assets (ROA)

Control Variables

7. Data integration and access (Jayachandran, Sharma, Kaufman and Raman, 2005)

- In our firm, we integrate customer data from the various functions/processes that interact with customers
- In our firm, we integrate internal customer data with customer information from external sources
- In our firm, we merge information collected from various sources for each customer
- In our firm, employees find it easy to access required customer data
- In our firm, employees can access required customer information even when other functions/processes have collected it
- In our firm, employees always have access to up-to-date customer data

8. Competitive intensity (Gatignon and Xuereb, 1997)

- Competition in our industry is cutthroat
- There are many competitive rivalries in our industry
- Our competitors are relatively strong
- Intensive competitor-related activities are a hallmark in our industry

9. Demand uncertainty (Gatignon and Xuereb, 1997)

- Customer needs can be assessed relatively accurately in this category
- Demand is fairly easy to forecast in this category
- The evolution of customer preference is difficult to predict in this category

10. Market dynamism (Homburg, Artz and Wieseke, 2012)

Please indicate how frequently the following aspects change in the market

- Product and service offered by competition
- Marketing, and sales strategy for competitors
- Customers' preferences for product features
- The price-value ratio customers expect

11. Technology turbulence (Jaworski and Kohli, 1993)

- The technology in our industry is changing rapidly
- It is very difficult to forecast the technology development direction in our industry
- Most technological developments in our industry are radical changes on existing techniques
- The technological changes in our industry can bring many opportunities for firms

Appendix D: Measures of the status of the relationship between CRM and SCM processes

In this part, we are interested in knowing your perception of the relationship between customer facing functions and the supply chain functions in your firm. Please check one answer for each dimension given below

1.	The customer facing functions and supply chain functions in this firm:		
	A☐	B☐	C☐
	not only ***share all available knowledge*** on customers, suppliers, operations and inventory but also have a ***close relationship*** with each other	***share all available knowledge*** on customers, suppliers, operations and inventory ***but do not*** have a ***close relationship*** with each other	***do not share all available knowledge*** on customers, suppliers, operations and inventory ***and do not*** have a ***close relationship*** with each other
2.	The customer facing functions and supply chain functions in this firm:		
	A☐	B☐	C☐
	not only ***share similar values*** with respect to the importance of meeting customer needs, but also ***speak the same language*** that each can understand	***share similar values*** with respect to the importance of meeting customer needs, ***but*** do ***not speak the same language*** that each can understand	***do not share similar values*** with respect to the importance of meeting customer needs, and do ***not speak the same language*** that each can understand
3.	Customer-centric management in this firm:		
	A☐	B☐	C☐
	Firm activities are driven ***by customer needs*** and ***not by*** the ***internal concerns*** of functional areas	Firm activities are driven somewhat ***by customer needs***, but also driven ***by internal concerns*** of functional areas	Firm activities are driven ***by*** the ***internal concerns*** of functional areas
4.	Supply chain employee's engagement with enhancing customer experience in this firm:		
	A☐		B☐
	Supply chain employees are ***fully invested*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers		Supply chain employees ***do not show much interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers
5.	Mandate from top management team with enhancing customer experience in this firm:		
	Strong☐		Weak☐

Appendix E: Conjoint Experimental Cards

SCENARIO 1

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

> ***do not*** share ***similar values*** with respect to the importance of meeting customer needs ***and***
>
> ***do not*** speak ***the same language*** that each can understand ***and***
>
> ***do not*** share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***
>
> ***do not*** have *a* ***close relationship*** with each other

Supply chain employees ***do not*** show much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by*** the ***internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 2

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***but***

do not speak ***the same language*** that each can understand ***and***

do not share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

do not have *a* ***close relationship*** with each other

Supply chain employees ***do not*** show much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***somewhat by customer needs***, but also driven ***by internal concerns*** of functional areas

There is a ***strong mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 3

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***and***

speak ***the same language*** that each can understand ***but***

do not share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

do not have *a* ***close relationship*** with each other

Supply chain employees are ***fully invested*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by customer needs*** and ***not by*** the ***internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 4

