THE IMPACT OF CRM SYSTEM DEVELOPMENT ON CRM ACCEPTANCE

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Although undoubtedly a more solitary journey in nature, writing a dissertation bears more similarities with CRM projects than first meet the eye. Different complementary resources are required to achieve desired outcomes. Specialized knowledge, financial support, and good old-fashioned hard work are necessary to complete the project, the output of which is either accepted or rejected by the target community. Though it has been a fascinating ride and an intense learning experience, the best part of this project will undoubtedly be its closure. A number of people have made important contributions during this process. I would like to thank them now.

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1 INTRODUCTION

1.1 Research gap

Customer Relationship Management (CRM) has been one of the most popular topics in marketing – embraced by academics as well as practitioners - in recent years (Payne & Frow 2005). The term CRM was originally coined by the IT vendor community in the mid-1990s. Technological advances in information technology (IT) made it possible to develop applications that capture, store, access, share, and analyze large amounts of customer data. At the same time, new theoretical discourses such as market orientation and relationship marketing were receiving increasing attention, urging managers to strive for firm performance by collecting, assimilating and utilizing market and customer knowledge to acquire, develop, maintain and retain customer relationships. The market orientation perspective stressed the organization's ability to generate, disseminate and utilize superior information about customers and competitors (Kohli & Jaworski 1990; Jaworski & Kohli 1993; Narver & Slater 1990; Webster 1988), and, consequently, to deliver superior value to its customers by profoundly understanding and satisfying their needs (Day 1994). In a similar vein, the relationship/services marketing paradigm (e.g. Berry 1983; Grönroos 1990; Gummesson 1987) emphasized the importance of the creation, maintenance and retention of valuable customer relationships.

Since drawing influences from these theoretical roots, CRM research has evolved into a theoretically distinct and meaningful discourse in its own right, particularly following the introduction of holistic frameworks and unifying definitions of the CRM phenomenon (Boulding, Staelin, Ehret & Johnston 2005). Payne & Frow (2005) provided the following definition: "CRM is a strategic approach that is concerned with creating improved shareholder value through the development of appropriate relationships with key customers and customer segments. CRM unites the potential of relationship marketing strategies and IT to create profitable, long-term relationships with customers and other key stakeholders. CRM provides enhanced opportunities to use data and information to both understand customers and co-create value with them. This requires a cross-functional integration of processes, people, operations, and marketing capabilities that is enabled through information, technology, and applications (p. 168)". As this definition suggests, CRM is a complex phenomenon, which encompasses a wide range of issues. As a result, CRM has been examined from a number of different perspectives, forming a fragmented field of research. According to Zablah, Bellenger & Johnston (2004a), CRM has been conceptualized and investigated by marketing researchers as a process, strategy, philosophy, capability and technology (for their respective definitions and main arguments, see p. 477).

In the present study, I adopt a CRM technology perspective, which emphasizes the role of CRM technology in building, retaining and maintaining valuable customer relationships (Chen & Popovich 2003). More specifically, the CRM technology perspective posits that CRM success is achieved through the functionality of the firm's implemented CRM technology, the consequent user acceptance of CRM technology, and the performance impacts of using CRM technology in terms of efficiency and /or effectiveness at the individual and organizational levels (Zablah et al. 2004a).

CRM strategies can also be implemented, and CRM success can be achieved, without CRM technology. It is thus important to stress that this study specifically represents the CRM technology perspective. Therefore, I will use the term "CRM technology success" when explicitly referring to the impact of *CRM technology* (not CRM strategy or CRM/customer orientation philosophy, for example) on CRM success.

The potential benefits of CRM technology are numerous: increased customer loyalty, more effective marketing, improved customer service and support, and greater efficiency and cost reduction (Fjermestad & Romano 2003). As a result, CRM technology has become a large global industry with hundreds of vendors, which include both CRM software provides as well as CRM service providers (Speier & Venkatesh 2002). According to Ahearne & Rapp (2010, 119), CRM technology will continue to be used over the next decades to support CRM-related organizational processes.

However, CRM initiatives often do not meet firms' expectations and the majority end up as failures (Chen & Popovich 2003). As CRM success rates have been reported to be as low as 20 percent, firms are finding it difficult to transform their CRM investments into financial gains (Ahearne, Rapp, Mariadoss & Ganesan 2012, 117). In a similar vein, academics in information systems (IS) research have reported ambiguous results regarding the link from IS investments to firm performance (e.g. Wade & Hulland 2004). This problematic relationship has been coined as the "IT productivity paradox" (Hitt & Brynjolfsson 1996).

Yet some firms are more successful than others in reaping rewards from their CRM investments (Morgan & Inks 2001), which has created the need to better understand the reasons and mechanisms behind such differences. It has been argued that CRM initiatives fail in part because CRM's role as an IT solution has been overemphasized (Coltman 2007; Reinartz, Krafft & Hoyer

2004), organizational implementation has been disregarded, and there has been a failure to understand how technology is adopted by target users (Barker, Gohmann, Guan & Faulds 2009; Becker, Greve & Albers 2009). Installing CRM technology into an organization does not automatically lead to performance improvements: significant organizational change is also required to support the introduction of CRM technology (Morgan & Inks 2001; Zablah, Bellenger & Johnston 2004b). Therefore, CRM technology needs to be appropriately installed into the organization and its target user community, ensuring that a fit between technology, people and organizational processes is achieved (Chen & Popovich 2003; Zablah et al. 2004b). *I refer to this crucial phase in CRM initiatives as CRM system development.*

In empirical marketing studies investigating CRM technology success, CRM system development has not been included in research models. Marketing research has primarily focused on the later stages of CRM implementation, also referred to as post-implementation (e.g. Jones, Sundaram & Chin 2002), which takes place once the CRM application has been launched, after CRM system development has been completed. Consequently, the outcomes of CRM system development efforts, such as CRM technology use, have been employed as independent variables to explain firm performance. These measures have included, for example, CRM technology use across functions (Jayachandran, Sharma, Kaufman & Raman 2005); the use of different CRM-related legacy and modern applications (Mithas, Krishnan & Fornell 2005); use across CRM processes (Reinartz et al. 2004), the use of CRM interaction support and customer prioritization (Zablah, Bellenger, Straub & Johnston 2012); the extent of technological implementation in terms of information acquisition, storage, accessibility, and evaluation (Becker et al. 2009); and the use dimensions in terms of accessing, analyzing and communicating information (Hunter & Perreault 2007).

Empirical results regarding the impact of CRM technology use on firm performance have been mixed. The most common explanation offered for these ambiguous results has been related to the lack of complementarity between CRM technology and relational processes (e.g. Jayachandran et al. 2005; Mithas et al. 2005). More recently, Zablah et al. (2012) found that customer size and CRM tool functionalities had an impact on the effectiveness of CRM technology use. In general, however, the role of CRM technology has arguably been undermined in marketing literature, while the emphasis has been on almost exclusively on the firm’s customer-centric core processes. While I agree that customer orientation, organizational culture, and relational processes are at the heart of the firm’s CRM implementation success, I argue that CRM technology also plays an important role in supporting core CRM processes.

The quality of CRM system development efforts and resulting CRM technology applications vary substantially across firms, which should not be overlooked. The complementary role of CRM technology improves the marginal value of relational processes (Jayachandran et al. 2005, 181), which has the potential to provide additional productivity gains (Mithas et al. 2005, 206). Furthermore, although CRM technology use measures address the impact CRM technology has on organizational CRM process outcomes and firm performance, they do not increase one's knowledge about which factors affect CRM technology use, and whether CRM technology use is appropriately aligned to improve users' abilities to perform core CRM processes.

CRM /SFA[1] adoption research in sales management literature has identified various external factors - such as organizational factors, individual characteristics, and social norms - as antecedents for explaining CRM technology acceptance and use by individuals. These antecedents, however, arguably have the strongest impact on CRM adoption in the CRM post-implementation phase. Consequently, it seems that limited research has been done in addressing CRM-related efforts in the CRM system development phase apart from a few notable exceptions (e.g. Jones et al. 2002). Some conceptual and exploratory contributions (Chen & Popovich 2003; Fjermestad & Romano 2003; Ryals & Knox 2001; Zablah et al. 2004b) have also been made in marketing research, which have discussed CRM issues related to the system development phase. Overall, however, studies focusing on CRM system development are scarce. Thus, *CRM system development is an unexplored research area in CRM research in marketing, suggesting that a research gap exists.*

During system development, managers would like to be able to predict whether the system will be accepted by its target users, diagnose the reasons why it may not be, and take corrective action to increase user acceptance in order improve individual and, ultimately, firm performance (Davis, Bagozzi & Warshaw 1989, 999). If problems can be anticipated at an earlier stage, less money and time will be wasted on erroneous CRM implementation. There is a need to understand the drivers of successful CRM system development in order to proactively design managerial efforts to ensure user needs are met.

However, CRM system development, as well as information systems (IS) development in general, has remained a complex undertaking. Sabherwal & Robey (1993) offered some useful metaphors to describe IS development, such as that of a jigsaw puzzle: the pieces of the puzzle have been identified by academics and practitioners, but the lack of evidence related to solving the

[1] SFA refers to sales force automation technology, which is specialized CRM technology specifically used by salespeople (Morgan & Inks 2001). The terms SFA and CRM are used interchangeably in sales management literature (Avlonitis & Panagopoulos 2005).

puzzle makes it ambiguous at best. In addition, they suggested that the existing body of research on IS development is analogous to cooking with the necessary ingredients but without a recipe (p. 549). Two decades later, IS projects are still characterized by high failure rates.

Based on these considerations, CRM system development is clearly an important research topic that is not sufficiently understood, particularly from a marketing research perspective. Furthermore, IS development studies have rarely examined CRM system development specifically, suggesting that it has remained largely empirically untested. In order to make CRM system development a concept worthy of further examination, however, it must be explicitly linked to the concept of CRM success. Choosing the appropriate performance metric for CRM system development is a critical decision, but by no means a straightforward one.

The question of the appropriate CRM/IS performance measure has been a debated issue in marketing literature (Boulding et al. 2005) and in IS literature (DeLone & MacLean 1992; 2003). Within IS research, IS success has also been assessed with a number of different outcome variables. DeLone & MacLean (1992) broadly categorized IS performance measures as system quality, information quality, technology use, user satisfaction, individual performance, and organizational performance.

Marketing research has used several measures of CRM success (for an extensive review, see Kim & Kim 2009). In CRM/ SFA adoption research, CRM success has been evaluated with different measures, for instance those related to CRM acceptance (Avlonitis & Panagopoulos 2005), CRM technology use (Speier & Venkatesh 2002), and salesperson performance (Hunter & Perreault 2007). In CRM-performance research, process-level CRM success measures have included customer relationship performance (Jayachandran et al. 2005), customer satisfaction (Srinisavan & Moorman 2005), and customer-perceived relationship investment (Zablah et al. 2012). Firm performance has been included in most CRM-performance studies using various perceptual and objective measures.

While academics and managers would agree that the ultimate objective for profit-seeking organizations is shareholder value and financial performance, CRM technology has a complex relationship with firm performance. Boulding et al. (2005) argued that while firm performance would be a desirable measure in CRM success models, they regretfully conceded that no single CRM study could include all relevant independent and dependent variables. Rather, depending upon the research purpose, it is advisable to choose the most suitable dependent measures to appropriately investigate a specific aspect of the CRM-performance link.

The specific aspect in this study is CRM system development and CRM technology success. In IS research, user resistance/ lack of technology use has been identified as a principal factor behind failed IS investments (Venkatesh & Davis 2000). In the CRM context, Barker et al. (2009), Speier & Venkatesh (2002) and Zablah et al. (2004b) similarly argued that user acceptance ultimately determines whether CRM success is achieved or not. Therefore, I posit that CRM acceptance is the most appropriate measure in determining whether the firm's CRM system development efforts have been successful or not.

CRM system development is an IT-oriented, CRM pre-implementation phenomenon, which has been scarcely investigated in marketing. CRM implementation, on the other hand, typically refers to the post-implementation phase, when the firm's employees in marketing, sales and customer service have gained access to CRM technology and are utilizing it for managing CRM processes. These phenomena fall into the domain of marketing. Yet the step from CRM system development to CRM implementation is a crucial one with regard to CRM technology acceptance and use.

Marketing and IS research have remained relatively unattached despite the obvious inter-disciplinary nature of CRM technology, failing to converge existing knowledge into a common discourse. The notable exception is the Technology Acceptance Model (TAM; Davis 1989), which has been directly adopted by CRM/ SFA adoption researchers. In addition, CRM acceptance or use has been adopted in most marketing studies assessing the impact of CRM technology, either as a predictor or an outcome variable. Hence, I argue that any attempt to combine IS and marketing perspectives to the study of CRM technology success should include CRM acceptance and/or use. In conclusion, I will assess the success of the firm's CRM system development capability and resulting CRM technology in terms of CRM acceptance among the firm's employees in marketing, sales, and customer service.

1.2 Study purpose and research objectives

From a managerial perspective, the low success rates of CRM initiatives, coupled with the considerable investments required, suggest that there is a clear need to increase our knowledge regarding what factors contribute to CRM system development success. According to Speier & Venkatesh (2002), factors affecting CRM initiatives should be anticipated at earlier stages to avoid costly consequences. Venkatesh, Morris, Davis & Davis (2003) further argued that more research is needed in addressing the earlier phases of IT initiatives, thereby implying that CRM system development phenomena should be further investigated.

From a theoretical perspective, most marketing research has focused on the CRM post-implementation phase. Consequently, the concept of CRM system development has not been defined in marketing literature. This study tackles the knowledge gap in marketing literature related to CRM system development and its impact on CRM success.

Drawing from theories in IS research, such as risk and project management theory, IT innovation research, and IT capability literature, and from CRM/SFA adoption literature in sales management, this study aims to contribute to CRM research by introducing an integrated model linking CRM system development and CRM acceptance. Based on an extensive review of literature, I will propose a parsimonious higher-order concept of CRM system development which captures all relevant facets of this phenomenon.

Therefore, *the purpose of this study is to investigate the impact of CRM system development on CRM acceptance*. This purpose can be divided into the following research objectives: (1) to propose and empirically test a parsimonious conceptualization of CRM system development; (2) to determine whether the proposed conceptualization of CRM system development predicts CRM user acceptance; and (3) to identify which specific resources, and by what mechanisms, affect CRM system development and, ultimately, CRM acceptance.

1.3 The positioning of the study

CRM system development and CRM technology success have been studied the employment of various theoretical lenses in the fields of marketing and information systems (IS). While marketing research has explicitly concentrated on CRM implementation and CRM success, IS research has addressed issues related to IS development, which includes CRM system development, and IS success in general. The contributions from these disciplines have varied, depending upon whether the focus was on pre-implementation (system development) or post-implementation CRM issues. Generally speaking, studies relevant to CRM technology success have focused on: (1) IS (CRM system) development and direct outcomes such as IS project success and system quality (2) antecedents of CRM technology acceptance, (3) consequences of CRM technology acceptance in terms of individual performance, and (4) consequences of CRM technology acceptance in terms of organizational performance.

The first research area deals with pre-implementation issues and is biased towards IT/IS literature. Within IS research, risk and project management literature (McFarlan 1981; Zmud 1980) and IT innovation theories (Fichman

2004a) have a long tradition of examining IS development success. While the former has focused primary on IS project level analysis, IT innovation theories have investigated IT innovation adoption from various perspectives, ranging from individual IT innovation adoption (Moore & Benbasat 1991) to organizational IT adoption and implementation (Cooper & Zmud 1990). More recently, IT capability literature (Wade & Hulland 2004), rooted in the resource-based view of the firm (RBV; Wernerfelt 1984), has emerged in the IS research arena, primarily adopting a strategic firm-level approach (Bharadwaj 2000). However, an operational process/project-level perspective (Ray, Muhanna & Barney 2005) has also surfaced within the IT capability paradigm.

The second and third research areas have been applied in information systems and marketing alike, with similar theoretical underpinnings. Research on the antecedents and consequences of technology acceptance by individuals has been dominated by the utilization research paradigm (Goodhue & Thompson 1995), and particularly by the Technology Acceptance Model (TAM; Davis 1989) and its various extensions. While TAM was originally developed by IS researchers, marketing academics in CRM/ SFA adoption research (Parthasarathy & Sohi 1997) in sales management have widely adopted TAM and its extensions as their theoretical perspective of choice.

The fourth research area has been widely studied in the CRM-performance literature (Reinartz et al. 2004) in marketing. Marketing scholars investigating the CRM- firm performance link have mainly drawn influences from relationship marketing, organizational learning (Senge 1990), market and customer orientation, RBV and dynamic capabilities (Teece, Pisano & Shuen 1997), and, to a lesser degree, from marketing strategy (Andrews 1971) and industrial economics (Porter 1980). Although the fourth research area and CRM-performance research are beyond the scope of the present study, it is important to include a brief presentation of this discourse in order to gain a full understanding of the positioning of this study in the context of marketing and IS research related to CRM system development and CRM technology success.

Figure 1 presents the positioning of these alternative approaches to the study of CRM system development and CRM technology success in terms of the primary level of analysis and key outcomes. The circle sizes representing different theoretical approaches in Figure 1 express their respective scopes in terms of the diversity of applied levels of analysis and key outcomes in empirical studies.

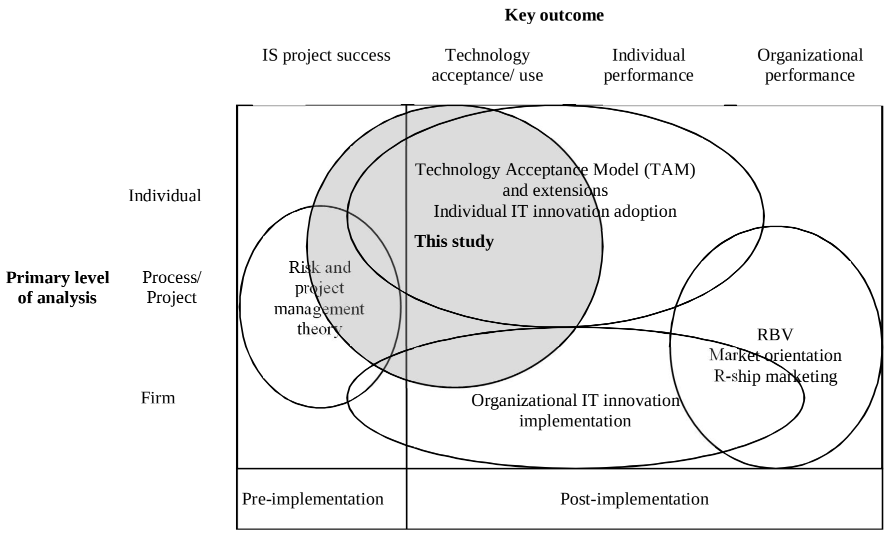

Figure 1 Theoretical approaches to CRM system development and CRM technology success

As Figure 1 illustrates, studies related to the assessment of IS project success predominantly adopt a project level of analysis. Risk and project management theories in particular have adopted this approach, which measures IS success primarily with IT-oriented performance metrics.

