

**Driving Customer Relationship Management (CRM) Performance:  
The Role of Knowledge Stores and Technology Assimilation**

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# **Driving Customer Relationship Management (CRM) Performance: The Role of Knowledge Stores and Technology Assimilation**

## **ABSTRACT**

Knowledge development and management is important for marketing firms seeking a competitive edge. We contend that for firms that adopt Customer Relationship Management (CRM) technology, two forms of knowledge stores become critical drivers of CRM performance: (a) Relational knowledge stores, and (b) Technology knowledge stores. Given that integration of new technologies can face resistance within the organization and often requires senior management advocacy to appear legitimate, we conceptualize two moderators of the effects of knowledge stores on CRM performance: (a) CRM technology assimilation, which refers to the acceptance, utilization, and expertise of CRM technology in the firm, and (b) Top management championship, the extent of positive beliefs and advocacy practices by senior management regarding CRM technology. The empirical test of the conceptual model is based on a mail survey of North American firms that have adopted information technology based CRM systems. Our results, based on random effects model, show that higher levels of relational and technology knowledge stores, and CRM technology assimilation lead to superior CRM performance. The results also provide some support for moderating conditions of CRM technology assimilation and top management championship.

## 1. Introduction

Organizational acquisition and development of knowledge is critical for delivering performance and building a sustainable competitive advantage. Development and management of knowledge in areas such as buyer-seller relationships (Johnson, Sohi, & Grewal, 2004) and new product development (Madhavan & Grover, 1998) can lead to firm specific capabilities resulting in competitive advantage. The notion of utilizing a repository of knowledge stores becomes even more critical when firms adopt new marketing technologies such as customer relationship management (CRM) that considerably bolster the institutionalization of relationship marketing and add to the existing knowledge stores (Jayachandran, Kaufman, & Raman, 2005; Reinartz, Krafft, & Hoyer, 2004; Winer, 2001). CRM technology allows the integration of a firm's marketing activities (e.g., sales, service, communication, order management, market research, analytics) to bring a focus on individual customer acquisition, retention, and profitability. While researchers have independently addressed both knowledge management (Glazer, 1991; Johnson, Sohi, & Grewal, 2004; Madhavan & Grover, 1998), and CRM processes and technology (Payne & Frow, 2005; Hunter & Perreault, 2007), the impact of organizational knowledge stores on CRM performance has not been directly addressed.

Knowledge stores are composite of a firm's collective learning, insights, institutionalized routines, policies, beliefs, and practices (Johnson, Sohi, & Grewal, 2004). Since CRM is a confluence of relationship marketing and information technology (IT), in the event of CRM technology adoption by a firm, knowledge and experience in identifying and managing the right relationships, and IT skills become critical. Therefore, we identify two sets of knowledge stores that are vital for delivering firm performance for CRM adopter firms: (a) Relational knowledge stores, that provide the skills and routines required for creating and maintaining customer relationships, and (b) Technology knowledge stores, that are a firm's accumulation of technical knowledge, skills, and routines for utilizing information technology (IT).

The adoption of CRM technology comes with challenges. Research indicates that despite widespread initial adoption, a new technology may still not be thoroughly deployed among acquiring firms<sup>1</sup> - a phenomenon that is referred to as *assimilation gap* (Fichman & Kemerer, 1999). Reasons often cited for assimilation gaps include high knowledge barriers of employees, and lack of top management support (Attewell, 1992; Chatterjee, Grewal, & Sambamurthy, 2002; Purvis, Sambamurthy, & Zmud, 2001). Therefore, in order to understand how the introduction of CRM technology impacts the effect of knowledge stores, we conceptualize the notions of (a) CRM technology assimilation, and (b) top management championship. CRM technology assimilation refers to the acceptance, utilization, and expertise of CRM technology in the firm. We argue that assimilation is critical for realizing the performance advantage of knowledge stores. Additionally, we also argue that top management championship of CRM creates the right conditions for the knowledge stores to deliver performance. Top management championship brings institutional legitimacy to CRM efforts in the firm; without the right backing of top management, CRM may be regarded less seriously as a model for relationship marketing. We present our conceptual framework in Figure 1 that illustrates the effects of knowledge stores on CRM performance.

<Insert Figure 1 about here>

We address the following questions: What impact do knowledge stores have on CRM performance? What constitutes the assimilation of CRM technology? And, what is the relationship between the assimilation of CRM technology and knowledge stores in driving CRM performance? Our contribution to the marketing literature includes advancing the concept of assimilation and investigating the interaction between assimilation and knowledge stores. Our managerial contribution lies in identifying and testing conditions for knowledge management that lead to better CRM performance and in highlighting aspects of technology assimilation that could be used as benchmarks by managers of CRM adopter firms.

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<sup>1</sup> For example, see Liker, Fleischer, and Arnsdorf (1992) and Cooper and Zmud (1990) for evidence of gap between adoption and assimilation of Computer Aided Design (CAD) and Material Requirements Planning (MRP) technologies respectively.

Using data from a mail survey of North American firms that have adopted information technology based CRM systems, we estimate random effects model to test our hypotheses. Our results underscore the importance of cultivating relational and technology knowledge stores for CRM adopter firms. In the subsequent sections, we first present theoretical background on relational and technology knowledge stores and introduce the concept of CRM performance. Second, we advance hypotheses that address the impact of knowledge stores on CRM performance. Third, we develop the concepts of CRM technology assimilation and top management championship and present hypotheses on the moderating effects of assimilation and championship. Fourth, we provide details of our data collection, instrument validation, estimation procedures, and results. Finally, we conclude with a discussion section, including theoretical and managerial implications.

## **2. Theoretical Background**

### *2.1. Organizational Knowledge Stores and CRM*

Knowledge stores represent a firm's collective learning and insights, and serve as cognitive guides for organizational actors (Johnson, Sohi, & Grewal, 2004). Many different perspectives on how organizations learn as a collective have been presented in the literature. For instance, organizational learning has been characterized as a process of information acquisition, information dissemination, and shared interpretation (Slater & Narver, 1995), a resultant of dynamic interplay between tacit and explicit knowledge (Nonaka, 1994), and as cumulative development of knowledge through a firm's absorptive capacity (Cohen & Levinthal, 1990). Any of these institutionalized approaches to building knowledge stores can provide a strategic edge since the deeply embedded knowledge can be used to build capabilities that are distinctive to the firm (Eisenhardt & Martin, 2000) and therefore have positive performance ramifications.