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***but***

do not speak ***the same language*** that each can understand ***but***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***but***

do not have *a* ***close relationship*** with each other

Supply chain employees are ***fully invested*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by*** the ***internal concerns*** of functional areas

There is a ***strong mandate from the top management team*** (including CEO) for maximizing customer value

SCENARIO 5

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***and***

speak ***the same language*** that each can understand ***and***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***but***

do not have *a* ***close relationship*** with each other

Supply chain employees ***do not*** show much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***somewhat by customer needs***, but also driven ***by internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 6

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

do not share ***similar values*** with respect to the importance of meeting customer needs ***and***

do not speak ***the same language*** that each can understand ***but***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***but***

do not have *a* ***close relationship*** with each other

Supply chain employees ***do not*** show much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by customer needs*** and ***not by*** the ***internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 7

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***and***

speak ***the same language*** that each can understand ***and***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

have *a* ***close relationship*** with each other

Supply chain employees ***do not*** show much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by*** the ***internal concerns*** of functional areas

There is a ***strong mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 8

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

> ***do not*** share ***similar values*** with respect to the importance of meeting customer needs ***and***
>
> ***do not*** speak ***the same language*** that each can understand ***but***
>
> share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***
>
> have *a* ***close relationship*** with each other

Supply chain employees are ***fully invested*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***somewhat by customer needs***, but also driven ***by internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 9

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***but***

do not speak ***the same language*** that each can understand ***but***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

have *a* ***close relationship*** with each other

Supply chain employees ***do not*** show much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by customer needs*** and ***not by*** the ***internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 10

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***and***

speak ***the same language*** that each can understand ***but***

do not share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

do not have *a* ***close relationship*** with each other

Supply chain employees are ***fully invested*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by*** the ***internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 11

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

do not share ***similar values*** with respect to the importance of meeting customer needs ***and***

do not speak ***the same language*** that each can understand ***and***

do not share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

do not have *a* ***close relationship*** with each other

Supply chain employees ***do not show*** much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***somewhat by customer needs***, but also driven ***by internal concerns*** of functional areas

There is a ***strong mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 12

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***but***

do not speak ***the same language*** that each can understand ***and***

do not share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

do not have *a* ***close relationship*** with each other

Supply chain employees ***do not show*** much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by customer needs*** and ***not by*** the ***internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 13

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

do not share ***similar values*** with respect to the importance of meeting customer needs ***and***

do not speak ***the same language*** that each can understand ***but***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***but***

do not have *a* ***close relationship*** with each other

Supply chain employees ***do not show*** much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by*** the ***internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 14

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***but***

do not speak ***the same language*** that each can understand ***but***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***but***

do not have *a* ***close relationship*** with each other

Supply chain employees are ***fully invested*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***somewhat by customer needs***, but also driven ***by internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 15

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***and***

speak ***the same language*** that each can understand ***and***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***but***

do not have *a* ***close relationship*** with each other

Supply chain employees ***do not show*** much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by customer needs*** and ***not by*** the ***internal concerns*** of functional areas

There is a ***strong mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 16

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***but***

do not speak ***the same language*** that each can understand ***but***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

have *a* ***close relationship*** with each other

Supply chain employees ***do not show*** much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***by*** the ***internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 17

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***and***

speak ***the same language*** that each can understand ***and***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

have *a* ***close relationship*** with each other

Supply chain employees ***do not show*** much ***interest*** in using the customer information communicated to them for taking care of problems and pain points experienced by customers

Firm activities are driven ***somewhat by customer needs***, but also driven ***by internal concerns*** of functional areas

There is a ***weak mandate from the top management team*** (including CEO) for maximizing customer value.

SCENARIO 18

Ranking _____

The customer-facing functions and the supply chain functions in this firm:

share ***similar values*** with respect to the importance of meeting customer needs ***and***

speak ***the same language*** that each can understand ***and***

share ***all available knowledge*** on customers, suppliers, operations, and inventory ***and***

have *a* ***close relationship*** with each other

Supply chain employees are ***fully invested in*** using the customer information communicated to them for taking care of problems and meeting customer expectations

Firm activities are driven ***by customer needs*** and ***not by*** the ***internal concerns*** of functional areas

There is a ***strong mandate from the top management team*** (including CEO) for maximizing customer value.