Studies related to the antecedents or consequences of technology acceptance by individuals, in turn, typically adopt an individual level of analysis as well as individual performance measures. This is not surprising as user acceptance is inherently an individual level concept. TAM and individual IT innovation adoption studies form a rich body of research, spanning from IS to marketing. In addition, organizational adoption and implementation of IT innovations is also a diverse field, which examines these issues ranging from initial adoption decision to innovation diffusion, at an aggregate, firm level of analysis.

Most studies applying organizational performance measures have incorporated aggregate process or firm level constructs into their research models. IT capability literature, influenced by resource-based theories in strategic management, and CRM-performance research, drawing mainly from market/customer orientation and relationship marketing, represent these strategic approaches to CRM/IS success. Data regarding CRM technology use, for example, is typically collected from a single respondent in senior management instead of the CRM users themselves, resulting in aggregate process or firm level constructs. This level of analysis is consistent with other constructs in these studies, which represent the strategic rather than operational level, such as IT capabilities, relational processes, organizational culture and routines, and firm performance.

In this study, *the level of analysis of CRM system development is the project level, and CRM success is measured at the individual level in terms of CRM acceptance*. More specifically, this study will provide a project-level, resource-based conceptualization of CRM system development, and its impact on CRM technology acceptance at the individual level. The IT capability literature, rooted in the resource-based view (RBV) in strategic management, has contributed to both marketing and IS research related to CRM/IS success. Similarly, TAM has been applied in both marketing as well as IS studies. Therefore, RBV and TAM provide a sound theoretical foundation, upon which an integrated research model, drawing from IS and marketing studies, can be built.

1.4 The structure of the study

This study is organized into nine chapters, which will now be briefly outlined. The main topic and content of each chapter is listed in Table 1.

Table 1 Structure of the study

Chapter	Main content
1. Introduction	Presentation of research gap; study purpose and objectives; positioning of the study
2. Conceptual analysis	Definitions for core concepts based on theoretical analysis
3. Literature review	Discussion of relevant marketing and IS literature
4. Theoretical conceptualization	Introduction of resource-based concepts related to CRM system development
5. Research model and hypotheses	Presentation of research model and hypotheses linking antecedents, dimensions, consequences, and moderators of CRM system development
6. Methodology	Operational measures; data collection and sampling; PLS path modeling; reliability and validity analyses
7. Results	Structural model assessment; conclusions regarding hypotheses; model fit evaluation
8. Discussion and conclusions	Theoretical, methodological and managerial contributions; limitations and implications for future research
9. Summary	Summary of dissertation

In the first chapter, a research gap in existing academic research is identified. In essence, the role of CRM system development in achieving CRM acceptance, which has been overlooked in marketing research, is discussed. Based on these considerations, the main purpose and research objectives of the study are introduced. A presentation of the theoretical positioning of the study concludes the first chapter.

The second chapter provides a deeper conceptual analysis of the core concepts adopted in this study. These concepts include CRM technology, CRM systems, IT implementation, CRM system development, and CRM acceptance. Based on these conceptual analyses, an explicit definition for each core concept is formulated.

A review of academic literature relevant to the present study is presented in the third chapter. More specifically, the existing literatures in marketing and IS research related to IS/CRM system development and CRM technology success are discussed, respectively.

In the fourth chapter, a theoretical conceptualization of CRM system development capability is derived from the resource-based view of the firm (RBV) and the IT capability paradigm. Resource-based mechanisms are discussed to provide rationales for linking relevant theoretical concepts to CRM system development capability.

The research model and the hypotheses are presented in the fifth chapter. The research model depicts the hypothesized relationships between the antecedents, dimensions, and consequences of CRM system development capability. Hypotheses H1-H15 are introduced to formally test these relationships. Furthermore, hypotheses H16-H17 are formulated to test for moderating effects.

The sixth chapter discusses the methodological considerations regarding the present study. These issues include the pre-testing of the online survey instrument; operationalization of constructs; sampling and data collection process; detection for biases within collected data; PLS path modeling as the primary analysis method; reliability and validity analyses regarding measurement models; and the criteria used in assessing the structural model.

The empirical results of the structural model are analyzed in the seventh chapter. The hypothesized relationships between constructs in H1-H17 are discussed respectively, after which final conclusions are drawn based on empirical data. Lastly, a competing models comparison is undertaken.

The eighth chapter includes the final discussion and conclusions of the study. More specifically, the concluding remarks are divided into theoretical and methodological contributions, managerial implications, study limitations, and recommendations for future research.

The ninth, and final, chapter presents the summary of the entire dissertation.

2 CONCEPTUAL ANALYSIS

This core concepts in this study include (1) the CRM system, which is a CRM technology application implemented into a given organizational context; (2) CRM system development as a project aiming to implement the CRM technology application into that organization; and (3) CRM acceptance by individuals using the CRM technology application, which is adopted as the measure of CRM technology success. In addition, the IT implementation concept is analyzed in order to gain a better understanding of the CRM system development and CRM acceptance concepts. The core concepts have been subject to a certain degree of ambiguity, and numerous overlapping terms have been introduced in various streams of relevant IS and marketing literature. Therefore, I will now analyze these three concepts in further detail, and provide definitions adopted in the present study.

2.1 CRM technology and CRM system

CRM technology can be defined as information technology that serves as an input into the CRM process with the specific purpose of managing customer relationships more productively (Chen & Popovich 2003). More specifically, CRM technology can be categorized based on organizational function into IT applications directed at supporting sales, marketing and customer service, which offer different functionalities needed by end-users in these departments (Zablah et al. 2004b, 281). Sales support, for instance, helps salespeople manage customer accounts and automate administrative work; marketing support provides tools for marketing campaign management; service support facilitates timely and high quality customer service delivery (Jayachandran et al. 2005, 181). Regardless of these different functionalities, the key role of CRM technology is to provide a common infrastructure to integrate marketing, sales, and service functions in order to optimize customer-related processes (Ryals & Knox 2001). In the present study, I define CRM technology broadly, encompassing all IT applications used by employees in sales, marketing and customer service related to the efficient and effective delivery of CRM processes.

However, CRM technology does not independently carry out CRM processes - people and skills are required (Hunter & Perreault 2007, 17). In their holistic conceptualizations of CRM, Zablah et al. (2004a) and Payne & Frow (2005) included CRM technology as a supporting dimension for value-creating CRM processes, such as the knowledge management and interaction management processes, which are performed by the firm's employees. CRM technology is thus an enabler, which facilitates the efficient and effective execution of relational processes (Jayachandran et al. 2005). Therefore, CRM technology is a necessary but insufficient condition for CRM implementation success (Day 2003).

This system view of technology, people and processes helps us distinguish between the concepts of CRM technology and CRM system. The CRM system concept is derived from the information system concept. Drawing from IS research, information systems are complex technical and organizational innovations[2], involving much more than a mere adoption (investment) decision and technology installation (Sabherwal & Robey 1993, 548).

According to Silver, Markus & Beath (1995), an information system encompasses hardware, software, data, people and processes (p. 363). The impacts of an information system occur over time as a result of its interaction with the organizational context (p. 364). Technology design features must fit the organizational context for benefits to occur which can only be achieved through co-operation between IT management and business units (p. 366), and through a careful diagnosis of users and their needs (p. 374).

In marketing research, CRM has also been defined as a fit between technology, people and organizational processes (Chen & Popovich 2003). Based on these considerations, I define a *CRM system as an information system, comprised of technology, people and processes, which enables the organization to manage its customer relationships more efficiently and effectively*.

In order to benefit from a CRM system, it needs to be brought into the organization through a CRM system development project as a necessary part of CRM implementation. CRM system development has neither been adopted in marketing terminology nor explicitly distinguished from the concept of CRM implementation. I draw upon IS research, and IT innovation research in particular, to delineate the concept of CRM implementation, CRM system development, and CRM acceptance. I will first discuss the overall concept of IT implementation developed by IT innovation theorists.

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[2] In IT innovation research, information systems are regarded as organizational IT innovations. Organizational innovation can be defined as the adoption of an idea or behavior that is new to the organization (Fichman 2001, 429), or as "a technology or practice that an organization is using for the first time (Klein, Buhl Conn & Sorra 2001, p. 811)", regardless of whether other organizations have used the same innovation previously. Similarly Pullig, Maxham & Hair (2002) argued that CRM/SFA implementation is "an innovation since it is an application of technology to a new system or process of collecting and disseminating customer information throughout the organization. (p. 402)".

2.2 IT implementation

IT innovation research[3] examines IT implementation phenomena across different stages of its lifecycle. As briefly discussed in the previous chapter 1.3, IT innovation research is a vast body of research, which includes studies focusing on organizational IT innovation implementation, and on IT innovation adoption at the individual level. From this perspective, organizational IT implementation can be defined as an organizational effort to diffuse the IT innovation to a target user community (Cooper & Zmud 1990, 124), or "the process of gaining targeted organizational members' appropriate and committed use of an innovation (Klein & Sorra 1996, 1055)".

Cooper & Zmud (1990, 124–125) presented an innovation-diffusion model of IT implementation as consisting of six phases, including initiation, adoption, adaptation, acceptance, routinization and infusion (Table 2). Each phase is conceptualized as a function of *processes* and *products*. *This study focuses on the adaptation stage and the acceptance stage of IT implementation*. Adaptation refers to (1) the process, during which the IT application is developed and completed, organizational procedures are revised, and organizational members are trained both in the IT application as well as new procedures; and (2) the product, which is a direct result of that process, namely, the IT application available for use in the organization (Cooper & Zmud 1990, 124). *Adaptation is theoretically similar to the concept of CRM system development adopted in this study.*

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[3] IT innovation research is a general term often used by scholars in this field (e.g. Fichman 2001), which encompasses IT implementation research and technological diffusion theory (Cooper & Zmud 1990).

Table 2 Innovation-diffusion model of IT implementation (adopted from Cooper & Zmud 1990)

Phase	Process	Product
Initiation	Rational and political negotiations ensue to get organizational backing for implementation of the IT application.	A decision is reached to invest resources necessary to accommodate the implementation effort.
Adoption	Rational and political negotiations ensue to get organizational backing for implementation of the IT application.	A decision is reached to invest resources necessary to accommodate the implementation effort.
Adaptation	*The IT application is developed, installed, and maintained. Organizational procedures are revised and developed. Organizational members are trained both in the new procedures and in the IT application.*	*The IT application is available for use in the organization.*
Acceptance	*Organizational members are induced to commit to IT application usage.*	*The IT application is employed in organizational work.*
Routinization	Usage of the IT application is encouraged as a normal activity.	The organization's governance systems are adjusted to account for the IT application; the IT application is no longer perceived as something out of the ordinary.
Infusion	Increased organizational effectiveness is obtained by using the IT application in a more comprehensive and integrated manner to support higher level aspects of organizational work.	The IT application is used within the organization to its fullest potential

Acceptance, in turn, refers to (1) the process, during which organizational members commit to using the IT application; and (2) the product, namely, the IT application is adopted in organizational work. Although acceptance here is conceptualized as collective acceptance at the organizational level, acceptance must first take place at the individual level. *Acceptance at the individual level is theoretically similar to the concept of CRM acceptance adopted in this study.*

In this view, a distinction can be made between IT implementation at the organizational level and at the individual level. The adoption of information technology by both organizations and individuals is part of the process of IT implementation (Moore & Benbasat 1991, 193). Klein, Buhl Conn & Sorra (2001), for example, discussed innovation adoption and implementation. Organizational adoption refers to the decision, plan, or purchase to install an

IT innovation. Implementation, in turn, is the stage during which users become more skillful and committed in their use of an innovation (p. 811). It is worth noting that their definition of the term “implementation” is defined more narrowly to refer to stages after the completion of innovation development.

In sales management literature in marketing, Pullig, Maxham & Hair (2002) defined organizational innovation adoption – in reference to CRM/SFA technology adoption - as a process, which passes many phases ranging from a decision to adopt, activities that facilitate implementation, and ongoing use of the innovation. The decision to adopt is called the initiation stage, which also includes problem perception, information gathering, evaluation, and resource attainment. The implementation stage includes all following events, ranging from initial utilization (acceptance/use) to continued use as part of routine (infusion).

Parthasarathy & Sohi (1997) similarly suggested that CRM/SFA adoption takes place at two levels. First, the organization makes the decision to adopt CRM/SFA technology in the pre-implementation phase and make organizational adjustments accordingly. Second, target users have to adopt the CRM/SFA technology. Importantly user adoption can only occur after organizational adoption. Thus, CRM/SFA technology must first be adopted by the organization and then by users, which Parthasarathy & Sohi (1997) referred to as “dual adoption”. In this study, a parallel distinction is made between CRM system development, an organizational concept, and CRM acceptance, a user concept. I will discuss the CRM system development concept first.

2.3 CRM system development

As the previous discussion illustrates, the term IT implementation has different meanings, depending upon whether one asks an IS researcher or a marketing researcher; a system developer or a business manager, for example (Silver et al. 1995, 375). In parallel, it is important to make a distinction between CRM implementation and CRM system development. *CRM system development lacks a definition in marketing literature.* In order to define CRM system development, I will first discuss the CRM implementation concept in marketing, followed by an analysis regarding closely related definitions in IS research, such as information systems (IS) development.

The CRM implementation concept in marketing is similar to Klein et al.’s (2001) definition of innovation implementation, referring to the stage during which users become more skillful and committed in their use of an innovation (p. 811). In addition, CRM implementation is typically defined as a broader concept, which includes the alignment of CRM technology use with other non-

IT organizational resources such as organizational culture, customer orientation, and CRM processes related to the acquisition, retention and management of customer relationships (e.g. Reinartz et al. 2004). In this view, CRM implementation primarily refers to the period after the CRM system development project has been completed, also referred to as the post-implementation phase. For example, Jones et al. (2002) referred to pre-implementation and post-implementation phases in the CRM/SFA implementation context.

Although acknowledged as a part of CRM implementation, Klein et al.'s (2001, 811) organizational innovation adoption concept, which refers to the decision, plan, or purchase to install an IT innovation (CRM technology application), has been largely neglected in marketing research. I adopt the term CRM system development to refer to the early phase of CRM implementation, which takes place prior to the CRM system being rolled out and used by the target user community. In order to formulate a precise definition for CRM system development, I drew from IS research for definitions on IS development/implementation and system development capability.

Sabherwal & Robey (1993, 549), for example, referred to IS implementation as the development process that includes the feasibility study, system analysis and design, programming, training, conversion, and installation of the system. Their definition conceptualizes IS implementation as a project for which resources are allocated for its completion. Risk and project management studies refer to these projects as IS development. IS implementation and IS development have thus been used interchangeably in IS research. For the sake of clarity, I will use the term IS development from this point forward.

More recently, new concepts have been developed within the resource-based IT capability literature. IS development has been recognized as a key IT capability (e.g. Rockart, Earl & Ross 1996; Ross, Beath & Goodhue 1996; Feeny & Willcocks 1998), or more specifically, as "system development capability". Ravichandran & Lertwongsatien (2005) defined system development capability as "the ability to develop high-quality applications in a timely and cost-effective manner (Ravichandran & Lertwongsatien 2005, 245)". This definition emphasizes two issues: (1) the quality of the product and (2) the quality of the development process. This definition is quite similar to Cooper & Zmud's (1990) definition of "adaptation" in IT innovation research.

In comparison, adaptation was described as the process, during which the IT application is developed, organizational procedures are revised, and organizational members are trained both in the IT application as well as new procedures. The output of this process is the product, which is the IT application available for use in the organization (Cooper & Zmud 1990, 124). This definition is more precise with regard to the process element, identifying the need to fit technological development, organizational processes, and employees.

Therefore, the definition of organizational adaptation is similar to the definition of CRM system adopted in this study, which stressed the importance of fit between technology, people and organizational processes (Chen & Popovich 2003).

Based on the analysis of relevant definitions put forward in IS research and marketing literature, I argue that the definition of CRM system development should include four distinct aspects. Firstly, CRM system development is a project-level phenomenon for which resources are specifically allocated to ensure its completion. Second, CRM system development is a process, which should facilitate the alignment of CRM technology, organizational processes, and end-users. Third, the CRM system development process should be carried out and completed in a timely and cost-effective manner. Fourth, the desired output, or product, of CRM system development is a CRM application characterized by high quality.

A closer examination reveals that all four dimensions implicitly refer to the organization's ability, or capability, to perform activities related to CRM system development, such as allocating resources to CRM system development, and executing CRM system development activities efficiently and effectively. Furthermore, the theoretical approach adopted in this study is the resource-based view of the firm (RBV) and IT capability paradigm, which have already made theoretical developments related to the concept of system development capability. As the primary focus in this study is to examine the firm's capability to develop CRM systems, CRM system development and CRM system development capability will be used interchangeably in the present study.

Based on these considerations, I define *CRM system development (capability) as a project for which dedicated resources are allocated, ensuring the organization's ability to align CRM technology with the organizational environment into which it is installed in a timely and cost-effective manner, resulting in a high-quality CRM application.*

CRM system development represents the first phase of the previously discussed dual adoption of CRM technology (Parthasarathy & Sohi 1997). After organizational adoption has resulted in a CRM application available for use within the organization, target users have to adopt the new CRM application. I refer to CRM technology adoption by individuals as CRM acceptance, which will be discussed next.

2.4 CRM acceptance

CRM system development takes place in the pre-implementation phase prior to system rollout, i.e. before CRM users have access to the CRM technology. In the CRM implementation phase, CRM users have access to interact with and use the CRM application. In Cooper & Zmud's (1990) model of IT implementation, this phase was referred to as "acceptance", during which organizational members commit to using the IT application, and as a result, the IT application is adopted in organizational work. Although acceptance here is conceptualized as collective acceptance at the organizational level, there is a consensus among IS and marketing research that acceptance is inherently an individual level concept. Therefore, I adopted the concept "CRM acceptance" at the individual level.

Acceptance is more commonly referred to as individual (technology) adoption, or technology acceptance. These concepts have originated in IS research, and have since also been widely adopted in sales management literature in marketing. Sales management literature refers to acceptance at the individual level as "CRM/SFA adoption" or "CRM/SFA acceptance". However, these terms may also have different meanings which calls for an explicit definition of the CRM acceptance concept adopted in this study. Drawing from IS and marketing literature, I will now analyze the CRM acceptance concept in further detail.

Adoption is a term, which originated in innovation diffusion theory (Rogers 1995), and was extended to the context of IT innovation adoption (Davis 1989; Moore & Benbasat 1991). Davis (1989) introduced the influential Technology Acceptance Model (TAM), which places a specific emphasis on explaining user acceptance of information systems. TAM is also largely based on the theory of reasoned action (Fishbein & Ajzen 1975), which posits that behavior, in this context information technology usage, is logically processed through an individual's beliefs, attitudes and intentions (Davis et al. 1989). Consequently, concepts such as adoption, acceptance, technology adoption, technology acceptance, user adoption, and user acceptance, for instance, have been used somewhat interchangeably to refer to an individual's intention, attitude, belief, actual use of an IT application, or all of them in combination. Therefore, technology acceptance is a complex phenomenon, which has been conceptualized with a number of inter-related variables. Technology adoption is often used as an umbrella term in IS and marketing research, encompassing more commonly used concepts such as technology acceptance, user acceptance and technology use.