Knowledge stores assume great importance for CRM adopter firms. As one of the most visible and prolific market-facing technologies, CRM software applications amalgamate IT with a firm's marketing processes to allow firm-wide execution of relationship marketing (Reinartz, Krafft, & Hoyer 2004; Hunter

& Perreault, 2007). CRM technology integrates a firm's marketing activities (i.e., sales, service, communication, order management, market research, analytics) to build knowledge on individual customers, allowing the firm to focus on customer acquisition, retention, and profitability. Therefore, not only is CRM a useful technological tool to connect boundary spanning customer touch points (field sales force, web sites, service centers), but also a management model that assists the execution of relationship marketing (Payne & Frow, 2000). Firms that make a decision to invest monetary, temporal and human resources into CRM technology do so with the expectation that results from the new technology will complement their existing knowledge stores on building customer relationships.

Not all firms that adopt CRM technology by purchasing it off the shelf automatically derive full benefits of the technology. Firms that have familiarity and experience with building relationships and handling IT are likely to do better at using CRM technology than firms that do not. CRM adopter firms with limited prior experience in relationship building will be at a disadvantage, since CRM technology in and of itself is not a panacea for building and managing profitable relationships (Rigby, Reichheld, & Scheffer, 2002). Therefore, we argue that two kinds of knowledge stores are critical for performance consequences of CRM adopter firms. Since CRM encompasses the twin domains of relationship management and information technology, firms should focus on building and utilizing knowledge stores in these two domains. We conceptualize and operationalize these two knowledge stores as (a) relational knowledge stores, and (b) technology knowledge stores.

### *2.1.1. Relational Knowledge Stores*

Marketing practitioners and scholars have time and again recommended striving for close relationships with customers (Day, 2000b; Dwyer, Schurr, & Oh, 1987; Lemon, White, & Winer, 2002). Multiple premises have been advocated towards this conclusion, most notably the belief that existing customers are more profitable because attracting new customers is expensive, and that it is easier and less costly to sell an incremental product to current customers (Berry, 1995; Peppard, 2000; Sheth & Parvatiyar, 1995).

Moreover, it has also been argued that relationship marketing leads to competitive advantage for firms since it is hard for competitors to imitate or displace such relationships (Day, 1997; Day, 2000a).

Researchers further argue that successful relationships are not accidents, but result from knowledge stores that embody the skills and routines required for creating and maintaining them (Dyer & Singh, 1998; Johnson, Sohi, & Grewal, 2004). Such stores include knowledge that ranges from how to select the right customers in the first place, to how to make such relationships fully functional. Therefore, based on literature, we argue that relational knowledge stores comprise of four dimensions: (a) relational *identification* knowledge stores, the skills and ability to identify high profit potential key customer relationships and distinguish those to be cultivated for long-term, (b) *interactional* knowledge stores, that entail the subroutines on how trust, trustworthiness, and commitment are communicated, along with conflict resolution skills, (c) *functional* knowledge stores, that include skills in managing supply chain functions, such as operations, logistics, delivery, cost reduction and product development, and (d) *environmental* knowledge stores, that involve a firm's collective understanding of factors external to the firm and to the relationships (Dwyer, Schurr, & Oh, 1987; Johnson, Sohi, & Grewal, 2004).

### 2.1.2. *Technology Knowledge Stores*

Marketing academics and practitioners agree that technology is now a core part of marketing processes such as new product development, supply chain management, and customer relationship management (Srivastava, Shervani, & Fahey, 1998). For example, advances in networking technology have facilitated the use of global virtual software development teams, allowing firms to shorten new software development time and enhance quality (Majchrzak, Rice, Malhotra, & King, 2000). Advances in logistics technologies have enabled firms to improve supply chain management and outsource strategic logistics tasks (Chesbrough & Teece, 2002). Likewise, the considerable growth of CRM software applications is altering approaches to customer relationships by enabling activities such as the calculation of the values and costs associated with acquiring and divesting individual customers (Ryals, 2005). Nonetheless, not all firms

succeed in integrating marketing technologies in their core marketing processes. Firms need a sound technical knowledge base to be able to absorb any new technologies. We address this through technology knowledge stores.

We conceptualize technology knowledge stores as a firm's accumulation of technical knowledge, skills, and routines for utilizing information technology (IT). Technology knowledge stores are multi-faceted. They are first and foremost manifest as awareness and knowledge of information technology (IT) among employees across functional areas. Further, technology knowledge stores exist as technical skills of employees who interact with IT to capture, store, maintain, and analyze data (Attewell, 1992; White & Christy, 1987). They are also evident as technical competence for the timely incorporation of new IT and maintenance of existing IT infrastructure (Bharadwaj, 2000). Employees at firms with well developed technology knowledge stores exhibit confidence in switching to a new technology.

### **3. Hypotheses**

Given that firms are likely to face pressure to demonstrate the financial returns on their investments in knowledge stores, we examine the performance consequences of relational and technology knowledge stores for CRM adopter firms. We argue that greater knowledge stores result in enhanced CRM performance. CRM performance is conceptualized as managerial perception of relative performance (post versus pre-CRM technology adoption) on the following parameters: customer acquisition, retention, lifetime value, profitability, service quality, and satisfaction (Winer, 2001). This disaggregated view of performance at the customer level (as opposed to an aggregated view of market share and profitability at the firm level) is consistent with contemporary research on performance (March & Sutton, 1997). Researchers contend that in order to create a truly customer-focused organizational structure, decision-makers should disaggregate the conventional performance parameters at the customer level, given that the primary objectives of implementing CRM are enhanced customer acquisition, retention, and profitability

(Homburg, Workman, & Jensen, 2000). Other similar instances of using a disaggregated view of performance in the literature include examining performance of new product outcomes (Moorman & Miner, 1997) and inter-firm relationships (Kumar, Stern, & Achrol, 1992).

Relational knowledge stores provide cognitive guides for maintaining current relationships and cultivating new ones. Firms with well established relational knowledge stores are more likely to successfully identify key customers, better assess the long-term relationship potential of key customers, and are better able to initiate and manage relationships with key customers. In terms of choosing the right customers, researchers have found that if firms take an outward view of customers (i.e., a view of total customer transactions including those with competing firms), correctly identify and incentivize customers to switch, it could lead to sales increases (Du, Kamakura, & Mela, 2007). Further, managing relationships becomes more effective for firms with established knowledge stores on customer interactions, and environmental conditions that surround specific customer relationships (Johnson, Sohi, & Grewal, 2004).

Relational knowledge stores also help in clarifying the purpose of CRM technology. Firms with limited relational knowledge stores on customer acquisition and retention are more likely to treat CRM technology as a cure-all for building profitable relationships. Whereas firms with established relational knowledge stores are more likely to be experienced in integrating other efficiency related technologies in relationships with customers (as would be evident in their high levels of functional knowledge stores); such experience is likely to result in learning curve effects, leading to a better understanding of the importance of CRM technology. Thus, it would lead to employees making sense of CRM technology and its purpose, and would enhance CRM performance.