CHAPTER 6: CONCLUSION

Generally, synergy refers to the interaction or cooperation of two or more entities to produce a combined effect that is greater than the sum of their separate effects. In a business process context, there is a strong belief that synergy among core business processes, including customer relationship management (CRM), supply chain management (SCM) and new product development (NPD), can deliver superior firm performance (Srivastava, Shervani, and Fahey, 1999). However, no empirical study to date has examined this proposition. The three studies in this dissertation address this specific gap.

Chapter 2 provides empirical evidence on the combined impact of CRM, SCM and NPD processes on two types of firm performance: effectiveness (evidenced by market share and sales) and efficiency (evidence by profitability and ROA). The results show that high CRM performance has significant positive impact on a firm's financial position in combination with the NPD process of the firm and a significant negative impact on the firm's financial position in combination with the SCM process of the firm. The unexpected negative synergy effect between CRM and SCM processes implies that the goals of CRM and SCM may be in conflict with each other, and that it may not be easy to achieve synergy between CRM and SCM processes compared to between CRM and NPD processes. In this chapter, synergy is captured using proxy measures that are based on the interactions of the performance of individual processes.

To achieve spill-over synergistic benefits, business processes should be able to complement each other; in other words, they should support and improve the functioning of the other processes. In line with this notion, chapter 3 examines the interdependence among the CRM, SCM and NPD processes. Specifically, we examine how organizational actions relating to the SCM and NPD processes affect firm's capability with respect to the CRM process. Process

actions examined are network leadership and outsourcing for SCM and innovation investment and customer co-creation for NPD. The results show that network leadership contributes to CRM capability because it enables a firm to form a common vision of customers, transfer information more quickly among the supply chain network members and obtain their buy-in to enhance market responsiveness of the network. In addition, there is a strong combined effect of network leadership and outsourcing on CRM capability, suggesting that if a firm can leverage "customer ownership" in negotiating with its outsourcing vendors, it can further enhance the firm's CRM capability.

Chapter 4 takes the idea of chapter 2 and chapter 3 further. This chapter develops a measurement method for capturing synergy and then examines the consequences of synergy for both process and firm performance. The method is based on the notion that an overall index of synergy can be built from (a) the degree to which synergy-inducing drivers are present in the relationship between CRM and SCM processes, and (b) the salience of each driver for inducing synergistic effects. Through 25 in-depth interviews with senior managers, five key drivers of synergy are identified. These include customer-centric management, mandate from top management, relationship embeddedness, shared cognition and employee engagement. Our results show that firms are different not only on the status of the relationship between the CRM and SCM processes, but also on the salience of each dimension. Overall, our measurement is superior to proxy measures of synergy used in prior literature because it allows us to capture not only the variation across firms in the state of the relationship, but also the variation relating to the importance of each driver of synergy. Following our definition, synergy can be calculated both at aggregate level and the individual firm level. We call the value of synergy as the synergy index value. To demonstrate the value of synergy index to senior managers and investors, we further

link it to firm performance. Our findings show that synergy index value directly contributes to a firm's market position evidenced by customer satisfaction, retention and lifetime value; however, the synergy may not directly contribute to financial position evidenced by sales, profitability, and ROA. Instead synergy added value to financial position via enhancing CRM and SCM process capabilities, which in turn result in improved CRM and SCM process performance.

In conclusion, this dissertation demonstrates inter-dependent relationships among business processes, empirically tests the synergistic impacts on firm performance using proxy measures of synergy, and develops a new measurement (named synergy index value) and examines the linkages between synergy index value and firm performance.

APPENDIX IRB APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 5/11/2016

To: Linlin Chai
4611 Mortensen Rd. Unit 220
Ames, IA 50014

CC: Dr. Sridhar Ramaswami
3216 Gerdin Business Bldg

From: Office for Responsible Research

Title: The synergy between a firm's customer-facing functions and its back-end support functions

IRB ID: 16-193

Study Review Date: 5/11/2016

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

  Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

  Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.**

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.