Furthermore, technology adoption is longitudinal phenomenon, which evolves through different stages. The initial implementation phase is the period during which the technology is introduced to users (Leonard-Barton 1988, 251). Cooper & Zmud (1990) suggested that acceptance is followed by routinization and infusion. Klein & Sorra (1996, 1057), in turn, argued that innovation use can be depicted as a continuum, which varies between non-use and committed use. In the CRM/SFA context, Parthasarathy & Sohi (1997) stressed that initial adoption is different from true adoption, i.e. making full use of an innovation (p. 203). Using different terminology, Schillewaert, Ahearne, Frambach & Moenaert (2005, 324) suggested that the CRM/SFA adoption decision is followed by an implementation and confirmation stage during which usage becomes regular and a part of an individual's routines.

In sales management literature in marketing, the most commonly used definitions4 related to CRM/SFA adoption are based on (1) two beliefs, namely, perceived ease of use and perceived usefulness; (2) technology use; and/or (3) infusion. Perceived ease of use refers to "the degree to which a person believes that a using particular system would be free of effort (Davis 1989, 320)". Perceived usefulness, in turn, refers to "the degree to which a person believes that using a particular system would enhance his/her job performance (Davis 1989, 320)". These two beliefs have become integral parts of the CRM acceptance concept, and have received wide empirical support. Technology use, in turn, is often included in the concept of CRM acceptance. However, technology use is a controversial concept as it may be understood in terms of actual usage, extent of use, frequency of use, or infusion.

Infusion has been adopted less frequently in marketing studies, and has not been included in the CRM acceptance concept. Infusion is defined as "the extent to which the salesperson uses SFA to its fullest extent to enhance their productivity (Jones et al. 2002, 147)". Schillewaert et al. (2005, 324) defined individual adoption similarly as the extent to which a salesperson frequently and fully uses SFA technology. Hence, infusion could be understood as "true" CRM adoption, i.e. a long-term, continuous behavior. However, it is beyond the scope of this study to define CRM acceptance with dynamic properties, which would require the adoption of a longitudinal research setting.

In summary, CRM acceptance is most commonly defined as a belief, a behavior, or a combination of both. Seddon (1997) argued that perceived ease of use and perceived usefulness, based on actual use in the initial implementation phase, sufficiently capture an individual's technology acceptance. In this view, ex post, experience-based beliefs after actually using the CRM technology would be an appropriate conceptualization of CRM acceptance. In addition, technology use is a vague concept compared to perceived ease of use

[4] Intentions and attitudes have been excluded from the CRM/SFA acceptance construct in more recent empirical marketing studies. For an extensive discussion, see Chapter 3.1.4.

and perceived usefulness: there is an ongoing debate concerning whether IS technology use should be measured in terms of actual usage, extent of use, frequency of use, or infusion. (For an extensive analysis of the justification of CRM acceptance as a belief-based concept, without a behavioral (use) dimension, see Chapter 3.1.2)

Based on these considerations, I define CRM acceptance as an individual's beliefs regarding the use of a CRM application. This can also be expressed as:

CRM acceptance = Perceived ease of use + Perceived usefulness

More specifically, I define *CRM acceptance as the individual's experience-based beliefs regarding the ease of use and usefulness of the CRM application with respect to his/her job performance*.

3 LITERATURE REVIEW ON CRM SYSTEM DEVELOPMENT AND CRM TECHNOLOGY SUCCESS

The theoretical review covers relevant IS research and marketing research which have focused on IS/ CRM system development and CRM technology success. This chapter is organized as follows. First, I will present a review of marketing literature related to CRM technology success. More specifically, I will discuss CRM/ SFA adoption literature in sales management, and the contributions from CRM-performance literature in marketing. Second, I will present a review of IS research relevant to the present study. More specifically, I will discuss risk and project management theory, IT innovation research, and the IT capability paradigm. Although this study focuses specifically on the development of CRM technology, there are many aspects in IS literature which are useful and directly applicable to the CRM context. My intention is not to provide an exhaustive review of the rich and diverse IS literature; rather, I selected those IS theories that were deemed to be most relevant to this work.

3.1 Marketing research on CRM technology success

There are two research streams in marketing which are relevant to the role of CRM technology in CRM success. The first stream of marketing research focuses on sales force automation (SFA) technology adoption at the individual salesperson level. *SFA adoption literature* can be divided into studies, which examine the (1) antecedents of SFA adoption, which is the key outcome; and (2) the effect of SFA technology use as predictor on individual performance, which is the key outcome, respectively.

The second stream of research, *CRM-performance literature* in marketing, examines the link between the broader concept of CRM implementation and firm performance. A number of empirical studies have incorporated CRM technology use as an independent variable assessed at the firm or process level. These studies thus examine the impact of CRM technology use on organizational performance.

As this study focuses on the antecedents of CRM acceptance, extant marketing literature related this specific area will be the primary area of interest. In particular, the Technology Acceptance Model (TAM) and related theories have been influential in the context of CRM/ SFA adoption literature. In addition, marketing literature related to the consequences of CRM/SFA technology use on individual performance and firm performance will be reviewed briefly in order to provide a more comprehensive understanding of the positioning and contribution of this work to CRM research in marketing.

3.1.1 CRM/SFA adoption literature

CRM/SFA adoption literature is still a fairly new but growing body of research in marketing. Fortunately, marketing researchers have benefited from substantial contributions made in IS research since the 1970s regarding information technology adoption (Davis 1989), which is now one of the most mature research areas IS literature (Venkatesh et al. 2003, 426). In fact, Ahearne & Rapp (2010, 112) argued that the majority of sales management articles have largely replicated the findings made in the IS domain, leaving little room for theoretical advancements. As discussed earlier, however, CRM system development has remained an unexplored area as an antecedent of CRM/SFA adoption. The contributions from relevant IS literature will be included in the review of extant CRM/SFA adoption literature.

The SFA adoption literature has focused specifically on sales force automation (SFA) technology, which is a core function of CRM applications. The terms SFA and CRM are used interchangeably in sales management literature (Avlonitis & Panagopoulos 2005). SFA technology can be defined as the hardware and software used by salespeople in their selling and administrative activities, which support the collection, assimilation, analysis, and dissemination of information (Morgan & Inks 2001, 463). Thus, the definition of SFA technology is equivalent to CRM technology: the only difference is that SFA technology is specifically used by salespeople whereas the broader term CRM technology includes applications used by marketing and customer service personnel as well.

Reported failure rates of SFA initiatives, ranging between 55–80% (e.g. Bush, Moore & Rocco 2005; Erffmeyer & Johnson 2001; Park, Kim, Dubinsky & Lee 2010; Honeycutt, Thelen, Thelen & Hodge 2005), are very similar to CRM initiatives in general. Given the magnitude of investments and continuing challenges, research in marketing is still relatively sparse (Hunter & Perreault 2007). Similar to the CRM discourse, advocates of SFA technology have emphasized its benefits in terms of increased individual efficiency, effectiveness and productivity in customer relationship management processes

(Cascio, Mariadoss & Mouri 2010; Barker et al. 2009), which ultimately enhance firm performance (Park et al. 2010, 1129).

Lack of technology adoption/acceptance by SFA users is the primary reason why SFA initiatives fail (e.g. Barker et al. 2009; Buehrer, Senecal & Pullins 2005; Morgan & Inks 2001; Pullig et al. 2002). The same reason has also been previously suggested in the IS context (Davis et al. 1989) as well as in the organizational innovation context (Klein & Sorra 1996). Bush et al. (2005), for example, found in their exploratory study based on in-depth interviews that salesperson buy-in through perceived benefits of SFA adoption was the primary determinant of SFA success or failure. The rationale behind this conclusion is straightforward: SFA technology must be used by individuals first to achieve productivity gains in terms of efficiency and/or effectiveness (e.g. Keillor, Bashaw & Pettijohn 1997; Pullig et al. 2002). Technology adoption by individuals is thus a necessary but insufficient condition for CRM/SFA success (Hunter & Perreault 2007, 17).

3.1.2 Technology Acceptance Model and related theories

There are a number of theories developed within IS research that have been applied in the SFA adoption literature. These theoretical approaches include the *Technology Acceptance Model (TAM)* by Davis (1989), an extension to the original TAM model referred to as TAM2 (Venkatesh & Davis 2000), the theory of reasoned action (TRA; Davis et al. 1989), and innovation diffusion theory (Moore & Benbasat 1991; Rogers 1995). While proposing different antecedents, the common denominator in all these IS theories[5] is their attempt to explain individual technology acceptance, which is also the case in SFA adoption literature that has adopted these theories into the CRM/SFA context (Avlonitis & Panagopoulos 2005). Goodhue & Thompson (1995) coined this body of research “utilization focus research” as their implication is that increased utilization of information systems leads to positive performance outcomes (p. 214). The most widely applied theory specifically on CRM/SFA acceptance is the original TAM model and its extensions. For this reason, it was a natural theoretical foundation for choosing appropriate dependent

[5] In their proposal of a unified theory of acceptance and use of technology (UTAUT), Venkatesh et al. (2003) also included the motivational model (MM), the theory of planned behavior, the model of PC utilization (MPCU), and social cognitive theory (SCT) as other IS theories explaining individual technology acceptance. In addition, Goodhue & Thompson’s (1995) task-technology fit theory may be considered as an extension of TAM explaining technology acceptance, which was applied by Speier & Venkatesh (2002) as “person-technology fit” in marketing research. Similarly, Klein & Sorra (1996) suggested innovation-values fit in innovation research.

variables in the present study. I will discuss influences from other theories whenever applicable.

TAM is largely based on the theory of reasoned action (Fishbein & Ajzen 1975) and innovation diffusion theory with a specific emphasis on explaining user acceptance of information systems (Moore & Benbasat 1991). TAM's strength is to serve as a general theory, which is applicable across different technologies, populations and research contexts (Davis et al. 1989).

Similarly to the theory of reasoned action[6], TAM posits that behavior, in this context information technology usage, is logically processed through an individual's beliefs, attitudes and intentions (Davis et al. 1989), which is illustrated in Figure 2.

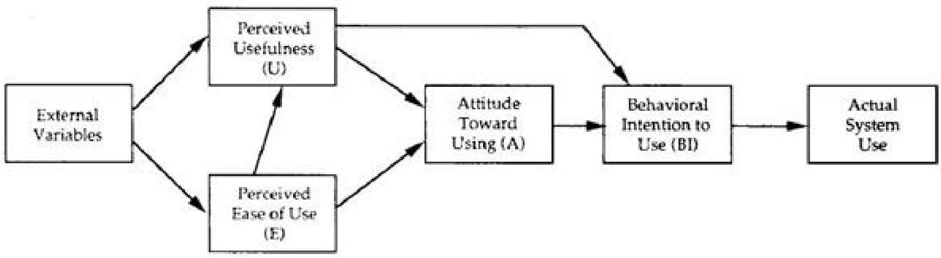

Figure 2 The Technology Acceptance Model (adopted from Davis, Bagozzi & Warshaw 1989)

Davis (1989), respectively, identified *two significant belief-based determinants, perceived ease of use and perceived usefulness*, which directly impact technology adoption. Perceived ease of use and perceived usefulness are very similar to the concepts "relative advantage" and "complexity" in innovation diffusion theory, which have empirically proved to be the two most important innovation characteristics in the context of information technology innovations (Moore & Benbasat 1991).[7] TAM also depicts that an individual's attitude towards and intention to use information technology mediate the relationship between user beliefs and technology use, which is consistent with reasoned action theory. Since the constructs "attitude towards" and "intention to use"

6 The theory of reasoned action (TRA), which is drawn from social psychology, is one of the most important general theories of human behavior. Adopted to IS acceptance, TAM findings have been consistent with TRA findings in other contexts of human behavior (Venkatesh et al. 2003, 428).

7 Moore & Benbasat (1991) adapted innovation characteristics from Rogers (1995), which are innovation characteristics affecting innovation adoption in the context of individual technology acceptance. Other innovation characteristics include compatibility, observability, trialability, voluntariness, and image. In SFA adoption literature, innovation characteristics have also been applied as "individual perceptions of technology" by Speier & Venkatesh (2002).

CRM/SFA technology will not be applied in this study, they will not be reviewed in extensive detail. However, the rationale behind their exclusion will be explained later in this chapter.

Perceived ease of use refers to “the degree to which a person believes that a using particular system would be free of effort (Davis 1989, 320)”. Davis (1989) elaborated further that, all else being equal, a system perceived as easy to use is more likely to be accepted by a person.

Davis (1989, 320) defined perceived usefulness, in turn, as “the degree to which a person believes that using a particular system would enhance his/her job performance”. Furthermore, it is important to emphasize that even if an objective assessment of innovation/system characteristics pointed towards improved performance, an individual is unlikely to use the application unless he/she perceived it to be useful (p. 335).

In addition, Davis (1989) posited that perceived ease of use impacts technology use both directly and indirectly through perceived usefulness, which is more strongly linked to use (p. 333). Users are primarily driven to use a system due the benefits achieved from using it while ease of use is of secondary importance (Davis 1989; Davis et al. 1989). More specifically, users are willing to cope with some required effort to achieve benefits; however, no amount of ease of use compensates for a system that is not useful to them. Hence, perceived ease of use is an antecedent rather than a parallel of perceived usefulness (Davis 1989, 333–334). This relationship has been substantiated by a plethora of empirical IS and marketing studies.

The original TAM has received strong empirical support across various technologies and populations (Igbaria, Zinatelli, Cragg & Cavaye 1997), suggesting that TAM is a highly generalizable theory (Venkatesh 2000, 343-344). Perceived ease of use and perceived usefulness have proven to be distinct dimensions with highly robust psychometric properties (Segars & Grover 1993), which allows for more fine-grained analysis on beliefs (Davis et al. 1989, 988). TAM has consistently explained 40% of the variance in technology use by individuals, which fares favorably in comparison to alternative theoretical models (Venkatesh & Davis 2000, 186).

3.1.3 Antecedents of CRM/SFA adoption

In addition to TAM’s roots in reasoned action theory and innovation characteristics, complementary extensions to TAM have been applied in SFA adoption studies, which attempt to further explain individual technology acceptance and use. It is widely accepted that *external factors* (see Figure 2), namely, (1) social, (2) individual and (3) organizational characteristics, affect technology adoption through an individual's beliefs (Avlonitis & Panagopoulos 2005, 357; Schillewaert et al. 2005, 325; Speier & Venkatesh 2002, 99). In addition, technical factors have been mentioned in IS literature as predictors of user beliefs (Davis 1989, 335; Davis et al. 1989, 983). These antecedents of CRM/ SFA acceptance are listed in Table 3.

Table 3 Antecedents of CRM/ SFA adoption

External factors	**Measures**	**Key outcomes**
Social norms	Supervisor support; Peer usage; Customer interest; Competitor utilization; Voluntariness; Image	Perceived ease of use; Perceived usefulness; Intention to use; Use
Individual characteristics	Age; Sex; Job experience; Computer experience; Computer self-efficacy; Personal innovativeness	
Organizational factors	Top management support; User training; User involvement; Accurate expectations; Technical user support	
Technical factors	System quality (functionality, interface, design)	

Social influence, which is also known as subjective norms (Jones et al. 2002) or social norms (Schillewaert et al. 2005), refers to the individual's normative belief structures (Jones et al. 2002, 146) regarding his/her perception what behavior other people think he/she should perform (Venkatesh & Davis 2000, 187). Social influence may stem from supervisor support, peer usage, customer interest and competitor utilization (Schillewaert et al. 2005).

In IS research, the extended TAM2 model (Venkatesh & Davis 2000) added antecedents of perceived usefulness to the original TAM model. These antecedents are social influence processes (subjective norm, voluntariness, image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, perceived ease of use), which are similar to perceptions of innovation characteristics. Venkatesh & Davis (2000) reported high levels of explained variance in perceived usefulness (40–60%) and in technology use (34–52%) by these factors across different phases from pre-implementation to post-implementation.

In the SFA context, Schillewaert et al. (2005), Avlonitis & Panagopoulos (2005) and Jones et al. (2002) tested for the impact of social influence on technology adoption. Avlonitis & Panagopoulos (2005) and Schillewaert et al. (2005) found supervisor support to be a significant predictor of SFA adoption.

In addition, Schillewaert et al. (2005) found a positive relationship between peer support and SFA adoption.

In summary, social factors have received support as predictors of user acceptance. However, *social factors are likely to influence user acceptance in the CRM implementation phase*. As pointed out by Jones et al. (2002, 151), prior to adoption of new SFA technology, a salesperson's peers, supervisors and customers also do not have experience with the technology and are thus less likely to have an impact on his/her CRM/SFA acceptance.

Cascio et al. (2010) and Schillewaert et al. (2005) argued that TAM and TAM2 are insufficient conceptualizations from the sales and marketing perspective: neither model includes facilitating conditions such as individual and organizational characteristics as determinants of CRM/SFA adoption. Parthasarathy & Sohi (1997) discussed these characteristics in their seminal article. Within IS research, Venkatesh (2000) had previously investigated *individual characteristics*, which were tested as the determinants of perceived ease of use. Venkatesh (2000) divided individual characteristics into anchors, which are general beliefs about computers and computer usage, and adjustments[8], which refer to beliefs shaped as a result of direct experience with the information system. Together they explained 60% of the variance in perceived ease of use. More specifically, anchors are individual characteristics such as computer self-efficacy, perceptions of external control, computer anxiety and computer playfulness (also referred to as innovativeness). These have been adopted by marketing scholars in SFA adoption research. Personal innovativeness, in particular, has received strong empirical support to have a positive relationship with SFA adoption in terms of SFA technology beliefs (Speier & Venkatesh 2002), CRM acceptance (Avlonitis & Panagopoulos 2005), SFA technology use (Schillewaert et al. 2005), and intention to use and infusion (Jones et al. 2002). Speier & Venkatesh (2002) also tested individual traits such as age and sex, which had a significant impact on SFA acceptance, consistent with findings in IS research. Other individual characteristics studied by marketing scholars have included job experience (Keillor et al. 1997), which had a negative impact on SFA technology acceptance, and computer experience (Avlonitis & Panagopoulos 2005; Cascio et al. 2010).

In summary, individual characteristics play an important role in CRM/SFA acceptance. In particular, general beliefs about technology, gender, age and job experience have received support in IS and marketing research (e.g.

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[8] Adjustments are individual perceptions such as perceived enjoyment and objective usability, which manifest themselves in the post-implementation phase in conjunction with actual usage experience with the information system (Venkatesh 2000). They have not been tested further in empirical SFA studies, possibly due to the fact that the majority of research has focused on initial SFA adoption.

Venkatesh 2000; Speier & Venkatesh 2002). Importantly, *these characteristics are embedded within individuals and cannot be managerially controlled* by other means than recruiting certain types of individuals.