**H<sub>1</sub>:** *The greater a firm's relational knowledge stores, the higher its CRM performance.*

Strong technology knowledge stores guide the usage of CRM technology by facilitating the formal and informal learning of the new technology. Well-developed technology knowledge stores, comprising IT awareness and skills, increase the comfort level of CRM technology users, lower the “knowledge barrier”

(Fichman & Kemerer, 1997), and enhance appreciation of CRM by both management and users (Tyre & von Hippel, 1997). The absence of technology knowledge stores may result in users resisting the adoption and application of a new technology, leading to a diminished CRM performance. High awareness and appreciation of IT will likely result in extracting more out of CRM technology, thereby positively impacting CRM performance. Thus, we suggest:

**H<sub>2</sub>:** *The greater a firm's technology knowledge stores, the higher its CRM performance.*

### *3.1. CRM Technology Assimilation*

The adoption of a technology does not automatically equate to its assimilation. Although the decision to adopt technologies such as CRM is taken by top management (Klein & Sorra, 1996), assimilation of the technology itself ensues among users across the relevant organizational sub-units and entails the acceptance and usage of the technology by the users (Ettlie & Vallenga, 1979; Meyer & Goes, 1988). The changes in core business processes demanded by new technologies such as CRM elevate the stakes for successful assimilation of the technology (Swanson, 1994). The eventual success of CRM technology largely depends on how much the users have bought into the technology, how much is the technology applied towards strategic marketing goals, and how well the technology has been mastered. As such, we define CRM technology assimilation as the composite of *buy-in, strategic utilization, and expertise of an IT based CRM system.*

*Buy-in*, the acceptance of CRM technology by organizational actors in the firm, implies that there is a favorable reception of CRM technology and that users are convinced about its benefits (Noble & Mokwa, 1999). *Strategic utilization* is the extent to which the information generated by CRM technology plays a role in planning relationship marketing strategies. For example, one bank's private equity arm uses CRM to track customer profiles, purchase patterns, and profitability. The information is used to segment, organize sales leads, and match products to customers -- in effect shaping the firm's relationship marketing

strategies (Ebner, Hu, Levitt, & Mccrory, 2002). Similarly, AT&T plans relationship strategies for its long-distance customers based on CRM information, offering differential levels of service to highly profitable versus less profitable customers (Winer, 2001). A finely delineated segmentation analysis forms the backbone of a relationship marketing strategy. Information from CRM technology plays an invaluable role in the process because it allows firms to identify the most valuable customer relationships, plan acquisition and retention strategies, and focus on customer profitability, in addition to serving a forecasting function that assesses the potential of alternative strategies (Dyché, 2001). Finally, *expertise* is the proficiency of individuals in handling the CRM technology. A high level of expertise in operating the technology suggests ability, confidence, and hence, advanced assimilation.

Given that firms are under mounting pressure to demonstrate the financial effectiveness of their IT investments (Dehning, Richardson, & Zmud, 2003), we also examine the performance consequences of CRM technology assimilation. We argue that greater CRM technology assimilation results in enhanced customer acquisition, retention, profitability, and satisfaction (Winer, 2001). As firms partake in assimilation actions (i.e., buying into the technology, using it, and gaining expertise in it) to make room for new technology, firm-specific patterns of collective activities are formed. These are ‘firm-specific’ because a firm’s way of assimilating a new technology is unique, and inimitable. In other words, these collective assimilation actions are higher order capabilities<sup>2</sup> that are difficult to imitate. Contemporary research emphasizes the development of such firm specific, IT-based higher order capabilities as strategic options that lead to superior firm performance (Rai, Patnayakuni, & Seth, 2006; Sambamurthy, Bharadwaj, & Grover, 2003). We argue that assimilation of CRM technology is instrumental in delivering superior CRM performance for the firm. The assimilation of CRM technology is unique to every firm in how the firm makes room in its strategies and operations for CRM. This uniqueness, therefore, is a source of inimitable

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<sup>2</sup> Higher order capabilities are patterns of collective activities that allow inputs to be effectively transformed into superior value propositions (e.g., Zollo & Winter, 2002).

competitive advantage, leading to high performance. As CRM performance stipulates a meaningful and productive use of CRM technology, assimilation should have a positive impact on CRM performance.

**H<sub>3</sub>:** *The greater a firm's CRM technology assimilation, the higher its CRM performance.*

### *3.1.1 Moderating Effects of CRM Technology Assimilation*

We argue that assimilation of CRM technology is synergistic with the growth and impact of both relational and technology knowledge stores. If CRM technology is assimilated well in terms of buy-in, expertise, and strategic use, it strengthens the positive effects of relational and technology knowledge stores. With more assimilation, relational knowledge stores have a greater impact on CRM performance because the ability to identify key profitable customers, leading to a finer segmentation analysis of CRM data, is greatly enhanced with assimilated technology. Assimilated technology allows for strategic use of CRM data for calculations of customer lifetime values and costs, adding to the existing relational knowledge stores, and leading to profitable customer retention.

Assimilation of CRM technology also enhances the positive impact of technology knowledge stores. As the usage and expertise of CRM technology develops, the comfort levels of CRM users grow cumulatively. With greater assimilation, user confidence in switching to a new technology grows, and the knowledge base for technology use in customer-centric marketing activities is augmented. Successful assimilation of CRM technology ultimately adds to the user portfolio of IT skills. Overall, well assimilated CRM technology enhances the use and depth of relational and technology knowledge stores, boosting customer acquisition and retention efforts and outcomes.

**H<sub>4</sub>:** *The greater the CRM technology assimilation, the stronger the positive relationship between relational knowledge stores and CRM performance.*

**H<sub>5</sub>:** *The greater the CRM technology assimilation, the stronger the positive relationship between technology knowledge stores and CRM performance.*

### 3.2. *Top Management Championship*

Top management championship, the extent to which senior management believes in and advocates the use of CRM technology in the firm (Beatty & Gordon, 1991; Howell & Higgins, 1990), is manifest as (a) top management's signaling of *beliefs* in CRM technology, and as (b) top management *practices* such as articulating plans for the CRM technology, establishing norms, expressing mandates or incentivizing use (Leonard-Barton & Deschamps, 1988; Purvis, Sambamurthy, & Zmud, 2001). Top management championship brings about institutional norms and commitment towards technology innovation (Leonard-Barton & Deschamps, 1988), thereby impacting individual actions related to the technology acceptance (Chatterjee, Grewal, & Sambamurthy, 2002). Championship manifests itself in many forms. It could be through expressed mandates, incentive based reward systems, or through signaling top management's belief in the technology (Leonard-Barton & Deschamps, 1988; Purvis, Sambamurthy, & Zmud, 2001); belief that CRM creates significant competitive advantage by improving the efficiency of marketing processes in the firm.

#### 3.2.1 *Moderating Effects of Top Management Championship*

Since top management championship brings institutional commitment to technology adoption and acceptance (Armstrong & Sambamurthy, 1999; Jarvenpaa & Ives, 1991), it impacts individual actions related to the usage of relational and technology knowledge stores. Top management can establish norms for the usage of the knowledge stores, articulate a vision for CRM use, and publicly advocate the benefits of CRM. If top management fails to explain how CRM advances firm goals and strategies, any initiative to apply relational knowledge stores is likely to be interpreted as a gimmick or a fad. Without championship, utilization of relational knowledge stores may not be taken seriously, leading to underutilization of data and poor CRM performance. Top management, thus, is a vital source of organizational motivation that impacts the effectiveness of relational knowledge stores.

Top management's influence on technology knowledge stores is equally important. Research shows that the CEO's high involvement in IT (or a favorable perception of IT) and active personal participation in IT, is linked to a firm being highly progressive in its use of IT (Jarvenpaa & Ives, 1991). Literature on implementation also acknowledges the role of senior management support or championship (Noble & Mokwa, 1999) and contends that a key driver for innovation adoption in organizations is the reputation of the sponsoring executive (Robertson & Gatignon, 1986). Whatever may be its form, top management championship of CRM technology is likely to further accelerate the institutionalization of information technology in the firm. Specifically, due to their dominant position in a hierarchy, top management can mandate and provide incentives to ensure that their beliefs on incorporating CRM technology are followed through. Thus, we argue

**H<sub>6</sub>:** *The greater the top management championship of CRM, the stronger the positive relationship between relational knowledge stores and CRM performance.*

**H<sub>7</sub>:** *The greater the top management championship of CRM, the stronger the positive relationship between technology knowledge stores and CRM performance.*

## **4. Methodology**

### *4.1. Sample and Procedure*

The research context for this study is North American firms that have adopted information technology based CRM systems. The unit of analysis is a strategic business unit (SBU) that has invested in and implemented CRM technology. Given the focus on the enterprise-wide assimilation of application software, CRM technology is defined as IT that enables management of customer relationships and includes branded (e.g., Siebel, J.D. Edwards, Pivotal etc.) and custom built CRM software applications.

We combine qualitative and cross-sectional quantitative research approaches. The qualitative arm was intended to provide foundation for the quantitative study and was designed first to verify and validate the nomological net, serving as a check to ensure that the model was appropriately bounded. Second, the

qualitative component aided in questionnaire development, verifying basic approaches to operationalizations, and providing the basis for item refinement. The third objective of the qualitative component involved pretesting of the questionnaire. For the qualitative component, we interviewed managers from ten CRM adopter firms located in a large metropolitan area in the northwestern U.S. Results indicated that the conceptual model accurately represented the determinants of CRM performance through the lens of knowledge stores, and basic operationalizations were deemed appropriate. For pretesting, we administered the questionnaire to three subjects and observed firsthand the completion time, obstacles in the questionnaire flow, and comprehension problems in items or instructions. On completion of the questionnaire, we debriefed the respondents to refine the questionnaire further.

For the cross-sectional quantitative study, we constructed the sampling frame from a list of 2000 subscribers to the trade publication “CRM” that was provided by a list broker. Because the list did not include the firm phone numbers, they were located with web based search engines. Next, key informants were identified through extensive telephone prescreening (Campbell, 1955). Based on our qualitative research, the key informant was defined as a senior level marketing official who was close in rank to top management and highly knowledgeable about CRM in the firm; except in firms where CRM was an information systems (IS) function, the key informant was selected from IS. The telephone screening resulted in 1300 firms with a confirmed key informant and his/her mailing address. Of these, 650 firms were randomly selected for this study.

Data collection involved three steps: (1) a pre-notification letter, (2) mailing of the main data collection package which included a cover letter, the questionnaire, a \$1 bill as an incentive, and postage paid return envelope, and (3) a follow-up of the main package to non respondents. The mailing and follow up yielded 220 responses, a 34% response rate. We assessed nonresponse bias by comparing early and late respondents (Armstrong & Overton, 1977). No significant differences were found, hence there was no indication of non-response bias. A check of demographics indicated success in identifying key informants.

The respondents were senior level marketing officials, Chief Technology Officers, or CEOs/Presidents, and had been with their firms for an average of 9.7 years.

Finally, we took two steps to alleviate common method concerns, i.e., questionnaire design and statistical testing (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). First, in terms of the design of the questionnaire, the questionnaire consisted of different subsections, i.e., one each for knowledge stores, top management championship, CRM assimilation and performance. Additionally within and across the sections we used different response formats. For example, in the first section we used seven point Likert rating scales (agree/disagree) in two different response formats, i.e., circling a number as a response or writing the number in the blank space provided. Second, we use the Harmon's single factor test to assess the common method bias. Using exploratory factor analysis on SPSS, we estimated a model that consisted of all items for all 11 latent constructs.<sup>3</sup> As one would expect, 12 eigenvalues exceed 1 (ranging from 21.32 to 1.07) that accounted for 75% variance in the items and rotated component matrix showed that the items on the correct latent factor. The last (12<sup>th</sup>) factor had no construct load on it and thus one could effectively assume that there were 11 latent constructs. Based on this analysis, common method bias does not seem to be an issue (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

#### *4.2. Construct Operationalization*

To ensure content validity, construct operationalization began with a review of the academic literature; additionally, given the number of new constructs and newness of the context, the qualitative interviews with practitioners also played a central role. All constructs were measured with multiple item scales. Appendix A shows exact wording of the items. Unless otherwise indicated, item responses were on a one to seven scale with appropriate anchors as indicated in the appendix.

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<sup>3</sup> That is, (1) relational identification knowledge stores, (2) relational interactional knowledge stores, (3) relational functional knowledge stores, (4) relational environmental knowledge stores, (5) technology knowledge stores, (6) top management championship – beliefs, (7) top management championship – practices, (8) CRM technology assimilation– buy in, (9) CRM technology assimilation-strategic utilization, (10) CRM technology assimilation – expertise, and (11) CRM performance.

For *Relational knowledge stores*, we adapted the Johnson, Sohi, and Grewal (2004) scales. We added a new formative measure for relational identification knowledge stores (i.e., ability to identify key customers). It paralleled the other knowledge store measures. We developed a new reflective scale to assess *Technology knowledge stores*. Learning (Attewell, 1992) and information technology usage (White & Christy, 1987) literature provided the basis for the scale that focused on employee technological skills, awareness, and knowledge.