Significant organizational change is required to promote SFA acceptance (Morgan & Inks 2001). *Organizational factors* or facilitators posit that certain types of management efforts may facilitate technology acceptance by users. Facilitating conditions refer to supporting organizational and technical infrastructures to the individual that influence his/her technology adoption (Jones et al. 2002, 146; Venkatesh et al. 2003, 453). Organizational facilitators include user training, management commitment, user participation, setting accurate expectations, and technical user support (Avlonitis & Panagopoulos 2005; Morgan & Inks 2001; Speier & Venkatesh 2002).

User training has been found to be an important organizational factor leading to CRM/SFA adoption (Buehrer et al. 2005; Cascio et al. 2010; Schillewaert et al. 2005), although Avlonitis & Panagopoulos (2005) reported an unexpected insignificant relationship. Management commitment, especially at the top management level (Cascio et al. 2010), has also been associated with SFA acceptance (Speier & Venkatesh 2002). Morgan & Inks (2001), however, found that management commitment was not a significant predictor of SFA acceptance.

User participation and accurate expectations, respectively, have received strong empirical support (Avlonitis & Panagopoulos 2005; Morgan & Inks 2001; Speier & Venkatesh 2002) as facilitating conditions of SFA acceptance. Furthermore, user participation increases the likelihood of task-technology fit (Goodhue & Thompson 1995, 230) and thus is expected to be associated with individual CRM/SFA adoption. Finally, technical user support has been described as less important facilitator than user training, for example, but failure to provide it is nevertheless regarded as an impediment to SFA adoption (Cascio et al. 2010; Schillewaert et al. 2005).

A few SFA studies have also examined the relationship between organizational characteristics and SFA adoption at the organizational level. Rivers & Dart (1999) took a firm level approach by assessing the effect of numerous organizational factors on SFA acquisition in terms monetary investment and technological sophistication. They found a positive relationship but added that SFA investments did not necessarily lead to SFA benefits, implying that SFA adoption was not achieved. In their exploratory study on completed SFA technology implementations in various industries, Erffmeyer & Johnson (2001) reported that organizational facilitators such as formal planning, goal setting, training and team effort were important factors behind firms' satisfaction with completed SFA initiatives. In another exploratory study, Pullig et al. (2002) identified specific organizational factors such as training, encouragement, facilitative leadership and organizational support to be necessary enabling conditions for SFA technology adoption. Training was found to be particularly important.

In summary, organizational factors have been extensively incorporated into models predicting SFA acceptance Empirical evidence has largely supported that particularly user training, user involvement, top management commitment and accurate expectations are important determinants of SFA acceptance. Unlike social and individual factors, *organizational facilitators are managerially controllable efforts* (Igbaria et al. 1997, 284), which *can be realized in the CRM system development phase* as well as in the CRM implementation phase. Therefore, organizational factors are especially relevant to the present study.

There is also a fourth external factor, *technical factors*, which have received limited attention in CRM/SFA adoption literature. In early IS research, a number of studies have addressed how perceived usefulness and perceived ease of use can be influenced by improving system design characteristics through (1) technical factors such as functionality, system interface and design of the system, and (2) organizational factors such as training and user involvement (Davis 1989, 335; Davis et al. 1989, 983). Technical factors could be defined as factors determining the "actual quality of the system (Lucas 1975, 913)". While organizational factors have been incorporated into models as external variables explaining SFA acceptance, technical factors have been ignored in marketing research.

For example, Avlonitis & Panagopoulos (2005) concentrated on a single CRM application in their empirical study to assess the effect of social, individual and organizational factors on perceived ease of use, perceived usefulness and CRM acceptance. By doing so, they (p. 359) "excluded the possibility that the study will be affected by different CRM characteristics (i.e. design characteristics, system quality)". Lucas (1975) also pointed out in his study that the actual quality of the system was not included as a variable due to a single-system design (p. 913). In a similar vein, Speier & Venkatesh (2002) investigated the impact of individual and organizational characteristics on technology acceptance in two firms. They stressed that both firms had implemented SFA technologies in an appropriate fashion - paying attention to important factors such as top management support and user training – which allowed them exclude the impact of system development problems (and resulting variance in innovation characteristics) on study findings.

Contrary to these articles, this study aims to explicitly examine the *effect of CRM system development and "actual" CRM system quality* (based on IT management perceptions) on CRM acceptance by target users. Since marketing research has not focused on issues related to the system development phase, this study will draw influences from IS success research, which will be reviewed later in this chapter.

The main implications from research on antecedents of CRM/ SFA adoption for this study can be summarized as follows:

- *identifies external factors (social norms; individual characteristics; organizational facilitators; technical factors) as predictors of individual CRM acceptance*
- *CRM research in marketing has ignored technical factors as predictors of CRM acceptance*
- *organizational facilitators and technical factors are managerially controllable efforts, which can be exercised during CRM system development*
- *organizational and technical factors are thus particularly relevant to this study*

3.1.4 CRM acceptance as the measure of CRM technology success

There is some ambiguity surrounding what the appropriate criterion of CRM/SFA success is when measured in terms of CRM/SFA adoption. Complicating matters further, longitudinal studies (Jones et al. 2002; Speier & Venkatesh 2002) have shown that different factors affect different performance measures, and may also vary across different points in time. Jones et al. (2002) found that different factors affect intention to use prior to actual usage (perceived usefulness, attitude, compatibility) and infusion *ex post* (innovativeness, attitude, organizational facilitators). Speier & Venkatesh (2002) found that salespeople had positive perceptions of SFA technology in the pre-implementation phase, but six months into post-implementation SFA acceptance and use had diminished.

Ultimately, the success variable(s) should be chosen based on empirical research context (Rai, Lang & Welker 2002, 54). Most studies still rely on CRM/SFA technology use, a behavior, as the appropriate measure of CRM/SFA adoption success. CRM/SFA acceptance, on the other hand, has been defined as a belief, attitude, intention or a combination of all, which determines CRM usage behavior. In this study, CRM acceptance, referring to perceived ease of use and perceived usefulness, was chosen as the performance measure. The following discussion elaborates on the rationale behind this decision.

Davis (1989) contended in his seminal work that beliefs are meaningful determinants of usage behavior in their own right. According to Avlonitis & Panagopoulos (2005), the direct link between perceived ease of use and CRM usage can be justified by innovation diffusion theory, which posits that an innovation, which is difficult to understand and use, would have an impact on its adoption. In addition, Avlonitis & Panagopoulos (2005) based the rationale concerning the direct link between perceived usefulness and CRM technology use on expectancy theory, which posits that people choose their behavior in accordance with expected benefits, i.e. improvements in their job performance (Avlonitis & Panagopoulos 2005, 357).

There is also strong anecdotal evidence that individuals' beliefs are the key constructs constituting CRM acceptance, and the most important determinants of CRM technology use. In recent marketing literature, perceived ease of use and perceived usefulness have been linked directly with CRM/SFA technology use, without the concepts attitude and intention to use (Avlonitis & Panagopoulos 2005; Buehrer et al. 2005; Rangarajan, Jones & Chin 2005; Schillewaert et al. 2005).

Empirical findings with respect to other components of CRM acceptance such as attitude or intention, have been less consistent. Davis et al. (1989) found that attitudes, defined as "positive or negative feelings about performing the target behavior (Venkatesh et al. 2003, 456)", only partially mediated the link between beliefs and usage behavior. They concluded that "one of the theoretical virtues of the attitude construct is that it purports to capture the influence of beliefs. Much of its value is foregone if it only partially mediates the impact of beliefs (p. 989)". Consequently, the most recent conceptualization of TAM excludes the attitude construct (Venkatesh et al. 2003, 428). In an SFA setting, attitude has also been found to become insignificant in the presence of perceived ease of use and perceived usefulness (Jones et al. 2002).

Intention to use, defined in the SFA context as "the likelihood that the salesperson will adopt the technology (Jones et al. 2002, 147)", has been found to be a problematic concept with respect to its predictive power on usage, since it is an inherently pre-implementation concept with different determinants in comparison with SFA technology use in the post-implementation phase (Jones et al. 2002). Avlonitis & Panagopoulos (2005), in turn, reported that perceived ease of use and perceived usefulness were the key predictors of "CRM acceptance" (operationalized similarly to CRM usage). In their study, user satisfaction[9] was not a significant predictor while intention to use was not even included in the model. Schillewaert et al. (2005) also examined the direct link between perceived ease of use and perceived usefulness and SFA technology use and found a strong positive direct relationship.

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[9] User satisfaction is a parallel construct with technology use in DeLone & MacLean's (1992; 2003) general model of IS success.

Based on these considerations, I argue that perceived ease of use and perceived usefulness are the appropriate dependent variables within the non-behavioral dimension of TAM. However, the choice of perceived ease of use and perceived usefulness as the appropriate representation of CRM acceptance must also be justified with respect to the exclusion of use, the behavioral dimension of TAM.

Seddon (1997) argued that by changing Davis' (1989) future-oriented operationalization, based on expectations, to past tense regarding the perceived ease of use and perceived usefulness, these constructs in fact sufficiently capture individuals' technology acceptance in the implementation phase, i.e. ex post perceptions after actually using the technology. In this view, perceived usefulness relates to beliefs that are based on perceptions of "net benefits", i.e. the benefits of usage minus the effort of using the application (Seddon 1997, 246), gained from past use of the system (Rai et al. 2002, 53). These net benefits include perceived usefulness based on past experience, and user satisfaction with the information system. Rai et al. (2002) found empirical support, in a general IS context, for Seddon's (1997) experience-oriented perceived usefulness measure. They also argued that perceived usefulness based on past experience is applicable to both mandatory and voluntary usage contexts (Rai et al. 2002), whereas usage is only appropriate in a voluntary user environment (Goodhue & Thompson 1995; Guimaraes, Igbaria & Lu 1992).

Seddon's (1997) construct is also consistent with the argument raised by Moore & Benbasat (1991) about the diffusion of information technology innovations. They contend that the perceptions of using the innovation is the key to innovation diffusion, which refers to continuous use to the fullest extent of an innovation's potential, embedded in an individual's daily routines (p. 196). One could argue that innovation diffusion, or infusion[10] (Jones et al. 2002), predicts individual performance better than CRM/SFA usage[11], which may be occasional random behavior instead of true long-term behavior. As Davis (1989, 320) argued, high perceived usefulness reflects an individual's belief that a positive use-performance relationship exists, which is the main driver behind usage behavior. If this belief has prevailed after actual CRM/SFA use, it can be argued to represent a more robust state of CRM acceptance than Davis's (1989) original future-oriented measure of perceived usefulness or

[10] Infusion does not measure casual use but rather the extent to which SFA technology becomes a part of the individual's daily routines (Jones et al. 2002, 150). There is another similar concept to infusion, namely, dependence on the system (Goodhue & Thompson 1995) which refers to "the extent to which the information system has been integrated into the user's work routines (p. 223)"

[11] It is debated by academics whether IS technology use should be measured in terms of actual usage, extent of use, frequency of use, or infusion.

actual technology usage, which may be occasional random use. Rai et al. (2002) suggested that past-oriented perceived usefulness should be considered an individual impact measure since actual use must precede it (p. 55).

In support of this notion, Avlonitis & Panagopoulos (2005) found that only perceived usefulness and perceived ease of use significantly influenced salesperson performance in the CRM context. CRM usage, on the contrary, was not associated with salesperson performance. They reached the conclusion that beliefs regarding easy-to-use and useful CRM systems are the most important factors in a salesperson’s decision to use CRM technology to its full potential (infusion) in daily activities, which is most likely to lead to improved salesperson performance. In other words, salespeople are internal customers of CRM systems, whose needs and beliefs, above all, must be taken into account and enhanced to achieve performance improvements.

Based on these considerations, it seems plausible not to include attitude, intention to use, user satisfaction, and usage behavior as CRM technology acceptance measures in the assessment of CRM system development success. Measuring perceived ease of use and perceived usefulness based on past experiences sufficiently capture CRM acceptance among users in sales, marketing and customer service. Therefore, perceived ease of use and perceived usefulness are jointly referred to as CRM acceptance in this study.

The main implications from the discussion on CRM acceptance as the key outcome for this study can be summarized as follows:

- *CRM acceptance can be defined as a belief, attitude, intention, or behavior*
- *theoretical rationale and empirical evidence supported defining CRM acceptance as an experience-based belief, which is formed by perceived ease of use and perceived usefulness.*

3.1.5 Consequences of CRM/SFA technology use

Although the primary approach in this work is to concentrate on CRM acceptance as the key outcome of CRM system development, it is important to include a brief review of literature on the CRM technology use-performance link to position CRM acceptance and use as determinants of overall CRM success in terms of individual and firm performance.

The majority of SFA adoption research has focused on factors that encourage SFA technology acceptance and use. However, the significance of the relationship between SFA technology use and individual performance is obvious: technology acceptance and use is only important if it leads to performance improvements (Ahearne, Jelinek & Rapp 2005, 380). The empirical evidence on the direct link between SFA usage and individual performance is scarce and inconclusive. Only two marketing studies (Avlonitis & Panagopoulos 2005; Speier & Venkatesh 2002) have addressed both antecedents and consequences of CRM/SFA technology adoption at the individual level, and another two articles at the organizational level (Rivers & Dart 1999; Pullig et al. 2002).

Avlonitis & Panagopoulos (2005) found an insignificant direct relationship between CRM technology use and salesperson performance. Speier & Venkatesh (2002) tested person-technology fit, which is based on task-technology fit theory (Goodhue & Thompson (1995)[12], as a mediator between external factors and performance outcomes, namely, SFA usage and salesperson performance, finding partial support.

At the organizational level, Pullig et al. (2002) reported in their exploratory study that organizational factors and customer-oriented organizational values predicted effective SFA implementation, defined as organization-wide continuing SFA usage, which in turn was positively associated with better firm productivity. Rivers & Dart (1999) used numerous organizational factors as antecedents to determine the firm’s propensity to invest in SFA technology, and achieve SFA performance in terms of salesperson efficiency and investment payback period. Organizational factors had an insignificant relationship with SFA performance.

Ahearne et al. (2005) also examined the moderating role of organizational facilitating conditions (user support and user training) on the relationship between SFA usage and objective salesperson performance measures. They found that SFA usage affects salesperson performance only when adequate user training and support is provided. It seems that organizational factors are considered important not only as antecedents of SFA use, but also as predictors of individual performance after SFA use. Indeed, organizational facilitators are employed by firms in the development and implementation phases of CRM initiatives.

Other empirical studies have concentrated on identifying mediating variables affecting the relationship between technology use and individual performance. In a South Korean study, Park et al. (2010) investigated the mediating effects of adaptive selling (Weitz, Sujan & Sujan 1986) and learning behaviors on the link between SFA usage and two individual performance measures, relationship quality and salesperson performance. SFA usage was only associated with individual performance when mediated by

[12] In the IS context, Goodhue & Thompson (1995) found moderate support that task-technology fit (i.e. technology meets requirements to complete user-specific tasks) and IS use jointly predicted individual performance better than IS use alone.

adaptive selling and learning. In a pharmaceutical sales setting, Ahearne, Jones, Rapp & Mathieu (2008) adopted task-technology fit theory to test the mediating effects of salesperson behaviors (customer service and attention to personal details) and salesperson characteristics (knowledge and adaptability) on the relationship between CRM/ SFA use and salesperson performance. CRM/ SFA use had positive impact on salesperson performance through customer service and adaptability. In a US-based study in a single company, Robinson, Marshall & Stamps (2005) also reported that SFA acceptance affected job performance through a mediating effect of adaptive selling. Adaptive selling, i.e. the salesperson's ability to match customer characteristics with the appropriate sales strategies (Robinson et al. 2005, 407), is thus an important determinant of individual performance.

Drawing from relationship marketing theory, Hunter & Perreault (2007) categorized SFA technology use into accessing, analyzing and communicating information. They found support that using SFA technology to analyze or communicate information, mediated by relationship-forging tasks, is positively associated with relationship-building performance. Hunter & Perreault's (2007) article is significant because it uses a salesperson level of analysis to investigate the SFA use-individual performance link while incorporating relational processes and outcomes. Similarly, adaptive selling is also a selling behavior which has a relationship-building dimension.

These studies imply that the relationship between SFA/CRM use and individual performance is likely to be indirect. Overall, this relationship remains unsubstantiated (Ahearne et al. 2008, 671). The complex relationship between technology and performance was already acknowledged in early IS research (e.g. Lucas 1975). The complementarity of CRM/SFA technology with relational processes is well-documented in CRM-performance literature, which is discussed next.

The main implications from research on individual performance consequences of CRM/ SFA adoption for this study can be summarized as follows:

- *consequences of CRM acceptance are not investigated in this study; however, it is important to position CRM acceptance and use in terms of its impact on individual performance*
- *CRM use – individual performance link remains inconclusive and is likely to be indirect*

3.1.6 CRM-performance literature

Marketing scholars investigating the CRM-firm performance link have mainly drawn influences from relationship marketing and market/customer orientation. In a limited number of empirical studies, CRM technology use has been employed as an independent variable to explain firm performance. It could be argued that there is a general consensus that the relationship between CRM technology use and firm performance is indirect - CRM technology is regarded as an enabler of value-creating customer-oriented organizational processes.

In empirical studies, CRM technology use measures have included CRM technology use across functions (Jayachandran et al. 2005); use of different CRM-related legacy and modern applications (Mithas et al. 2005); use across CRM processes (Reinartz et al. 2004), use for CRM interaction support and customer prioritization (Zablah et al. 2012); extent of technological implementation in terms of information acquisition, storage, accessibility, and evaluation (Becker et al. 2009); and use dimensions in terms of accessing, analyzing and communicating information (Hunter & Perreault 2007). With the exception of Hunter & Perreault (2007), empirical studies have gathered technology use data at the aggregate SBU or firm level from key informants. Similarly with the SFA literature concentrating on individual performance consequences, findings linking CRM technology use (at aggregate level) and organizational performance have been mixed: positive, insignificant, and even negative impacts have been reported.

Mithas et al. (2005) found that CRM application use, mediated by customer knowledge, was positively associated with customer satisfaction. Srinisavan & Moorman (2005) reported that firm CRM system investments, coupled with firm CRM capability, positively influenced customer satisfaction. Becker et al. (2009)'s study partially supported a positive association between technological implementation and CRM process performance. Zablah et al. (2012) found that CRM use had a positive impact on firm performance when mediated by customer-perceived relationship investment.

On the other hand, Jayachandran et al. (2005) found that CRM use had an insignificant moderating effect on the relationship between customer relationship orientation, customer-centric management system (predictors), and customer relationship performance. Yim, Anderson & Swaminathan (2004), in turn, reported that incorporating CRM technology had an insignificant impact on customer satisfaction, customer retention, and sales growth. Finally, Reinartz et al. (2004) studied the positive effect of CRM processes on firm performance, which was supported. However, CRM technology use negatively moderated that relationship.

In addition, a few recent empirical studies have applied the resource-based perspective to investigate the effect of CRM technology on firm performance. Rapp, Trainor & Agnihotri (2010) adopted CRM technology capability and customer orientation as independent variables, finding support that they predicted customer-linking capabilities, customer relationship performance, and firm performance. In a cross-industry study in South Korea, Chang, Park & Chaiy (2010) found that CRM technology use, a customer-centric management system and organizational culture - mediated by marketing capabilities - were positively associated with market effectiveness and profitability. Coltman (2007) also found empirical support that CRM capability, mediated by market orientation, positively influenced firm performance.