For both the beliefs and practice components of *Top management championship*, we adapted established measures (Chatterjee, Grewal, & Sambamurthy, 2002; Purvis, Samabamurthy, & Zmud, 2001). The beliefs scale assessed top management's viewpoint concerning the potential of CRM, and the practice scale assessed the extent to which the senior management actively participated in advocating the use of CRM technology. *CRM Assimilation* consists of *buy-in*, *strategic utilization*, and *expertise* of an IT based CRM system; *buy-in* assessed the general acceptance of CRM technology in the organization, *strategic utilization* captured the emphasis on applying data derived from CRM technology towards relationship marketing strategic activities such as customer acquisition, customer retention, and customer lifetime value analysis, and *expertise* assessed proficiency of employees with CRM technology.

The measure for *CRM performance* assessed the respondent's perception of how well the firm had performed on customer acquisition, retention, and profitability after a CRM system was implemented relative to before the adoption of CRM system. Given the heterogeneity of firms in our sample, we controlled for firm size (number of employees), firm age (the year the firm came into existence), and CRM age (the year the CRM technology was adopted).

#### 4.3. Data Analysis: Instrument Validation

Since instrument validation is the cornerstone of good theoretical research, we followed appropriate steps for validating both formative and reflective scales (e.g., Jarvis, MacKenzie, & Podsakoff, 2003). We

have three higher order constructs (relational knowledge stores, CRM assimilation, and top management championship) and two first order constructs (technology knowledge stores and CRM performance) in the study. As we indicate in Appendix A, which details the measures, at the second order the constructs are formative as are the dimensions of relational knowledge stores and CRM performance. For formative scales we assessed validity by ensuring that the items were comprehensive and the construct domains were captured accurately (Diamantopoulos & Winklhofer, 2001). The procedures followed in our literature review, qualitative research, and pretesting of scale items provide evidence for the validity of our formative scales.

The following scales were conceptualized as reflective: (a) technology knowledge stores, (b) two dimensions of top management championship (i.e., top management beliefs and practices), and (c) three dimensions of CRM technology assimilation (i.e., buy-in, strategic utilization, and expertise). For reflective scales we use confirmatory factor analysis (CFA) to assess construct reliability, convergent validity, and discriminant validity. We estimated two CFA models in order to ensure adequate ratio of sample size to number of parameters estimated: (1) two top management championship dimensions (i.e., top management beliefs and practices) and technology knowledge stores, and (2) three CRM technology assimilation dimensions (i.e., buy-in, strategic utilization, and expertise). We used factor loadings, standardized residuals, and modification indices to delete items that either did not strongly load on the latent construct or cross-loaded on other latent constructs (Kline, 1998; for details see Appendix A).

Overall, the CFA models for reflective scales exhibit adequate levels of goodness of fit.<sup>4</sup> We also assessed composite reliabilities (reported in Appendix A) and found all constructs having a composite reliability over the cut-off of 0.70. All observed variables had significant factor loadings linked with the latent constructs, which provided evidence of convergent validity (Anderson & Gerbing, 1988). To assess discriminant validity, we calculated average variance extracted for each construct and found it to be higher

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<sup>4</sup> Specifically, goodness of fit index ranged from .90 to .94, comparative fit index ranged from .97 to .98, non-normed fit index was .97 in both cases, and root mean square error of approximation ranged from .060 to .066 (statistically equivalent to .05 in both cases). Although the  $\chi^2$  statistic was statistically significant in the models, the ratios of  $\chi^2$  to degrees of freedom were 1.89 and 1.95 for the two models.

than the squared correlations between constructs (Fornell & Larcker, 1981; Zhu & Kraemer, 2005). All constructs met this test indicating that the items have more common variance with their own constructs than with others. We present descriptive statistics and bivariate correlation coefficients in Table 1.

[Insert Table 1 about here]

#### 4.4. Estimation Procedure

Because the CRM software/suite adopted by a firm can influence effectiveness in CRM technology assimilation, we control for it. A comparison of Siebel and JD Edwards CRM suites, two popular suites in our sample, illustrate the need for this control. While the seven modules of the Siebel CRM suite included marketing campaign management, e-marketing, partner relationship management, call center and service, analytics, customer order management, and employee relationship management, the JD Edwards CRM suite includes sales force automation, contact center, customer service, and marketing campaign management applications modules. Thus, in data collection, we asked managers to name the CRM suite they were using. In our sample, 51 CRM suites were used. The most popular was Siebel, used by 19 firms, then Onyx (11 firms), Pivotal (10 firms), J.D. Edwards (9 firms), Saleslogix (7 firms), and Act (7 firms). Thus, we created a variable ranging from one, for the most popular suite, to six for the least popular suite. Seven represented the other category, where we clubbed suites used by six or fewer firms (157 firms fell in this class).<sup>5</sup> To control for the suite, we modeled this one to seven variable as fixed and random effects.

Specifically, the estimation procedure was driven by the need to control for unmeasured and unobservable effects due to use of CRM suites (Boulding, 1990; Jacobson, 1990). We modeled these unobserved effects as fixed and random effects and used the Hausman (1978) test to compare the two models. We specified the fixed effects model as follows:

$$y_{si} = \alpha_s + \beta' X_{si} + \varepsilon_{si}, \quad (1)$$

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<sup>5</sup> Out of these 157 firms, 17 used custom made in-house CRM software, 6 used Goldmine, 5 used Peoplesoft, 4 used Oracle, and 3 firms each used SAP and Epicor.

where,  $y_{si}$  stands for the dependent variable (CRM performance) for firm  $i$  that used suite  $s$ ,  $\alpha_s$  denotes suite-specific constants,  $X_{si}$  represents the explanatory variables for firm  $i$  that used suite  $s$ ,  $\beta$  is a vector of the influence of the explanatory variables, and  $\varepsilon_{si}$  is the error term, such that  $E(\varepsilon_{si}) = 0$  and  $E(\varepsilon_{si}^2) = \sigma_\varepsilon$ .

We estimated the fixed effects models specified in equation 1 with ordinary least squares. A parallel representation of the random effects model is given as follows:

$$y_{si} = \mu + \beta' X_{si} + \varepsilon_{si} + \nu_s, \quad (2)$$

where,  $\mu$  stands for the constant term,  $\nu_s$  denotes the random disturbance characterizing the  $s^{\text{th}}$  suite that is constant across firms. The assumptions are  $E(\nu_s) = 0$  and  $E(\nu_s^2) = \sigma_\nu$ ; and the following assumption applies:  $E(\varepsilon_{si}, \nu_r) = 0$ ,  $\forall s, i$ , and  $r$ . Furthermore, we assume  $E(\varepsilon_{si}, \varepsilon_{rj}) = 0$  and  $E(\nu_s, \nu_r) = 0$ , if  $i \neq j$  and  $s \neq r$ ,  $\forall s, i, r$ , and  $j$ . We used generalized least squares to estimate the random effects configuration specified in equation 2.

## 5. Results

### 5.1. Model Selection

We created product terms to test for the interaction effects hypotheses. Before creating the product terms we mean centered the explanatory variables (Aiken & West, 1996). Multicollinearity did not seem to be a concern as the variance inflation factor was 2.32. Further, for the dependent variable, the Hausman (1978) test showed that random effects model outperformed the fixed effects model. Thus, from here on, we report results for the random effects model.

### 5.2. Hypothesis Testing

We report the results for the antecedents of CRM Performance in Table 2. These results show support for  $H_1$  such that relational knowledge stores have a positive significant effect on CRM performance ( $H_1: \beta = .119, p < .1$ ). In support of  $H_2$  we find that technology knowledge stores also have

a positive significant effect on CRM performance ( $H_2: \beta = .109, p < .05$ ). Thus, we find support for the hypothesized relationships between the two organizational knowledge stores and CRM performance.

[Insert Table 2 about here]

We also find support for the hypothesized effect of CRM technology assimilation ( $H_3: \beta = .241, p < .01$ ) on CRM performance suggesting that greater levels of buy-in, strategic utilization, and expertise of CRM technology lead to superior performance. Next, we tested for the moderating effects of CRM technology assimilation and top management championship. Contrary to our expectations, we find a significant negative moderating effect of CRM technology assimilation on the relationship between relational knowledge stores and CRM performance ( $H_4: \beta = -.101, p < .1$ ). We discuss this anomalous finding in the discussion section. As expected, we find that emphasis on CRM technology assimilation enhances the positive relationship between technology knowledge stores and CRM performance ( $H_5: \beta = .096, p < .05$ ). As for the moderating effects of top management championship, we find that top management championship enhances the positive relationship between relational knowledge stores and CRM performance ( $H_6: \beta = .109, p < .05$ ). However, we do not find support for the moderating effect of top management championship for the relationship between technology knowledge stores and CRM performance ( $H_7: \beta = -.046, p > .10$ ).

## 6. Discussion

As marketers continue to invest in knowledge management systems, the performance expectations from adopting technologies such as CRM elevate the stakes for successful utilization of a firm's knowledge stores. The evidence we present in this study from CRM adopter firms underscores the importance of (a) developing and maintaining relational and technology knowledge stores to drive CRM performance and (b) assimilating CRM technology through buy-in, strategic utilization, and expertise to yield its full rewards. This study makes three key contributions: (1) it identifies and tests the knowledge stores important for

CRM performance; (2) it defines and provides a reliable and valid measure for CRM technology assimilation; and (3) it highlights the conditions of assimilation and championship that bring the best out of knowledge stores for CRM performance.

The results provide support for the main effects of knowledge stores on CRM performance. CRM adopter firms with established relational knowledge stores do well on CRM performance. Firms with no investments in relational identification, interactional, functional, or environmental knowledge stores are unlikely to find adoption of CRM technology as a panacea to their relationship marketing challenges. One of the potential reasons cited for lack of performance of CRM systems is too much dependence on technology to do the job of relational knowledge and experience (Rigby, Reichheld, & Schefter, 2002). Firms that can sense-make the selection key customers, have prior experience in initiating and implementing long-term relationships and are well aware of how their competitors interact with customers are likely to get more out of CRM technology.

Likewise, we also find support for the impact of technology knowledge stores on CRM performance. Clearly, awareness, knowledge, and skills at using information technology in general make the transition to CRM easier and more manageable. Literature indicates that technical training, in general, is an effective way to develop knowledge structures of employees in a relatively short period. In case of a new technology adoption by a firm, training provides individual learning that leads to the development of personal skills and knowledge that are required to utilize the technology (see Attewell, 1992). Specifically, with reference to IT, training has been shown to enhance both end-user efficiency and effectiveness (White & Christy, 1987). Encouraging informal learning activities including self-reading, learning by observation, learning by socialization, or “test-driving” the technology could be useful as well (Smith & Green, 2002). All of these contribute to the cognitive schemas of technology users; and on the other hand, the absence of well-developed cognitive knowledge stores about technology would negatively impact its appreciation by both management and users (Tyre & von Hippel, 1997).

The evidence presented in this study also underscores the importance of technology assimilation in explaining performance consequences of CRM. Assimilation is a rich construct that draws attention to the fact that unless there is buy-in, strategic utilization, and expertise of CRM technology, it may not yield full rewards. We also find support for the moderating role of CRM technology assimilation on the impact of technology knowledge stores on CRM performance. Thus, the positive relationship between technology knowledge stores and CRM performance becomes stronger as assimilation grows. In contrast, we find the opposite effect for the interaction between relational knowledge stores and CRM technology assimilation. The results suggest that relational knowledge stores are relatively more effective for CRM performance when emphasis on technology assimilation is low than when the emphasis is high. This anomalous finding suggests that while it is critical for CRM adopter firms to invest in relational knowledge stores, too much emphasis on technology assimilation may have a counterproductive effect on how the relational knowledge stores are used. Managers should make a judgment call on what is the optimal level of emphasis on technology assimilation so that the effect of relational knowledge stores is not impeded.

We find support for the moderating effect of top management championship on the performance consequences of relational knowledge stores, but not for those of technology knowledge stores. When a firm adopts CRM, organizational actors draw on top management championship to reassure themselves that their actions are consistent with organizational goals and values. Senior management has the power to set the agenda for integrating CRM at an enterprise-wide level. Therefore, consistent championship for CRM from the top management can bring the desired results from using relational knowledge stores.

## **7. Theoretical Implications**

We contribute to the growing literatures on both knowledge management (Johnson, Sohi, & Grewal, 2004; Madhavan & Grover, 1998) and CRM (Jayachandran, Sharma, Kaufman, & Raman, 2005; Reinartz, Krafft, & Hoyer, 2004; Hunter & Perreault, 2007) in several ways. First, we expand on the conceptual

development of relational knowledge stores by incorporating the element of relationship identification. This has resulted in a more comprehensive construct of relational knowledge stores. Second, we provide empirical support for the impact of knowledge stores on CRM performance. This link can now be further explored with various other mediating and moderating conditions. Third, we conceptualize and present a valid and reliable measure of CRM technology assimilation. This construct can be applied in future studies that include newer marketing technologies.

Our findings also underscore the importance of cultivating knowledge stores and assimilating technology for CRM adopter firms. Thus, we add to the understanding of why some firms are better able to deliver CRM performance than others. Firms with stronger knowledge base in relationships and IT will have a distinctive edge in getting the best performance out of CRM technology.

## **8. Contributions to Practice**

We provide multiple cues to practitioners for getting the best out of their CRM technology programs. First, it is important for managers to note that assimilation of CRM technology should take place at multiple levels. CRM software applications should no doubt play a central role in the operations of the marketing function, but it is equally important to integrate it with the strategy planning processes. As far as the nuts-and-bolts assimilation of CRM in the operations goes, managers need to know that assimilation comprises the elements of ‘buy-in,’ ‘utilization,’ and finally gaining ‘expertise.’ Knowing these dimensions of assimilation can help managers identify the right evidence of assimilation in their firms and take appropriate actions.