In summary, conceptual work and empirical evidence in CRM-performance literature clearly suggest that relational processes are the main drivers of customer relationship performance and overall firm performance. However, firms who are able to appropriately implement CRM technology, which is accepted and used by the target user community, and is complementary to the firm’s customer relationship management processes, are in a better position to acquire, maintain and retain valuable customer relationships.

The main implications from CRM-performance research for this study can be summarized as follows:

- *consequences of CRM acceptance are not investigated in this study; however, it is important to position CRM acceptance and use in terms of its impact on firm performance*
- *CRM use - firm performance link remains inconclusive and is likely to be indirect; CRM technology plays a supporting role for relational CRM processes*

3.1.7 Summary of marketing research on CRM technology success

Sales management theories in marketing research explain CRM/SFA adoption as a function of external factors, namely, social, organizational and individual characteristics. However, social influences and individual characteristics (apart from anchors) primarily affect CRM acceptance in the implementation phase after system development has already been completed. On the other hand, organizational characteristics have an impact on CRM acceptance during both CRM system development as well as CRM implementation. Furthermore, organizational factors can be controlled through managerial efforts. Within IS research, it has also been suggested that technical factors are expected to have an impact on technology acceptance. Similar to organizational factors, technical factors are also realized and managerially controlled in the CRM development stage.

In summary of the marketing literature review, external factors influencing CRM acceptance can be categorized (Table 4) based on whether they are *managerially controllable*; and whether they are expected to affect CRM acceptance primarily prior to system rollout and actual CRM use by the target user community (CRM system development) or after users have gained access and used the CRM application (CRM implementation).

Table 4 Categorization of external factors affecting CRM acceptance

Managerial control / Phase	Development	Implementation
High	Technical; Organizational	Organizational
Low	Individual; Social	Individual; Social

Technical factors, or system design characteristics, such as functionality, system interface and design, are primarily developed in the CRM system development stage. In case of problematic CRM adoption by individuals, technical factors can be modified to a limited degree in the implementation phase. However, the primary effect of technical factors on CRM acceptance is created during the system development project.

Organizational factors such as user training, user involvement, and management commitment, are managerially controllable efforts that should support the CRM initiative throughout its entire lifecycle, from initiation, development, initial implementation to long-term implementation (diffusion).

Individual traits such as sex, age and job experience are fixed variables beyond managerial control. Similarly, individuals' general beliefs about computers and information systems exist prior to gaining access to information technology and are thus not under managerial control. Venkatesh (2000) reported that these embedded belief structures far outweigh adjustments, which are formed based on actual experience with the application. In this view, academics have instructed practitioners take these individual characteristics into account in their recruitment processes (e.g. Avlonitis & Panagopoulos 2005). However, it is unlikely that firms would recruit individuals solely based on favorable individual traits and beliefs toward CRM systems.

Social influences from supervisors, peers and customers affecting individual CRM acceptance are more important in the implementation phase than in the system development phase, since these stakeholders lack experience with the CRM system prior to system rollout (Jones et al. 2002). Furthermore, perhaps with the exception of supervisor support, firms possess limited managerial control over social norms and how peers, customers and competitors may influence an individual's CRM acceptance.

For obvious reasons, IS research has focused on CRM development issues while marketing research has concentrated on the CRM implementation phase. However, CRM success is dependent upon the successful execution of both and should, arguably, be assessed holistically. For example, poor performance in system development and the resulting inferior CRM application are likely to have a negative impact on CRM implementation. In this view, it is important to incorporate CRM system development more comprehensively into the marketing research arena.

There is another possible explanation for a lack of research regarding the role of CRM system development in CRM success in marketing literature. According to Zablah et al. (2004a) and Coltman (2007), some marketing studies have suggested that the failures of CRM initiatives can be explained by the ill-advised overemphasis on CRM as an IT solution. This statement is true - installing a superior CRM application into the organization alone does not automatically lead to CRM acceptance and firm performance. Organizational change efforts must also take place, preferably during the CRM system development phase. Therefore, it is important to include managerial efforts related to organizational factors into the CRM system development projects, and into theoretical research models evaluating CRM acceptance. Becker et al. (2009), for example, suggested that technological implementation and organizational implementation must both occur to achieve CRM success in the implementation phase.

This study focuses on CRM system development and its impact on CRM acceptance. Thus, technical and organizational factors associated with CRM system development are particularly relevant to the present study. Most importantly, due to high investments and high failure rates in CRM initiatives, the impact of external factors should be anticipated at earlier stages to avoid costly problems in the future (Speier & Venkatesh 2002, 109). In the IS context, Venkatesh et al. (2003) criticized existing models predicting technology acceptance as “notably weak in providing prescriptive guidance to designers (p. 470)”. They concluded that more research is needed addressing the earlier phases of IT initiatives, implying that CRM system development is of great significance to the overall CRM implementation.

In addition, while SFA acceptance represents the most important dimension in most CRM systems, no literature exists on CRM adoption including not only sales but also marketing and customer service. This study aims to provide a general integrated framework of CRM system development and its impact on CRM acceptance by individuals.

In the context of CRM implementation, the consequences of CRM/SFA use on individual and firm performance were also reviewed. It was evident that CRM system development and CRM technology use have a supporting, enabling role in the CRM implementation process. It can be argued that relational organizational processes and capabilities, such as customer-centric orientation and culture, form the core elements of CRM success. However, the benefits of CRM technologies in knowledge management and interaction management processes are substantial, making CRM technology a valuable research subject from a marketing perspective.

In any case, CRM/SFA acceptance or use is often adopted in marketing studies assessing CRM success, either as predictor or outcome variable. Converging ideas with regard to CRM technology from IT and marketing perspectives may be best diffused through a shared concept such CRM acceptance, which has been previously adopted in both disciplines.

3.2 Review of relevant IS success research

Marketing research has studied the antecedents and consequences of CRM technology acceptance and use from the perceptual end-user perspective. IS research, on the other hand, makes a contribution to the present by addressing issues related to CRM system development and CRM success from an IT management perspective. As IS research discusses information systems (IS) in general, I will refer to IS instead of CRM. Unless stated otherwise, it is assumed that general IS concepts are also applicable to the CRM system development context.

This sub-chapter is organized as follows. First, I will provide an overview of IS success research from an IT management perspective. I will provide justifications why an IT management perspective is relevant to this study as well as generally relevant to CRM research in marketing.

Second, I will review three theoretical approaches to IS development and IS success, which *offer alternative conceptualizations of IS development, which comprise of factors predicting IS development success*. These theories, which include risk and project management theory, IT innovation research, and the resource-based IT capability paradigm, are applicable to the CRM system development context. Since CRM system development is considered a project-level phenomenon in this study, the emphasis of the literature review will be placed on project-level conceptualizations of IS success.

Lastly, I will summarize the discussion related to IS theories and marketing theories, and provide the justification for adopting a parsimonious, resource-based conceptualization of CRM system development in this study.

3.2.1 Overview and relevance to the present study

IS research is a vast and diverse research area, which has drawn from theories developed in disciplines such as economics, computer science, psychology, and general management (Wade & Hulland 2004, 107). IS research has examined IS success from different levels of analysis and different key outcomes, creating a degree of ambiguity regarding the evaluation of information systems (Rai et al. 2002, 50). DeLone & MacLean (1992) synthesized the fragmented field into a general model of IS success variables, which posited system quality and information quality (service quality[13] (Pitt, Watson & Kavan 1995) was added by DeLone & MacLean (2003) as determinants of information technology use (updated to include "intention to use" by DeLone and MacLean 2003) and user satisfaction which, in turn, are theorized to affect individual and firm performance. Thus, the model can be divided into three sequences: creation of a system, acceptance and use of a system, and consequences of system use (DeLone & MacLean 2003, 16). Correspondingly, marketing literature has focused on technology acceptance/use, its antecedents and consequences on individual and firm performance in the CRM/SFA context.

According to DeLone & MacLean (2003), other success measures cannot be fully understood without system and information quality measurements[14] (p. 25). System and information quality are attributes of IT applications, i.e. information systems (Seddon 1997, 244). *System quality* refers to the desired characteristics of the information system itself, or technical success, that produces the output of the information system, namely, information. *Information quality*, in turn, refers to the desired characteristics of the "information product (Bailey & Pearson 1983)", or semantic success (DeLone & MacLean 1992, 62; DeLone & MacLean 2003, 10).

Among other outcome measures of IS success, DeLone & MacLean (1992) conducted a comprehensive review of system and information quality, and presented a list of measures in terms of the desired characteristics of system and information quality. Depending upon empirical study, the empirical performance measures applied to assess system quality include convenience of access, flexibility of system, integration with other systems, response time, data accuracy, reliability, ease of use, ease of learning, realization of user

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[13] The concept of service quality (Parasuraman, Zeithaml & Berry 1985) and its measurement (SERVQUAL; Parasuraman, Zeithaml & Berry 1988) has been adopted from the services marketing paradigm.

[14] Based on a synthesis of existing operational measures, Chang & King (2005) developed extensive operational measures of "systems performance", "information effectiveness", and "service performance".

expectations, and usefulness (DeLone & MacLean 1992, 65; DeLone & MacLean 2003, 13). System quality is typically assessed with user-based perceptual measures (Rai et al. 2002). In their empirical study on end-user computing satisfaction, Doll & Torkzadeh (1988) measured system quality as ease of use (Rai et al. 2002, 56).

The desired characteristics of information quality have been measured in terms of information accuracy, reliability, relevance, recentness, precision, comprehensiveness, meaningfulness, timeliness, understandability, and perceived usefulness (DeLone & MacLean 1992, 67). Information quality has been usually measured from the end-user perspective, and has argued to be closely linked to perceived usefulness. For example, Bailey & Pearson's (1983) information product concept relates to the system's role as a producer of outputs that meet the users' information requirements, i.e. perceived usefulness. In a similar vein, Doll & Torkzadeh (1988) argue that the information product is the priority for users, supported secondarily by the system's ease of use (p. 261). Rai et al. (2002) argued that perceived usefulness reflects the degree to which information output is essential for the user's job performance (p. 62).

Based on this discussion, *perceived ease of use and perceived usefulness in TAM may be interpreted as perceptions of the most important aspects of system and information quality*. Indeed, system quality and information quality are, ceteris paribus, necessary and sufficient antecedents net benefits, i.e. perceived usefulness based on the past and user satisfaction (Rai et al. 2002, 53). However, although perceived ease of use and perceived usefulness are robust constructs capturing the most important perceptual aspects of system and information quality, they provide *little information regarding which factors, and by which mechanisms, contribute to achieving system/information quality, or to what extent actual system/information quality affects user perceptions of it.*

Venkatesh et al. (2003), for example, criticized existing models predicting technology acceptance as "notably weak in providing prescriptive guidance to designers (p. 470)". They concluded that more research is needed to gain a better understanding of the antecedents before IS implementation begins. In this view, it is important to assess the role of technical and organizational factors associated with the system development phase in explaining CRM acceptance. In the words of Speier & Venkatesh (2002, p. 109), "there is a broader set of factors beyond the constructs typically studied in acceptance of technology", whose impact should be anticipated at earlier stages to avoid future problems and failures in CRM initiatives.

Marketing research provided various external factors as antecedents of perceived ease of use and perceived usefulness, which primarily impact CRM technology success in the implementation phase. Some managerially controllable technical and organizational factors, however, are applied during the CRM system development project prior to the realization of end-user perceptions of the CRM system. Bush et al. (2005, 371) pointed out that SFA adoption studies, which have examined organizational antecedents to SFA acceptance did so from a salesperson or sales manager perspective. Yet most key decisions and activities regarding CRM system procurement and development are made by *the IT department* (Hunter & Perreault 2007, 31).

Furthermore, different stakeholders – top management, managers and users, IT department and line management, and so on – have different objectives and performance perceptions despite being involved in the same CRM technology initiative (Gemino, Reich & Sauer 2008). Swanson (1994) argued that the success of an information system depends on both IT and user departments and the partnership between them (p. 1072).

Based on these considerations, it is an interesting research area to incorporate an *IT management perspective on system quality and system development* into research models in marketing. I argue that CRM system development capability affects user-based perceptions of CRM technology such as technology acceptance (Davis 1989), innovation characteristics (Moore & Benbasat 1991), individual perceptions of technology (Speier & Venkatesh 2002) or system design characteristics (Davis et al. 1989), whichever concept one wishes to use.

As Davis (1989) pointed out, an objectively superior information technology application does not necessarily imply that all target users perceive it as such. However, it is reasonable to expect that an objectively superior CRM application has an impact on most end-users' perceptions of that system. Furthermore, there is a need to understand *how superior CRM system quality and, consequently, enhanced CRM user acceptance can be achieved*.

As with any complex information system, CRM implementation into an organization is includes the CRM system development project. Delivering expected system quality remains a critical challenge in IS projects (Gemino et al. 2008). IS projects are complex, multidimensional phenomena, which require the interaction of various factors before the desired outcome, a superior IT application, is completed. I will now discuss three theoretical approaches within IS research, which provide alternative conceptualizations of CRM system development and factors predicting different CRM technology success measures. These research streams include risk and project management theory, IT innovation theory, and the IT capability paradigm.

3.2.2 Risk and project management theory

SFA adoption research focuses on the relationships between external factors and CRM/SFA success in terms of CRM/SFA acceptance and use. Risk and project management literature, on the other hand, views IS project risks and risk management efforts as the primary causes of IS project success in terms of project performance (see Table 5). Similarly to SFA adoption literature, this stream of research emerged as a response to high failure rates in IS projects, plagued by cost and/or budget overruns as well as unmet user needs (Barki, Rivard & Talbot 1993, 204; Zmud 1980, 45). To tackle these phenomena, the unit of analysis in risk and project management studies is typically the project level.

Table 5 IS project risks affecting IS success

IS project risks	Measures	Key outcomes
Organizational risks	Top management commitment; User involvement/ participation	Process performance; Product performance
Technological knowledge risks	Degree of novelty of technology; Technological newness	
Project management risks	Lack of experience with technology; Lack of expertise; Planning & control; Expertise coordination	
Structural risks	Project size; Technological/ application complexity; Requirements uncertainty	

IS project risks are defined as conditions that may pose a threat to the successful completion of an IS project (Wallace, Keil & Rai 2004, 291). Research in this arena has focused on identifying various project risks and applying project management practices to control those risks (e.g. Barki et al. 1993; Barki, Rivard & Talbot 2001; McFarlan 1981), and assessing the relationship between project risks, risk management and project success (e.g. Gemino et al. 2008; Nidumolu 1995; Wallace et al. 2004). Next, I will review how risk and project management research conceptualizes IS implementation projects, and how project success is evaluated.

Risks have been conceptualized as a single construct, representing overall project risk, as well as separate risk factors (Gemino et al. 2008). In recent studies, the latter approach has been applied since IS project risk has been understood to be a multidimensional phenomenon (Wallace et al. 2004).

However, there is no clear agreement on the dimensionality of the risk concept. As a result, previous research has provided different listings of IS project risks. For example, Barki et al. (1993) reviewed IS literature and presented 35 different risk variables associated with IS projects, which they categorized into five distinct risk factors. Based on a review of risk and project management literature, I have categorized IS project risks into three general dimensions: organizational risks, knowledge (technological and project management) risks, and structural risks.

Organizational risks, which has also been called organizational environment risk (Barki et al. 1993; Wallace et al. 2004), organizational factors (Barki et al. 2001), and organizational support risk (Gemino et al. 2008), refer to uncertainty or risk surrounding the organizational environment where the IS project takes place (Wallace et al. 2004). Organizational risks such as lack of top management commitment, user support, and user involvement (Zmud 1980), have been shown to impact IS project performance in empirical studies. (Barki et al. 2001; Gemino et al. 2008; Wallace et al. 2004)

Knowledge risks refer to the lack of knowledge resources among people participating in the IS project, such as the project management and project team members. Knowledge risks have long been recognized as significant determinants of IS performance outcomes (Barki et al. 2001; McFarlan 1981). Knowledge risks can be divided into two specific groups in terms of what type of knowledge is lacking. First, there may be a *lack of technological knowledge* possessed by project team members due to the degree of novelty of technology (Zmud 1980), technological newness (Barki et al. 1993; 2001), or lack of experience with the technology (McFarlan 1981). In CRM system development projects, technological knowledge tends to be highly specialized and outside consultants are brought into project teams to meet technological knowledge requirements. Second, lack of managerial expertise among project management which encompasses, for example, project planning, formal and informal control and communication, team building, and staffing and expertise coordination, has been cited as an important risk for IS project success in conceptual (McFarlan 1981; Zmud 1980) and empirical (Nidumolu 1995; Wallace et al. 2004) studies. These project management risks are often dependent upon the competence of the project manager responsible for the IS project. Zmud (1980) argued that management deficiencies are the main reason why IS projects fail to meet expectations.

Structural risks have also been widely acknowledged for their impact on IS project performance (McFarlan 1981; Zmud 1980). Structural risks refer to the unique characteristics of each IS project in terms of their complexity and volatility. An IS project involves the development of an IT application, which needs to be integrated into an organization with some degree of complexity described by a set of requirements (Wallace et al. 2004, 295). Project-specific structural risks include the technological complexity of the application being developed (Gemino et al. 2008; Ramachandran & Gopal 2010); Zmud 1980), project size (McFarlan 1981; Wallace et al. 2004), and uncertainty of user requirements (Barki et al. 1993; Nidumolu 1995; Ramachandran & Gopal 2010). Gemino et al. (2008) also suggested volatility risk, which refers to changes in project team personnel and project targets.

McFarlan (1981) listed the unwanted consequences of risk exposures in the context of IS projects, which included failure to obtain anticipated benefits, unexpectedly high costs and duration of implementation, unsatisfactory technical performance, and incompatibility of the system with chosen hardware and software solutions (p. 143). In order to assess these consequences, two well-established measures of IS success have been developed in risk management theory, namely, *process performance and product performance* (Nidumolu 1995). Together they constitute the concept of project performance (Barki et al. 2001). Process performance refers to how well the IS project is carried out in terms of estimated budget and schedule. Product performance, in turn, refers to the quality of the developed system in terms of both the system quality itself (Barki et al. 2001; Nidumolu 1995). Thus, product performance is by definition closely related to the concept of system quality in IS research. Since process performance and product performance are not necessarily always complementary, it is necessary to measure these two IS project success constructs separately. For example, developing a high quality system may require time and/or cost estimates to be overrun (Gemino et al. 2008, 17). On the other hand, efficiently completed IS projects below time and cost estimates may deliver poor system quality (Nidumolu 1995, 194).

In summary, risk and project management theories attempt to explain and predict IS success at the project level with project performance as the key outcome. The IS implementation project is conceptualized as a collection of project-specific risks and project management practices, which determine project performance in terms of process and product performance.