Managers should also focus on building knowledge stores in firms that concern the management of long-term relationships with customers. These knowledge stores should involve an emphasis on utilizing information technology and codifying relationship marketing procedures and processes, which is likely to result in a systematic understanding at all levels of the organization on the coming together of a customer-

focused firm. The role of top management championship of CRM cannot be over-emphasized. Top management could champion the usage of CRM technology through expressed mandates, incentive based reward systems, or through signaling their own beliefs in the technology. Importantly, top management can signal championship through a visibly high involvement in IT (or a vocal appreciation of IT) and active personal participation in IT. It is also important for top management to create a firm culture that encourages the use of innovative work processes and does not reward sticking to old and traditional ways. Innovative technologies thrive when firms are open to modifying their business processes to make room for the new technologies.

## Appendix A

### Measures

We would like to assess the amount of knowledge you believe your firm has on each of the following customer related issues (please circle a number for your response on the scale shown below)

#### **Relational Knowledge Stores.** (Formative)

Scale anchors 1= very little knowledge, 7=lots of knowledge

##### *Relational Identification Knowledge Stores* (Formative)

1. Identification of key customers for building relationships.
2. Assessing the relationship potential of key customers.
3. Assessing the resources required to build relationships with key customers.
4. Assessing the willingness of customers for close relationships.
5. Establishing criteria for selecting key customers.
6. Discerning important customers from not so important ones.

##### *Interactional Knowledge Stores* (Formative)

1. Planning and management of partnering activities with key customers.
2. Initiating and implementing long-term relationships with customers.
3. Managing conflicts with customers.
4. Managing negotiations with customers.
5. Enhancing and building trust with customers.
6. Signaling commitment to the relationship with customers.

##### *Functional Knowledge Stores* (Formative)

1. Working with customers to develop products.
2. Working with customers to reduce delivery times.
3. Working with customers on quality management.
4. Integrating customers into the firm's supply chain system.
5. Customizing service to suit the customer's needs.
6. Working with customers to develop programs such as TQM, CRM etc.

##### *Environmental Knowledge Stores* (Formative)

1. Laws and regulations relevant to customer relationships.
2. Market conditions affecting customer relationships.
3. Competitors' relationship behaviors with customers.
4. Competitors' marketing activities.
5. Changes in important technologies.
6. Entry or exits of important competitors in our markets.

#### **Technology Knowledge Stores** (Reflective)

Scale Anchors 1=Disagree, 7=Agree

(Construct Reliability = 0.92; Range of Factor Loadings: 0.69 – 0.87)

1. Employees are skilled at utilizing information technology for accomplishing their tasks.
2. Awareness and knowledge of how to use information technology is generally very low.<sup>f</sup>
3. The vast majority of employees lack the skills for using information technology.<sup>f</sup>
4. We have the technical skills to rapidly incorporate a new information technology in our work processes.\*
5. We have the technical skills to maintain our information technology infrastructure.\*
6. Awareness and knowledge of how to use information technology is good across all functions of the organization.
7. Employees are generally confident that switching to new information technology is an easy task.\*

### Top Management Championship (Formative)

#### *Beliefs.* (Reflective)

Scale Anchors 1 = To a very small extent, 7 = To a very large extent

(Range of Factor Loadings: 0.60 – 0.96; Reliability: 0.97)

Question Stem: Please indicate the extent to which you think the senior management of your firm believes in the following

1. CRM has the potential of providing significant business benefits to the firm.
2. CRM can help better manage customers.
3. CRM can help create significant competitive advantage for the firm.
4. CRM can improve the efficiency of marketing processes in the firm.
5. Implementing CRM is necessary for the firm.\*
6. CRM is just another trend with no significant benefits.†
7. Investments in CRM are a waste of resources. † \*

#### *Practices.* (Reflective)

Scale Anchors 1 = To a very small extent, 7 = To a very large extent

(Range of Factor Loadings: 0.84 – 0.94; Reliability: 0.99)

Question Stem: Please indicate the extent to which the senior management of your firm actively participates in the following.

1. Articulating a vision for the firm's use of CRM.
2. Articulating a formal plan for the use of CRM in the firm.\*
3. Establishing norms for the usage of CRM in the organization.
4. Making an effort at convincing employees of the benefits of CRM technology.
5. Establishing goals and standards to monitor the usage of CRM.
6. Speaking positively about the uses of CRM technology to employees.
7. Talking publicly about their beliefs in the benefits of CRM.
8. Suggesting that CRM is a great idea for improving firm performance.\*
9. Using CRM technology themselves.

### CRM Technology Assimilation (Formative)

#### *Buy-in.* (Reflective)

Scale Anchors 1=Disagree, 7= Agree

(Range of Factor Loadings: 0.79 – 0.90; Reliability: 0.95)

1. Across the organization, there is a high level of “buy-in” for CRM technology.
2. Users of CRM in our firm have accepted the technology really well.\*
3. There is a general lack of support for this CRM technology across the organization. † \*
4. Across the organization, the users are convinced that this CRM technology is the best for our processes and goals.
5. Most everybody in the organization who interacts with CRM technology is convinced about its benefits.

#### *Strategic Utilization.* (Reflective)

Scale Anchors 1 = To a very small extent, 7 = To a very large extent

(Range of Factor Loadings: 0.75 – 0.91; Reliability: 0.97)

Please indicate how extensively is CRM being used for the following:

1. CRM data is frequently used to find new ways of segmenting customers.
2. Analysis from CRM data is frequently used to plan new customer acquisition strategies.
3. Analysis from CRM data is frequently used to plan new customer retention strategies.
4. CRM is used to identify and manage the most valuable customer relationships.
5. Profitability measures derived from CRM (such as Customer Lifetime Value) are regularly used as a part of planning strategy for relationship marketing.
6. CRM is used to assess potential contributions of proposed new strategies.\*

*Expertise.* (Reflective)

Scale Anchors 1=Disagree, 7= Agree

(Range of Factor Loadings: 0.75 – 0.87; Reliability: 0.99)

1. Most users of CRM technology in our firm know how to get the best out of this technology.
2. Our employees have fully developed the ability to successfully perform CRM technology related tasks.
3. Across the organization there is a general lack of confidence about properly using this CRM technology. <sup>†</sup> \*
4. No further training of employees is required regarding utilization of this CRM technology.\*
5. Our employees have mastered the new CRM related processes and technology rather well.\*
6. Employees easily accomplish everything they need to with this CRM technology.