There is one primary characteristic that sets risk and project management apart from other theoretical approaches. IS implementation is modeled "negatively" as risk factors. For example, project and risk management literature would discuss top management commitment or user involvement as "lack of top management commitment" or "lack of user involvement" (Gemino et al. 2008, 35). Gemino et al. (2008) called for a "positive" approach by re-conceptualizing knowledge risks and organizational risks in their model into knowledge resources, organizational resources, and project management practices. Only structural risks, which are conditions rather than constructs related to human behavior, were modeled as risk factors in their study.

There are clear similarities between organizational risks in IS project success studies, and organizational factors in SFA adoption research in marketing. Risk and project management studies contribute to marketing research by identifying additional factors affecting CRM system quality in the pre-implementation phase, such as knowledge risks and structural risks. While risk and project management theories stop short of measuring IS project success in terms of technology acceptance and perceptual measures from the user perspective, they do measure system quality through the robust product performance measure, which can thus be claimed to be an antecedent of technology acceptance.

The main contributions from risk and project management theory to this study can be summarized as follows:

- *conceptualizes IT project risks as antecedents of IS success*
- *offers a well-established project-level key outcome in project performance (process and product performance)*
- *product performance is a similar measure to system quality, which is an antecedent of user acceptance.*

3.2.3 IT innovation research

As the review of marketing literature revealed, innovation diffusion theory (Rogers 1995), and its application to IT innovation characteristics and user acceptance (Moore & Benbasat 1991), have significantly influenced the Technology Acceptance Model (TAM) and thus CRM/SFA adoption research in marketing. Within IS research, IT innovation research (Fichman 2004a; Swanson 1994) is associated with the organizational, IT management perspective and the work of the IT department, which is primarily responsible for delivering IS success prior to user experiences (Swanson 1994, 1072).

IT implementation research and technological diffusion theory (Cooper & Zmud 1990) are related and partially overlapping concepts with IT innovation research[15], which examine IT implementation phenomena more broadly across different stages of its lifecycle. Depending on research objective, IT innovation studies investigate these issues at firm, project or individual level. While the review of marketing literature addressed the CRM implementation phase, I will primarily focus on IT innovation research related to the IS development phase.

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[15] From this point forward, I will refer to these streams of research jointly as IT innovation research, which is the general term often used by scholars in this field (e.g. Fichman 2001).

IT innovation research is a vast research tradition, which attempts to identify what factors, and how, affect the IT innovation outcomes such as perceptual user measures, quantity of innovation, quality of innovation, and organizational performance impacts (Fichman 2004a). According to Cooper & Zmud (1990), IT innovation research can be categorized into factors research, process research and political research[16]. As this study concentrates on factors that are associated with performance outcomes, factors research will be now be discussed in further detail.

Factors research addresses "individual, organizational and technological forces which are important to IT implementation effectiveness (Cooper & Zmud 1990, 123)", or "understanding the role of one or more theoretical factors in determining innovation (Fichman 2001, 431)". Based on their review of IT innovation, IT implementation, and technological diffusion studies, Cooper & Zmud (1990) reported that factors research has identified five major *contextual factors*, which impact the *processes* and *products* (see next paragraph below) of IT implementation at its various stages. These contextual factors include (1) user characteristics (experience, education); (2) technological characteristics (technological complexity); (3) task characteristics to which the technology is being applied (task uncertainty, task autonomy, task responsibility, and task variety); (4) organizational environment characteristics (uncertainty, inter-organizational dependence); and (5) organizational characteristics (specialization, centralization, formalization) (Cooper & Zmud 1990, 125).

The importance of different contextual factors affecting IT implementation vary depending upon which implementation phase is being investigated (Fichman 2001, 432). The six stages is IT implementation (see Table 2) include initiation, adoption, adaptation, acceptance, routinization and infusion (Cooper & Zmud 1990). From the perspective of the present work, the adaptation stage is one of particular interest. Adaptation refers to (1) the process, during which the IT application is developed and completed; and to (2) the product, which is a direct result of that process, namely, the IT application available for use in the organization (Cooper & Zmud 1990, 124). In other words, adaptation refers to the IT development project, its completion and success in terms of system quality. The relevant contextual factors related to IT development projects are presented in Table 6, which are discussed next.

[16] Process research investigates the dynamics of social change activities and their impact on IT implementation success. Political research, in turn, examines the effect of different IT stakeholders' interests, and their management, on IT implementation success (Cooper & Zmud 1990, 124).

Table 6 Contextual factors affecting IT project success

Contextual factors	Measures	Key outcomes
Innovation delivery system/ Innovation configuration	Top management support; Technology champion; Training; Access to consulting services	Individual adoption; Organizational adoption; Firm performance

In the IS project context, Karimi, Somers & Bhattacherjee (2007a) argued that organizational factors and technological factors are considered to be the most important contextual factors, and they can be more easily managed and controlled by the organization (p. 102). Leonard-Barton (1988) argued that most IT innovation research related to IT implementation focuses on what can be done to the IT innovation to adjust it to the organizational context, or how the organizational context can be modified to accommodate the IT innovation. She introduced the concept of "*delivery system*" for technology innovations through which both technical as well as organizational change related to IT implementation, transferred from system developers to users, can be managed and controlled by management. The innovation delivery system acts as the mechanism in IT implementation through which the inevitable misalignment between technology (innovation characteristics) and organizational characteristics (organizational processes and target user community) can be decreased (Leonard-Barton 1988, 252). While Leonard-Barton's (1988) original work was a single case qualitative study focusing on the initial implementation[17], Karimi et al. (2007a) successfully applied the innovation delivery system concept to a quantitative research design in ERP system development context.

Based on a literature review of IT innovation literature, Fichman (2004a) identified organizational factors found in effective IT innovation delivery systems, or "*innovation configurations* (p. 319)", which included top management support, technology champion, training, and access to consulting services[18]. An innovation configuration can be defined as "a specific combination of factors that are collectively sufficient to produce a particular innovation-based outcome (p. 320)". Similar to the concept of innovation delivery system, the underlying logic of an innovation configuration is that firms in

[17] The initial implementation phase is the period during which the technology is introduced to the users (Leonard-Barton 1988, 251).

[18] Fichman (2004a) also identified process model factors, which refer to the fit between organization, processes and technology. However, this study builds upon a variance model and addresses the variance relationships between independent and dependent variables without causal or temporal assumptions.

possession of these factors are able to innovate more efficiently and effectively. Furthermore, Fichman (2004a, 348–349) stressed that especially when investigating complex phenomena such as CRM initiatives, a holistic configuration of antecedent factors, which interact to produce an IT innovation as an outcome, is a far more suitable approach than a simple examination of linear isolated effects to reach valid conclusions.

In another article, Fichman (2004b, 140) pointed out that these organizational factors are increasingly referred to as resources and capabilities in IT innovation research, implying the potential of the resource-based view of the firm (RBV) in conceptualizing IT implementation phenomena. Based on these considerations, this study posits that an *innovation delivery system refers to the extent to which a firm possesses resources and capabilities relevant to the development and management of the IT innovation* (Karimi et al. 2007a, 102; 105). In this view, it is assumed that firms vary in terms of their resource endowments, which determine why some firms can innovate more economically and are more likely to achieve IS success than others. Furthermore, organizations possessing such resources have a greater ability to recognize and evaluate innovation opportunities (Fichman 2004b).

In the implementation phase, Klein & Sorra (1996) suggested that various innovation, implementation, organizational, and managerial policies, practices and characteristics have an impact on innovation use (p. 1059). More specifically, these include training, user support, financial resource availability, top management support, communication, time for learning to use the innovation, supervisor encouragement, reward systems, and system quality characteristics (Klein & Sorra 1996; Klein et al. 2001). The similarities with innovation delivery system dimensions are evident.

In their empirical study, Klein et al. (2001) categorized these antecedents into implementation policies and practices, and implementation climate. They found partial support that these antecedents were positively associated with "implementation effectiveness" and "innovation effectiveness"[19]. Furthermore, Klein & Sorra (1996) stressed that users must perceive a fit between the innovation and their values (p. 1063). Cooper & Zmud (1990, 125) discussed the importance of fit between technology, task, organization and person, which is also addressed by task-technology fit theory (Goodhue & Thompson

[19] Klein et al. (2001) refer to the consistency and quality of individuals' (end-users and IT personnel) use of an innovation as implementation effectiveness. Therefore, it could be described as an organization level, aggregate construct equivalent of infusion-type innovation use at the individual level. Implementation effectiveness is a necessary but not sufficient condition of "innovation effectiveness", which refers to organizational performance improvements in terms of profitability and productivity. Committed use of an innovation does not always lead to firm performance (Klein & Sorra 1996, 1057).

1995) in IS adoption literature, and person-technology fit (Speier & Venkatesh 2002) in CRM/SFA adoption literature.

As IT innovation research is a highly diverse and vast field of enquiry, performance has also been measured using various outcome variables. These include quantity of IT innovation adoption - typically measured at organizational level - such as earliness, frequency, and extent of adoption; individual IT innovation adoption such diffusion, infusion, and routinization; and IT innovation performance impacts in terms of different perceptual and objective measures at both firm as well as process level (Fichman 2001; 2004a).

In summary, factor-based IT innovation research attempts to explain IT innovation outcomes with various contextual factors and the delivery system through which the IT innovation is managed. Depending upon research objective, IT innovation research has applied different levels of analysis (individual, project, firm) and key outcomes (quality of innovation, use, firm performance).

The organizational factors present in successful innovation delivery systems are similar to IT project risks in risk and project management theories, and organizational factors in SFA adoption literature. Similarly with risk and project management literature, IT innovation research contributes to CRM/SFA literature in marketing by explaining what factors are required in order to achieve desirable innovation characteristics can be achieved.

The main contributions from IT innovation research to this study can be summarized as follows:

- *factor-based studies conceptualize contextual factors as antecedents of IT implementation success*
- *project-level studies conceptualize holistic innovation delivery systems, or innovation configurations, as predictors of IT success*
- *recognizes adaptation (system development as process, system quality as output) as an antecedent of individual acceptance*

3.2.4 IT capability literature

The resource-based view of the firm (RBV; Wernerfelt 1984; Penrose 1959) has been applied to IS research through the emergence of IT capability literature in the mid-1990s (Wade & Hulland 2004). Pavlou & El Sawy (2006) described IT capability literature as a discourse based on the assumption that various *IT-related resources can be combined into a higher-order form of IT capability* - which is rare, valuable, imperfectly imitable, and imperfectly substitutable – that will lead to superior firm performance (p. 202).

Similarly to most resource-based studies, the majority of IT capability literature has been conducted at the firm level of analysis. From this "*strategic resource perspective* (Karimi, Somers & Bhattacherjee 2007b)", IT capability literature focuses on the relationships between the firm's IT resource endowments and IS success in terms of firm performance and sustainable competitive advantage (SCA). More recently, however, a few IT capability studies have also applied project and process levels of analysis (Karimi et al. 2007b; Pavlou & El Sawy 2006; Ray et al. 2005). From this *operational perspective*, IT capability research conceptualizes IS projects as project/process level IT resource endowments, which determine IS project success with an emphasis on functional and/or business process levels (Karimi et al. 2007b, 223). Strategic firm-level IT resources and their operational project-level counterparts affecting IT success are presented in Table 7. Both perspectives will be discussed next.

Table 7 IT resources affecting IT project success

IT resources	Measures	Key outcomes
Human/ Knowledge resources	Business process knowledge; Project management knowledge	Business process outcomes; Firm performance; SCA
Relationship resources	User involvement; Top management involvement	
Technology resources	IT infrastructure	

The strategic resource perspective in IT capability literature has identified several firm level IT resources, which act as factor inputs for IT capabilities and, consequently, lead to IS success in terms of firm performance. A number of scholars have offered IT resource categorizations (e.g. Ross et al. 1996; Mata, Fuerst & Barney 1995; Powell & Dent-Micallef 1997; Feeny & Willcocks 1998), which can be broadly summarized into: (1) technology resources such as tangible and intangible IT assets; (2) human resources such as technical and managerial skills; and (3) relationship resources such as the IT-business relationships and IT vendor relationships. IT capabilities, on the other hand, are organizational capabilities to integrate and utilize, or unique combinations of, these valuable IT resources; and which can interact in synergistic fashion with other organizational non-IT capabilities - for example, organizational culture, organizational learning, and market orientation - to achieve superior firm performance (e.g. Bharadwaj 2000).

Most studies from the strategic resource perspective have concentrated on investigating whether IT investment, IT resources and capabilities are directly or indirectly linked to firm performance and SCA, i.e. the business value of IT investments (Melville, Kraemer & Gurbaxani 2004). Empirical results have been mixed regarding this issue (for an extensive review, see Wade & Hulland 2004), which is often referred to as the IT productivity paradox (Hitt & Brynjolfsson 1996). Most scholars in the IT capability field consider that IT resource endowments are enablers of other value-creating activities, suggesting a positive indirect relationship. In this view, IT resources and capabilities should be complementary (Powell & Dent-Micallef 1997) with the firm's other organizational capabilities and core competencies – such as product quality, knowledge assets, market/customer orientation, customer service and organizational learning (Bharadwaj 2000, 174) - in order to achieve superior firm performance. Bharadwaj (2000), Ravichandran & Lertwongsatien (2005) and Santhanam & Hartono (2003), for example, found empirical support for these inter-dependent mechanisms. This indirect, complementary interpretation of the contribution of IT resources on firm performance is consistent with the one provided by CRM-performance research in marketing where results have also been inconclusive (Reinartz et al. 2004; Mithas et al. 2005; Jayachandran et al. 2005). CRM-performance studies which have adopted an IT capability perspective, however, have provided empirical support for this indirect relationship (Chang et al. 2010; Coltman 2007; Rapp et al. 2010).

From an operational resource perspective in IT capability literature, IT resources and capabilities are investigated at the project or process level, where first order effects take place, rather than at the firm level, which is affected only after process level improvements have first taken place (Ray et al. 2005). Since the level of analysis is a specific project, process, or technology, a set of more narrowly defined resources is appropriate, chosen based on their relevance to the specific research context, and on their heterogeneity across firms as a predictor of differential outcomes (Karimi et al. 2007b, 225).

Operational IT capabilities, in turn, are functional capabilities resulting from combining these relevant IT resources. Hall (1993) defines functional capabilities as "the ability to do specific things; it results from knowledge, skill and experience of employees, and others in the value chain (p. 610)". In the IS context, they are related to the organization's ability to identify and plan IT systems meeting business requirements (IT system planning capability), to develop high quality systems in a cost-effective manner (IT system development capability), and the ability to maintain and support IT systems effectively and efficiently (Ravichandran & Lertwongsatien 2005). Karimi et al. (2007b) stressed that the deployment of IT resources into functional IT capabilities can have substantial strategic value.

Considering that CRM system development is at the core of this study, conceptualizations of project level IT resources and IT system development capability are of particular interest. While IT capability literature is scarce in this area, a few studies have addressed these issues in the IS project context. Karimi et al. (2007b), for example, tested the relationship between IS resources, capabilities and business process outcomes in the ERP context. Their conceptualization of project level IS resources included knowledge resources (business process knowledge and project management knowledge), relationship resources (user involvement, top management involvement), and IT infrastructure resources. They found that IS resources had a positive impact on ERP capabilities, measured as the extent of ERP implementation, and business process outcomes (operational efficiency, effectiveness and flexibility).

Ravichandran & Lertwongsatien (2005) investigated the relationships between firm-level IT resources (human capital, IT infrastructure, IS partnership quality), firm–level IS capabilities (IS planning, system development, support and operations), and firm performance. Although they did not focus on particular IS projects or what factors form the firm's IS capabilities, their study nevertheless implies that primary effects occur first at the functional process level. They found empirical support for these inter-relations and concluded that the effective deployment of IS resources into functional IS capabilities predict the firm's ability to utilize IT in a supporting role for the firm's core competencies and financial performance. According to their results, IT resources must first improve functional IT capabilities, only after which, in conjunction with the firm's complementary core competencies, enhanced firm performance can be achieved.

Ethiraj, Kale, Krishnan & Singh (2005), in turn, examined the effect of client-specific capabilities and project management capabilities on IT project performance from the IT service provider perspective. Their empirical findings from the Indian market supported the proposed relationships. They concluded that a project-level research design is a promising approach to study the impact of IT resources and capabilities on differential performance.

A few studies in other contexts have found support for the appropriateness of process level examination of IT resources. Ray et al. (2005) reported that while IT resources (technical IT skills, generic technologies, IT spending, flexible IT infrastructure) did not directly influence process performance in a customer service setting, they did so when moderated by shared knowledge (between IT managers and line management), which was conceptualized as an IT capability. In the new product development (NPD) context, Pavlou & El Sawy (2006) found that the effective use of IT functionalities by users ("IT leveraging competence") positively influenced the effective execution of operational NPD processes ("NPD functional competencies") and competitive advantage in NPD.

In summary, the IT capability paradigm attempts to explain IS success in terms of firm performance from two complementary perspectives, namely, the strategic firm level perspective and the operational project/process level perspective. From the strategic viewpoint, firm level IT resources, stand-alone or as factor inputs for IT capabilities, have the potential to affect firm performance. From the operational perspective, project level IT resources can also be combined into unique bundles of IT resources, or functional IT capabilities, which may lead to business process improvements, and consequently to superior firm performance.

Research on project level IT resources is scarce. In the IS project context, only Karimi et al. (2007b) have examined IT resources at the level of a specific ERP project. In the CRM system development context, operational resource-based perspectives have not been adopted. A more careful inspection of Karimi et al.'s (2007b) project level IT resources reveal that they are very similar to organizational factors associated with successful innovation delivery systems. Considering Fichman's (2004b) reference to resource-based influences in the IT innovation field, this finding is not surprising. A comparison between a resource-based conceptualization of IS projects with a risk-based one also indicates that the most important constructs are quite similar. IT capability research thus contributes to CRM/SFA literature in marketing by explaining which resources are needed to develop a high quality CRM system.

The main contributions from IT capability research to this study can be summarized as follows:

- *conceptualizes both strategic (firm-level) as well as operational (project-level) IT resources as antecedents of IT success*
- *conceptualizes IT resources as inputs to form functional IT capability, which is theoretically similar to the innovation delivery system concept in IT innovation research.*

3.2.5 Summary of IS success research relevant to CRM system development

IS research provides additional theoretical lenses to understand what factors facilitate CRM acceptance in earlier stages of CRM implementation, namely, *prior* to CRM system rollout during the CRM system development project. A better understanding can be achieved by conceptualizing CRM system development from the perspective of IT management, who are primarily in responsible for and in control of CRM pre-implementation activities. Risk and project management theory, IT innovation theory, and the IT capability paradigm were reviewed to provide a conceptualization of CRM system development, and to seek common points in order to integrate CRM system development with CRM acceptance, which is the surrogate measure of CRM success in this study. As a result, I have chosen to tackle the CRM system development phenomenon with a parsimonious conceptualization including the most important factors identified affecting IS success, or CRM technology success. In addition, I chose the resource-based view of the firm and the operational IT capability perspective as the most useful theoretical lens in this dissertation. I will now elaborate on these decisions.

Based on the review of relevant IS research, many similarities can be found in their rationales to explain IS, or CRM system development, success. In Table 8, factors affecting IS development projects, and most common measures applied to assess these factors, are listed to accommodate comparisons between relevant streams of IS research and CRM/SFA adoption research.

Table 8 Summary of determinants of IS success and comparison with CRM/SFA adoption research

Stream of research	General concept affecting IS success	Factors affecting IS development success	IS Project-level measures	IS success measures
Risk and project management theory	IS project risks	Organizational risks	Top management commitment; User involvement/ participation	Process performance
		Technological knowledge risks	Degree of novelty of technology; Technological newness	Product performance
		Project management risks	Lack of experience with technology; Lack of expertise; Planning & control; Expertise coordination	
		Structural risks	Project size; Technological/ application complexity; Requirements uncertainty	
IT innovation theory	Contextual factors	Innovation delivery system/ Innovation configuration	Top management support; Technology champion; Training; Access to consulting services	Individual adoption
				Organizational adoption
				Firm performance
IT capability research	IT resources and IT capabilities	Knowledge resources	Business process knowledge; Project management knowledge	Business process outcomes
		Relationship resources	User involvement; Top management involvement	Firm performance
		IT infrastructure resources	IT infrastructure resources	SCA
Stream of research	**Overall factor affecting CRM success**	**Factors affecting development phase**	**Measures**	**CRM success measures**
CRM/ SFA adoption research	External factors	Organizational factors	Top management support; User training; User involvement; Accurate expectations	Perceived ease of use
				Perceived usefulness
				Intention to use
				Use

Risk and project management theory, IT innovation theory, IT capability research, and CRM/SFA adoption research refer to, respectively, IT project risks, contextual factors, IT resources and external factors as the general concepts affecting performance outcomes. While the terminologies used are different, a closer examination supports the notion that organizational factors are present in all of the above-mentioned theoretical perspectives.

In risk and project management theory, which specifically focuses on IS development projects, the most important organizational risks have been identified as top management commitment and user involvement. These are included in the other three research streams, which have also incorporated user training as a third organizational factor. In addition, SFA/CRM adoption research has found support that setting accurate expectations influences CRM acceptance. Based on these considerations, *top management commitment, user* *involvement and user training* have received considerable support across relevant theoretical perspectives, and *should be included in any model conceptualizing CRM system development*.

There are other common themes in the three streams of IS research under review. Technological knowledge risks in risk theory, access to consulting services in innovation delivery systems, and business process knowledge resources in operational IT capability research, have all been linked to the need of consulting resources to address the technological complexities related to IS development projects. While CRM/SFA adoption research has not included consulting services in theoretical models, technical factors such as functionality, system interface and design of the system (Davis 1989; Davis et al. 1989) are largely dependent on consultant resources. Therefore, resources related to technological skills, or *consultant resources, should be included in any CRM system development model.*

Project management risks (risk theory), technology champion (IT innovation theory), and project management resources (IT capability theory) are similar concepts, which highlight the importance of managerial skills related to IS project management. Mata et al. (1995), for example, identified managerial skills as the most important IT resources in terms of potential for gaining competitive advantage. In a similar vein, IT project risk scholars and innovation researchers have regarded project management as a crucial dimension of system development that ensures appropriate planning, control and coordination of the entire IS project. In this view, *project management resources should be included in any model depicting CRM system development capability.*

These resources related to the appropriate conceptualization of CRM system development have been previously investigated by a number of scholars in marketing, traditional IS research and the emerging IT capability paradigm. These references are listed in Table 9.

In addition to the above-discussed resources, I argue that structural risks should be taken into account in any CRM system development model. Structural risks are unique IS project characteristics, which have been examined in empirical risk and project management studies. Project size in terms cost, duration and people involved; technological complexity of the application being developed; and the diversity of requirements and needs of different users; are likely to have an impact on IS development which is not captured by organizational factors and skills related to technical and managerial expertise. *Structural risks create a project-specific context in which these resources operate*.

Table 9 Factors relevant to CRM system development capability

Project-level IT resources	IS studies	IT capability studies	CRM/ SFA studies in marketing
Project management resources	Karimi et al. 2007a; Dewar & Dutton 1986; Ryan 1999; Fichman 2004a; Gemino et al. 2008; McFarlan 1981; Zmud 1980; Wallace et al. 2004; Nidumolu 1995	Karimi et al. 2007b; Bhatt & Grover 2005; Powell & Dent-Micallef 1997; Ethiraj et al. 2005	
Consultant resources	Karimi et al. 2007a; Dewar & Dutton 1986; Barki et al. 1993; Gable 1991; Zmud 1980; Fichman 2004a; Barki et al. 2001; McFarlan 1981; Ramachandran & Gopal 2010	Karimi et al. 2007b	
Training resources	Karimi et al. 2007a; Fichman 2004a; Klein & Sorra 1996; Guimaraes et al. 1992; Fuerst & Cheney 1982; Igbaria et al. 1990; Igbaria et al. 1989; Nelson & Cheney 1987; Sanders & Courtney 1985	Powell & Dent-Micallef 1997	Becker et al. 2009; Avlonitis & Panagopoulos 2005; Schillewaert et al. 2005; Cascio et al. 2009; Morgan & Inks 2001; Pullig et al. 2002; Erffmayer & Johnson 2001; Hunter & Perreault 2007; Buehrer et al. 2005
Top management support	Karimi et al. 2007a; Armstrong & Sambamurthy 1999; Klein & Sorra 1996; Leonard-Barton 1998; Leonard-Barton & Deschamps 1988; Guimaraes et al. 1992; Meyer & Goes 1988; Zmud 1980; Barki et al. 2001; Gemino et al. 2008; Wallace et al. 2004; Fichman 2004a	Karimi et al. 2007b; Powell & Dent-Micallef 1997; Ross et al. 1996	Cascio et al. 2009; Speier & Venkatesh 2002; Pullig et al. 2002; Morgan & Inks 2001
User involvement	Zmud 1980; Barki et al. 2001; Guimaraes et al. 1992; Gemino et al. 2008; Klein & Sorra 1996; Wallace et al. 2004; Baronas & Louis 1988; Baroudi et al. 1986; Doll & Torkzadeh 1989; Franz & Robey 1986; Ives & Olson 1984; Mann & Watson 1984; Olson & Ives 1981	Karimi et al. 2007b	Avlonitis & Panagopoulos 2005; Morgan & Inks 2001; Speier & Venkatesh 2002; Pullig et al. 2002

How should the different factors related to CRM system development be conceptualized, and through which theoretical lens, for the purposes of the present study? Firstly, risk and project management theory focuses specifically on IS projects, which makes this theoretical perspective a potential candidate. Second, IT innovation theory, with the innovation delivery system/ innovation configuration concepts, is also a useful approach, not least because CRM/SFA adoption literature, CRM acceptance and TAM have been significantly influenced by IT innovation concepts. Third, the resource-based IT capability perspective has emerged more recently in the IS research arena, and has been successfully applied at the firm and project/process levels related to system development capability.

One common denominator between the three streams of research is that *scholars have called for more parsimonious models* to conceptualize the IS development project and success. In risk and project management theory, for example, very few studies have modeled IS projects as a complex integrated structure encompassing various factors (Gemino et al. 2008, 10). In a similar vein, Karimi et al. (2007a) pointed out that while IT innovation studies include contextual factors and innovation delivery system characteristics in their research models, they are examined in isolation (p. 123). They argued further that organizational factors should be conceptualized holistically to examine which combinations of factors are important in explaining IT innovation outcomes, and under what contextual conditions they best predict IT innovation performance (p. 103). This view is shared by Fichman (2004a), who referred to these combinations of "the right stuff" as innovation configurations. Applying a process level RBV perspective, Karimi et al. (2007b, 244) argued that due to the complementary and synergistic nature of IT resources, they should be conceptualized in a collective fashion. Resource complementarity is one of the core ideas of the resource-based view (e.g. Barney 1991; Wernerfelt 1984; Madakok 2001) and resource-based IT capability literature (e.g. Powell & Dent-Micallef 1997; Melville et al. 2004; Benjamin & Levinson 1993).

In addition to explicitly theorizing about the complementarity of factors affecting IS development success, there are some other benefits associated with a resource-based perspective. Unlike risk and project management theory, *the resource-based perspective represents a common theoretical approach*, which has been applied in marketing research (Fahy & Smithee 1999) as well as in IS studies (Wade & Hulland 2004). In relation to IT innovation research, innovation delivery systems and IT resources are conceptually closely linked (Fichman 2004b). IT capability research, however, arguably provides richer conceptual tools of IT resources with a defined set of resource attributes (Wade & Hulland 2004, 110). In existing CRM-related research, the relationships between firm level and project level IT resources have not been explicitly modeled or tested. In the next chapter, I will propose a resource-based mechanism through which firm and project level IT resources may be inter-related, and through which they are related to CRM system development.

In conclusion, I will adopt the resource-based view of the firm as the primary theoretical lens. I will discuss the concepts developed within RBV and the IT capability paradigm in Chapter 4, and provide a resource-based conceptualization of CRM system development. In the research model presented in Chapter 5, I will link CRM system development with CRM acceptance, a widely applied CRM success measure in CRM/SFA adoption research in marketing.

4 A RESOURCE-BASED CONCEPTUALIZATION OF CRM SYSTEM DEVELOPMENT

4.1 The resource-based view of the firm (RBV)

Since the resource-based view of the firm (RBV) was first introduced by Wernerfelt (1984), significant theoretical developments have been made in the fields of strategic management and marketing (e.g. Barney 1991; Conner 1991; Mahoney & Pandian 1992; Prahalad & Hamel 1990). RBV is largely based on Penrose's (1959) seminal work "The Theory of the Growth of the Firm", and Pfeffer and Salancik's (1978) resource dependency theory.

Barney (1991) argued that RBV has emerged as a response to the exclusive focus on the firm's external environment as the basis for strategy formulation (Porter 1980). Traditional strategy formulation literature, on the other hand, had acknowledged the importance of matching organizational strengths with external opportunities (Andrews 1971). Resource-based theorists argued that this external focus and the description of the nature of strategy as predominantly adaptive happened at the expense of neglecting abilities of firms to create innovations and discover new markets proactively (Jüttner & Wehrli 1994, 42–44; Prahalad & Hamel 1994, 10). Although RBV has an internal focus, it shares many common ideas with Porter's (1980) externally oriented theories (Conner 1991), and may be considered as complementary (Amit & Schoemaker 1993; Foss 1997).

According to resource-based theory, a firm is viewed as a bundle of resources (Wernerfelt 1984). A fundamental theoretical assumption is that firms are heterogeneous in terms of their resource endowments, and these differences are relatively stable over time (e.g. Barney 1991; Peteraf 1993). Resource heterogeneity across firms is offered as an explanation to differential performance and competitive advantage, or sustainable competitive advantage (SCA) (Foss 1997, 4). As no single firm can possess all resources, firm decisions related to the selection and acquisition of resources are assumed to be guided by economic rationality (Oliver 1997, 697) within the constraints of bounded rationality (see Simon 1991) such as incomplete information, for example.

Similarly with Porter's (1980) work, competitive advantage is one of the core concepts in resource-based theory. Barney (1991) coined sustained competitive advantage to order to include a temporal dimension, and perhaps secondarily to create a distinctive resource-based terminology separate from industry analysis. Although this study does not focus on competitive advantage as a performance variable, it is necessary to briefly discuss the relationship between resources and SCA to gain a better understanding of resource-based rationale.

Barney (1991) first suggested a set of criteria to determine whether a resource may be a source of sustainable competitive advantage: it must be valuable, rare, imperfectly imitable, and non-substitutable. A resource is valuable when it enables a firm to improve its efficiency and/or effectiveness. A valuable resource has value-creating properties, commonly referred to as rent in resource-based literature. A valuable resource is also rare when a limited number of firms have access to it. If the resource is also difficult to imitate and non-substitutable, it may be also be a source of competitive advantage (Foss 1997).

Peteraf (1993) extended on Barney's (1991) work to provide a comprehensive theoretical analysis of the criteria required for SCA. These criteria include heterogeneity, *ex ante* limits to competition, imperfect mobility, and *ex post* limits to competition. Resource heterogeneity is a fundamental basic condition since differentiation would be impossible if resource endowments across firms were homogeneous (Barney 1991). *Ex ante* limits to competition suggests that there must be limited competition to achieve a resource position. Barney (1986) discussed strategic factor markets where resources can be acquired. Firms may achieve rents by possessing superior information, being lucky, or both. Under these circumstances, resources can be purchased below their discounted net present value. Barney's (1991) criteria with regard to valuable and rare resources are similar to heterogeneity and *ex ante* limits to competition by Peteraf (1993). These criteria are sufficient to gain above-normal rents and thus competitive advantage *ex ante*.

Ex post limits to competition implies that heterogeneity can only be preserved through imperfect imitability and substitutability[20] (Peteraf 1993, 182). Imperfectly mobile resources are non-tradable assets, which are firm-specific and thus of limited use outside the firm (Dierickx & Cool 1989). Therefore, Barney's (1991) latter two criteria are conceptually similar to Peteraf's (1993) notions about *ex post* limits to competition and imperfect mobility. These criteria are sufficient to ensure the sustainability of above-

[20] Rumelt (1984) discussed "isolating mechanisms" such as causal ambiguity, learning, switching costs, and economies of scale, to maintain imperfect imitability and substitutability. Dierickx & Cool (1989) identified factors related to the process of resource accumulation, such as time compression economies, asset mass deficiencies, interconnectedness of resources (asset stocks), asset erosion, and causal ambiguity, as barriers to imitation and substitutes.

normal rents and thus lead to sustainable competitive advantage *ex post* (Kraaijenbrink, Spender & Groen 2010).

In the present study, I assume that IT resources and IT capabilities are heterogeneous, valuable and rare and, consequently, explain performance differences between firms. I do not assess, however, whether IT resources and IT capabilities possess properties related to *ex post* limits to competition that lead to SCA (for an extensive review, see Mata et al. 1995). In this study, resources have absolute values, which can explain variation in absolute outcome terms, i.e. maximization of output value (Ray et al. 2005). SCA, by definition, requires relative value assessment against competition to determine whether the firm achieves above-normal rents.

Furthermore, limiting the scope to valuable resources is logical due the fact that this study adopts an operational resource-based perspective, not a strategic one. While valuable and rare resources do not necessarily lead to SCA, they increase the probability of firm survival under conditions of competitive parity (Barney 1991, 106–107). This notion is similar to the strategic necessity hypothesis suggested by Clemons & Row (1991), who adopted a resource-based perspective in their conceptual work on firm IT resources and competitive advantage. In this view, IT resources are necessary but not sufficient conditions for SCA: although IT resources provide value by increasing firm efficiency and/or effectiveness, most IT resources are readily available in factor markets.

In summary, the main implications for this study are:

- *IT resources, the basic units of analysis, are assumed to be heterogeneous, valuable and rare; but not necessarily a source of competitive advantage*

4.2 Resources and capabilities

Resource-based terminology has been subject to considerable conceptual inconsistencies and overlaps (Foss 1997, 8; Peteraf 1993, 180). A plethora of concepts and terms have been introduced which have been met with confusion by both academics as well as practicing managers (for an extensive list of RBV terminology, see Bogaert, Martens & van Cauwenbergh 1994). *This study adopts the concepts of resource and capability*, which will now be defined and distinguished from other well-known concepts in the RBV field.

The theoretical arguments of RBV concentrate on the management of firm resources or assets. Resources (Barney 1991; Wernerfelt 1984) and assets (Amit & Schoemaker 1993; Dierickx & Cool 1989) are often used interchangeably as an umbrella term in strategic management literature. In this holistic definition, resources refer to any given strength or weakness of a firm (Wernerfelt 1984, 172); anything that can be utilized to improve the efficiency and effectiveness of a firm (Barney 1991, 106); or the stock of available factors owned or controlled by the firm (Amit & Schoemaker 1993, 35).

Resources are offered as the basic units of analysis in traditional resource-based theory. Barney (1991, 101–102) categorized them into financial, technological, human and organizational resources. In a similar vein, Grant (1991) discussed financial, physical, technological, human, reputation, and organizational resources[21]. Financial, physical and technological resources are fairly easy to acquire from the factor market, and human resources in terms technical and managerial skills and know-how are also relatively mobile and thus possible to obtain from resource markets. Organizational resources, on the other hand, such as reputation, brand, culture, relationships, processes, and learning, are more difficult to purchase from external sources. Resource categorizations will be discussed in further detail in the context of IT resources, which are more relevant to this work, and more specific than the general classifications presented here.

Since these early conceptual developments in RBV, new overlapping concepts and terminology have emerged. According to Foss (1997), there are two possible rationales behind the introduction of new concepts and their differentiation from resources, depending upon which author one refers to.

Firstly, the introduction of new concepts could be linked to Penrose's (1959) original distinction between stocks, i.e. resources, and flows, i.e. services rendered from the use of resources. Flows are the means by which resources are deployed, with an emphasis on process. Penrose (1959) argued that firms achieve rents not only because of better resources, but also by making better use of them (p. 54). This distinction has been widely applied to distinguish between resources and capabilities. Amit & Schoemaker (1993, 35), for example, defined capabilities as "a firm's capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end". Day (1994, 38) described capabilities as factors, which enable resources to be deployed advantageously through activities in business processes. Eisenhardt & Martin (2000), in turn, defined dynamic capabilities as the firm's processes that deploy resources (p. 1107). A capability is thus a

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[21] Other resource dichotomies have included property-based and knowledge-based resources; tangible and intangible resources (Grant 1991; Hall 1992); resource stocks and flows (Penrose 1959); and tradable and untradable resources, or asset stocks (Dierickx & Cool 1989). In addition, the knowledge-based view of the firm (Grant 1996b; Kogut & Zander 1992) has extended RBV with a special emphasis on knowledge resources and knowledge management (Nonaka 1991; Nonaka & Takeuchi 1995; Zeleny 1989).

special type of resource, which has the ability to improve the productivity of resource that serve as inputs (Madakok 2001, 389.)

Based on these considerations, a capability is different from other resources in terms of its characteristics, referring to its dynamic nature, requirement of human action and organizational processes, and resource-enhancing properties. Although this definition of capability is widely accepted in contemporary research, it is not adopted in this study. Considering that this study neither examines processes nor applies a longitudinal setting, it would not be appropriate to define capability with a process orientation. The dynamic resource-based perspectives, which adopt this dynamic definition, will be briefly introduced later in this sub-chapter.

Second, Foss (1997) argued that new concepts may have emerged to make a distinction between assets based on their ability to create SCA. Academics have argued that resources are rarely superior in isolation. The value of a resource should ultimately be determined by its contribution to the production process, and is determined by firm-specific and context-specific factors (Jüttner & Wehrli 1994, 43). These notions provide ideas about the mechanisms how the resource criteria put forward by Barney (1991) and Peteraf (1993) can be achieved.