**CRM Performance.** (Formative)

Scale Anchors 1=Very low, 7=Very high

Please rate each aspect of your firm's marketing performance relative to what it was *before* CRM was adopted by your firm:

1. Customer acquisition relative to pre-CRM levels.
2. Customer retention relative to pre-CRM levels.
3. Average customer lifetime value relative to pre-CRM levels.
4. Average customer profitability relative to pre-CRM levels.
5. Customer satisfaction relative to pre-CRM levels.
6. Customer service quality relative to pre-CRM levels.

<sup>†</sup> Item was reverse coded

\* Item removed in measure purification

**Table 1**  
**Descriptive Statistics: Mean, Standard Deviation, and Correlation**

Variable Name	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Relational Knowledge Stores (1)</b>	1.00							
<b>Technology Knowledge Stores (2)</b>	.35**	1.00						
<b>Top Management Championship (3)</b>	.36**	.26**	1.00					
<b>CRM Assimilation (4)</b>	.40**	.39**	.66**	1.00				
<b>CRM Performance (5)</b>	.26**	.21**	.23**	.34**	1.00			
<b>Firm Size (6)</b>	.10	-.10	.13	.05	.17*	1.00		
<b>Firm Age (7)</b>	-.01	.15*	.11	.15*	-.03	-.34**	1.00	
<b>CRM Age (8)</b>	-.01	-.01	.04	-.08	.01	.06	-.05	1.00
<b>Mean</b>	4.55	4.51	3.83	3.29	3.98	4.99	1960.44	1998.69
<b>Standard Deviation</b>	.93	1.32	1.41	1.21	1.08	2.48	34.80	3.31

\*p ≤ .10

\*\*p ≤ .05

**Table 2: Results from Random Effects Model <sup>a</sup>**

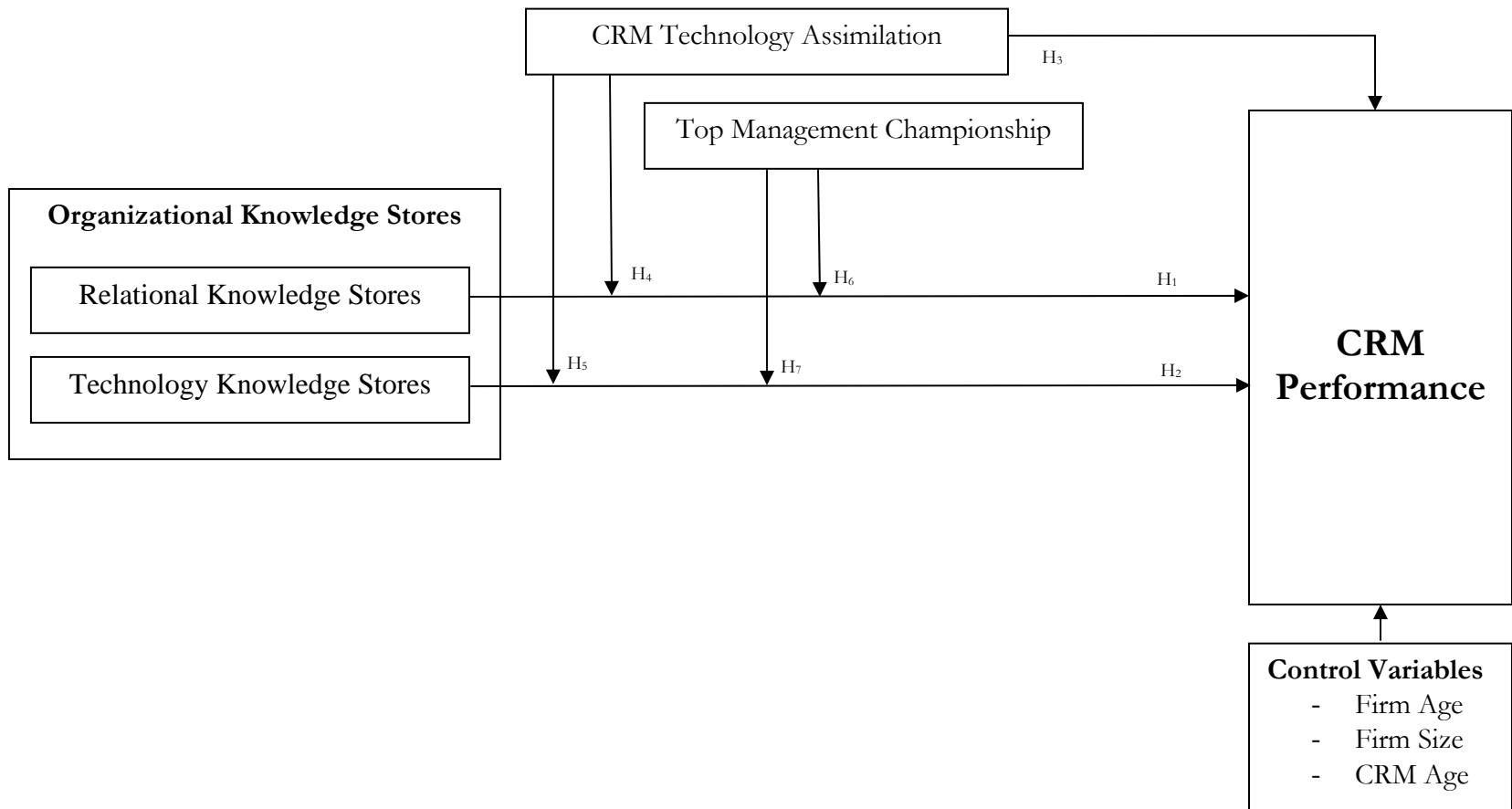
Variable Category	Independent Variable	CRM Performance
Control Variables	Firm Size <sup>b</sup>	.309*** (.131)
	Firm Age <sup>b</sup>	.028 (.083)
	CRM Age <sup>b</sup>	-.179 (.146)
Main Effects	Relational Knowledge Stores (RKS)	.119* (.084)
	Technology Knowledge Stores (TKS)	.109** (.062)
	Top Management Championship (TMC)	-.056 (.068)
	CRM Technology Assimilation (CRM)	.241*** (.084)
Interactions	RKS X CRM	-.101* (.075)
	TKS X CRM	.096** (.058)
	RKS X TMC	.109** (.061)
	TKS X TMC	-.046 (.048)
Overall Model Fit	Model R <sup>2</sup>	.22***

\*p<.10 \*\*p<.05 \*\*\*p<.01

<sup>a</sup> We report the standard error in parentheses and one-tail tests for hypothesized effects.

<sup>b</sup> Consistent with prior research (e.g., Geyskens, Gielens, & DeKimpe, 2002) we took log transformation of number of employees, number of years, and number of years since CRM technology was adopted to instrument firm size, firm age, and CRM age respectively.

Figure 1: Conceptual Model



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