Consequently, partially overlapping concepts such as combinative capability (Kogut & Zander 1992); core capability (Leonard-Barton 1992); integrative capability (Grant 1996a); organizational capability (Jüttner & Wehrli 1994; Stalk, Evans and Schulman 1992, 66); strategic asset (Amit & Schoemaker 1993; Dierickx and Cool 1989; Markides & Williamson 1994); dynamic capability (Teece et al. 1997); distinctive capability (Day 1994); competence (Reed and DeFilippi 1990, 89; Hamel & Heene 1994; Sanchez & Heene 1997); and core competence (Prahalad & Hamel 1990, 82) have been introduced to differentiate resources in terms of their potential for SCA. Some of these concepts are linked to a static, equilibrium-based perspective, while others are related to a dynamic, process-oriented perspective (Foss 1997).

Their various definitions share some common themes: they are path-dependent (Kogut & Zander 1992); firm-specific (Madakok 2001) and embedded in context (Granovetter 1985); are produced in an integration process of factor networks comprising of resources and skills (Black & Boal 1994); and are difficult, costly or impossible to trade, imitate or substitute (Dierickx & Cool 1989). Their common assertion is that individual resource value does not matter; it is rather the synergistic combination of resources that is most important (Kraaijenbrink et al. 2010).

For example, Jüttner & Wehrli (1994) made a distinction between "unspecific" and "specific components". In this view, unspecific, isolated components (lower level resources, skills) are integrated into specific, idiosyncratic components. These specific components are considered as higher-order resources, consisting of unique combinations of resource inputs. The inputs, or resources, are usually freely tradable while higher-order resources difficult or impossible to trade, imitate, or substitute (Amit & Schoemaker 1993; Dierickx & Cool 1989). Kraaijenbrink et al. (2010), in turn, pointed out that RBV has been criticized for investigating resources at "the component level, especially at the level of the individual resource (p. 356)". This has led to the neglect of the importance bundling resources and the role of human involvement.

Based on these considerations, I define *capabilities as unique, higher-order resource bundles, or combinations of resources*. Therefore, I refer to capabilities as a higher-order resource, indicating hierarchical position among resource endowments controlled by the firm. This clarification on the definition of capability is important because it is different from Penrose's (1959) division to stocks and flows, which has been widely applied to define resources and capabilities. In this case, capability refers to its characteristics in terms of human and processual properties, instead of hierarchical position compared with other resources.

Wade & Hulland (2004, 109) distinguished between capability and competence/core competencies based on its potential to lead to SCA. Competencies are capabilities with the ability to produce SCA. Therefore, the definition of capability here is consistent with the assumptions made in this study as I do not assess the relationship between resources, capabilities and SCA. Based on this definition, CRM system development capability is conceptualized as a bundle of resources integrated in an organizational production process. CRM system development capability is thus an organizational capability and, more specifically, a functional capability (Hall 1993), which refers to the ability to convert IT resources into useful outputs (Coltman 2007, 306).

Although I acknowledge that CRM system development capability is not only a bundle of resource inputs but also a process, the processual properties of CRM system development are not examined in the present study. This study investigates CRM system development capability from a *static perspective*, which implicitly assumes that any improvement in CRM system development capability is a result of resource input improvements, which are assumed to be complementary. In this view, firms may gain superior performance by creating or acquiring unique resource bundles (Bhatt & Grover 2005, 257). Therefore, the research model can be described as a variance model under the "more is better" logic with regard to resource inputs (Markus & Robey 1988).

In summary, the main implications for this study are:

- *IT capability is defined as a combination of IT resources without a process element*
- *this study adopts a static resource perspective*

4.3 Resource-based mechanisms

Following the static economic-rationalistic perspective, I adopt the resource complementarity arguments (Barney 1991; Melville et al. 2004) and the resource-picking mechanism for rent creation (Madakok 2001) to provide the underlying rationale between the relationships of resource-based concepts in the present study. While the idea of resource complementarity is related to IT resources in general, the resource-picking mechanism is adopted to make sense of the causal mechanisms between different resource hierarchies. For the purposes of this study, I propose a categorization of resources into hierarchies of higher-order IT resources, firm-level IT resources, and project-level IT resources. I will discuss these issues next.

4.3.1 Resource complementarity

Defining capabilities as combinations of resources highlight the notion of resource complementarity (Barney 1991). Resource complementarity refers to a situation when the presence of one resource enhances the value of another resource, resulting in a synergistic effect (Clemons & Row 1991). Therefore, by creating or acquiring unique, complementary resource bundles, firms can achieve differential performance. Although resource complementarity as an idea is widely accepted in the resource-based discourse, its theoretical development is sketchy. While complementary interaction enhances the value of both (or all) resources, determining causality is ambiguous (Barney 1991).

Within the IT capability paradigm, the traditional strategic resource perspective and IT business value discourse (Hitt & Brynjolfsson 1996) have adopted resource complementarity arguments to explain the *interactions between IT and non-IT resources*, and how IT impacts organizational performance (Melville et al. 2004, 285). According to Clemons & Row (1991, 276), complementary strategic resources[22] are needed to utilize an IT innovation.

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[22] A resource is strategic if it accounts for a significant portion of the firm's investment base, and is not freely available in factor markets (Clemons & Row 1991, 279).

In this view, sophisticated IT resources do not generally lead to superior firm performance, but those that combine IT with other strategic complementary resources within business processes do gain relative advantage (Bhatt & Grover 2005, 255; Powell & Dent-Micallef 1997, 379). However, Melville et al. (2004, 303) pointed out that the existence and magnitude of complementarity between resources vary as a function of organizational and technological context. Furthermore, the specific nature of complementarities, such as what specific resources are complementary to a given resource, or under what conditions, is poorly understood at present. Despite these limitations, resource complementarity is considered a useful theory, which has been adopted in several IT capability studies, receiving solid empirical support.

For example, Powell and Dent-Micallef (1997) investigated how the value of IT resources could be enhanced in the presence of other organizational resources such as an innovative culture (open organization and open communications), strategic planning, and supplier relationships. Bharadwaj (2000) tested the relationships between IT resources and complementary "IT-enabled intangibles", such as organizational culture and customer orientation. Organizational learning, which refers to the accumulation, sharing and application of knowledge, has been applied as an antecedent of IT resources (Bhatt & Grover 2005). Ravichandran & Lertwongsatien (2005), in turn, found that functional IT capabilities only affected firm performance when they were complementary with the firm's non-IT core competencies.

In the context of the present study, being in possession of a CRM system *per se* does not lead to superior performance. If the CRM system, however, is complementary with the firm's non-IT core competencies, such as a customer-centric organizational culture, they can together lead to superior firm performance through CRM business processes. CRM performance can be measured in terms customer relationship performance (Jayachandran et al. 2005) or customer satisfaction (Mithas et al. 2005; Srinisavan & Moorman 2005), for example. Overall, complementary non-IT resources have seldom been incorporated into research models in IS success research and SFA/CRM adoption studies, perhaps the notable exception being the adaptive selling concept (Weitz et al. 1986). CRM-performance literature in marketing, on the other hand, has extensively studied and provided mixed empirical evidence of the complementary relationship between CRM technology and organizational non-IT resources (see Chapter 3.2.3.2). Based on these considerations, I argue that *complementary non-IT resources are more relevant during the CRM implementation phase than during the CRM system development phase*. Therefore, although I acknowledge the existence of these complementary relationships, it is beyond the scope of this study to discuss the relationships between IT and non-IT resources in further detail.

Within the context of *complementarity between different IT resources*, Ross et al. (1996, 31) argued that different IT assets controlled by the firm represent necessary and complementary dimensions, which jointly determine the quality of the firm's IT capability. Melville et al. (2004, 294) argued that human IT resources, such as technical and managerial skills, and technology resources, such as IT infrastructure and business applications, are complementary. They further proposed that complementary IT resources "may create temporary competitive advantages that underlie performance differences among firms (p. 301)". This notion is consistent with my previous assumption that that IT resources and IT capabilities are heterogeneous, valuable and rare, and consequently explain performance differences between firms.

Building upon existing literature on resource complementarity, one could argue that both firm-level as well project-level IT resources related to CRM system development are complementary in nature. When complementary IT resources are combined in functional IT processes, they can together lead to superior IT project performance and CRM acceptance prior to CRM business processes. According to Clemons & Row (1991, 280), some IT resources may even be co-specialized, referring to a situation when one resource has little or no value without the other, such as hardware and software. In a similar vein, some IT resources related to CRM system development may also be co-specialized to a certain degree. For example, the lack of a proper IT infrastructure could decrease the value of consultant resources deployed in the CRM system development project. On the other hand, good internal and external relationships, for example, could facilitate the efforts of consultants, leading to synergistic effects between these different types of firm-level and project-level IT resources.

In conclusion, I adopt the general principle that IT resources do interact as complementary. Resource complementarity arguments regarding the mechanisms between different IT resources are consistent with the definition of the research model in this study, which is variance model assuming that higher resource inputs lead to better outcomes (Markus & Robey 1988). I do not attempt to provide additional contributions regarding the specific mechanisms how complementary resources interact, or the causal direction of those mechanisms. Nevertheless, I do attempt to determine the "right" configuration of IT resource inputs into CRM system development capability which provides the best prediction in terms of chosen performance metrics. As proposed by Melville et al. (2004, 301), superior performance results from the appropriate combination of different IT resources.

4.3.2 Resource-picking mechanism

Madakok (2001) discussed two distinct causal rent-creating mechanisms adopted in resource-based theory, namely, *resource-picking and capability-building*. Resource-picking refers to rent creation through the effective selection of resources from strategic factor markets. Capability-building, in turn, refers to rent creation through the effective deployment of resources (p. 387).

In the static resource-based perspective, resource-picking is the dominant mechanism for value creation. According to this view, the resource endowments of the firm, picked from strategic factor markets, explain performance differences. Resource-picking leads to rents when a resource is acquired for a lower cost than its value when used in combination with other resources. Superior information regarding how valuable the resource is, when combined with other resources, is a pre-requisite for rent creation through resource-picking (Madakok 2001, 388).

Capability-building, on the other hand, is the adopted rent-creating mechanism in the dynamic resource-based perspective. Capability-building mechanism asserts that differential performance between firms is explained by heterogeneity in firms' ability to deploy resources effectively (Madakok 2011, 387). Following this rationale, two firms with identical resource endowments achieve different levels of rent. Therefore, capability-building differs fundamentally from the resource-picking mechanism.

In this study, I will adopt the resource-picking mechanism to investigate the relationships between resource-based concepts. I acknowledge that adopting this static, "Ricardian perspective (Madakok 2001, 388)" may be considered a limitation in the present study. Following the resource-picking mechanism, CRM system development capability will be assessed in terms of the quality of resource inputs, which are assumed to predict performance outcomes. As the capability-building mechanism posits, firms are also likely to differ in terms of their ability to deploy resource inputs effectively. Unfortunately, cross-sectional data calls for the adoption of a variance model, which still has the potential to reveal the contributions made by different resources to the higher-order resource bundle, and to key outcomes. However, the static perspective does not improve one's understanding regarding how resources interact, and how capabilities are built and developed through organizational processes (Bhatt & Grover 2005, 257).

Alternatively, the "Schumpeterian perspective (Madakok 2001, 388)", encompassing evolutionary economic theory and organizational routines (Nelson & Winter 1982), the dynamic capabilities perspective (Teece et al. 1997; Eisenhardt & Martin 2000) and the theory of the learning organization (Argyris 1993; Senge 1990), offer process-oriented perspectives to investigate organizational capabilities in ways not possible with static equilibrium models. These dynamic perspectives posit that organizational capabilities dynamically evolve through the interaction between the firm's integrative capabilities and organizational learning, suggesting that process improvements (as opposed to input improvements) explain improvements in organizational capability. However, the research objectives and methodological choices made in the present study do not support the adoption of a dynamic approach.

4.3.3 Resource hierarchies

Kraaijenbrink et al. (2010) discussed the criticisms aimed at RBV with regard to *resource hierarchies*. They argued that resource-based rationale falsely suggests that firms should primarily strive for acquiring higher-order resources, undermining the need for stand-alone, component resources. Kraaijenbrink et al. (2010) posited that while their contributions are different, firms need both types of resources: higher-order resources should thus not be prioritized. Rather, research should focus on investigating the *relationships between them* because they are interdependent and complementary (p. 352).

Furthermore, Kraaijenbrink et al. (2010) argued that resources and capabilities are often conceptualized as capacities, implying that mere possession of resources explains performance differences between firms. Instead, it would make more sense to examine resources in terms of their utilization, or actual use. In this view, one should distinguish between *resource capacity*, i.e. the potential value of the resource, and *resource in action*, i.e. the realized value of the resource (p. 360–362). One could argue that the difference between firm-level and project-level IT resources is similar to the distinction between fixed and variable costs in accounting. Fixed costs exist regardless of specific activities undertaken within the firm, and they are shared between various functions. Variable costs, on the contrary, are specifically allocated and consumed by a given function or project, for instance.

In this study, I examine the relationships between resource hierarchies. I broadly categorize resources into component resources and higher-order resource bundles (capabilities). Capability thus refers to a hierarchical position above stand-alone resources. The core concept in this study, CRM system development capability, is such a higher-order resource. Component resources, in turn, are divided into two categories based on organizational scope and degree of application. For the purposes of this study, these two categories will be referred to as "*firm-level IT resources*" and "*project-level IT resources*". Madakok's (2001) resource-picking mechanism will be used to theoretically rationalize the relationships between firm-level resources and project-level resources.

Although Madakok (2001) referred generally to strategic factor markets, I will adopt his mechanism into the IS development context, which involves resource-picking from both the firm's resource capacity as well as from external markets. The resource-picking mechanism suggests that the firm's ability (1) to collect information to inform strategy formulation, and (2) to use cognitive processes to filter that information, determines the firm's ability choose the right resources in the right combinations (Madakok 2001, 389-390).

In a similar vein, I argue that the higher the firm's IT resource endowments, the better the firm's access to superior information and the firm's ability to pick the appropriate IT resources to be allocated to the CRM project. According to McFarlan (1981), IT project initiatives may fail in terms of implementation difficulties; budget and schedule overruns; below-par IT application quality; and incompatibility with technical and organizational environment. Firms are heterogeneous in terms of their IT resource endowments to deal with these challenges (Mata et al. 1995, 496). For example, firm-level IT resources, such as human IT resources characterized by high technical, managerial and business expertise, are more likely to make more sophisticated decisions regarding resource allocations to IS development initiatives, i.e. project-level IT resources.

In addition to resource-picking, the resource complementarity mechanism can be refined in accordance with the distinctions between the two IT resource categories. Firm-level IT resources represent the traditional strategic view of RBV (and strategic resource perspective in the IT capability paradigm), which examines the relationships between resources and performance at the firm level. Firm-level IT resources exist *a priori* before a CRM system development project is initiated. However, their existence does not necessarily mean that they will be utilized in the context of the CRM project. Following Kraaijenbrink et al. (2010), I posit that *firm-level IT resources represent the resource capacity possessed by the firm*. For example, the firm may possess relationship resources with particular suppliers but may opt not to use them. Similarly the firm may possess managerial skills applicable to a given project but may choose not to allocate them for that particular purpose.

Ravichandran & Lertwongsatien (2005) discussed the channeling perspective of resource complementarity, which argues that firm-level IT resources are not rent-yielding *per se*. The targeted use of IT resources, however, is likely to yield rents. As discussed in Chapter 4.3.1., the traditional interaction perspective of resource complementarity posits that the presence of one resource enhances the value of another resource. The channeling perspective and resource hierarchies, on the contrary, focus on whether a resource is utilized or not. Therefore, the resource complementarity mechanism adopted in this study posits that *firm-level IT resources must be utilized in order to create rents*. In the empirical part of their study, Ravichandran & Lertwongsatien (2005) found that IT resources affect performance outcomes as inputs for functional IT capabilities. In a similar vein, Ross et al. (1996, 36) stressed that IT resources lead to firm performance through the firm's IT system planning, development, operations and support capabilities. These functional IT capabilities must be effective, efficient, strategically aligned and complementary with the firm's business processes.

In summary, firm-level IT resources may or may not be used in the CRM system development project. Firstly, to the extent to which firm-level IT resources are used, they are assumed to affect CRM system development through the resource complementarity mechanism. Second, following the rationale of the resource-picking mechanism, I posit that firm-level IT resources contribute to the firm's ability to pick better IT resources to be allocated to the CRM project. These resources, which are allocated to a specific project, are referred to as project-level IT resources.

Project-level IT resources represent the operational view of RBV and IT capability literature. Specifically allocated to and deployed during the CRM project, *project-level IT resources are assumed to represent resources in action,* i.e. realized resources (Kraaijenbrink et al. 2010). For example, consultant resources specifically acquired for the CRM project are assumed not to be excess capacity; they are consumed during the execution of CRM system development.

Although project-level IT resources have been seldom incorporated into research models in IT capability literature, their inclusion in the present study is justified. Firstly, Ravichandran & Lertwongsatien (2005) demonstrated that the targeted use of IT resources predicts performance outcomes more accurately than mere possession of IT resources. Therefore, a more fine-grained analysis with resource hierarchies is warranted.

Second, Wade & Hulland (2004, 129) argued that a set of more narrowly defined resources should be adopted when specific technologies are being investigated. While broadly defined resources beneficial in terms of generalizability, they may be too abstract to reveal the true relationships that exist between IT resources and performance outcomes. Project-level IT resources adopted in this study may be described as mid-level constructs, striking a balance between an acceptable level of generalizability and adequate specificity (Wade & Hulland 2004, 128–129).

Following the ideas presented by Karimi et al. (2007b) but applied into a CRM context, I focus on five dimensions of IT resources that are critical to building better CRM system development capability and, consequently, better CRM project success and CRM acceptance. As the literature review on CRM/SFA adoption literature and IS success research revealed, these five resources are project management resources, consultant resources, user training, top management support, and user involvement. These IT resources are heterogeneous across firms, are valuable with rent-yielding potential, and have the ability to explain performance differences between firms with respect to CRM system development capability and success. CRM system development capability, in turn, is a higher-order combination of project-level IT resources.

In addition, the impact of firm-level IT resources, through the resource-picking mechanism and resource complementarity, are essential in conceptualizing CRM system development capability. In order to identify the relevant firm-level IT resources related to CRM development capability, I will first discuss the conceptual and empirical developments accomplished in the strategic resource perspective in the IT capability paradigm. Second, I will discuss the previously identified five project-level IT resources in more detail.

In summary, the main implications for this study are:

- *IT resources are divided into resource hierarchies, which include firm-level IT resources, project-level IT resources, and IT capabilities*
- *resource complementarity is adopted as the general theoretical action mechanism between resources; the theoretical assumption is that only utilized resources have complementary effects*
- *the resource-picking mechanism is also adopted to explain relationships between firm-level IT resources and project-level IT resources*

4.4 Firm-level IT resources

Since the IT capability paradigm is a direct extension of resource-based rationale, the resource-based principles, definitions and mechanisms discussed previously are directly applied to the context of IT resources and IT capabilities. Similar to the resource-based discussions, academics within the IT capability paradigm have argued that valuable IT resources are heterogeneously distributed across firms, and they are combined into unique combinations of organizational IT capability (Bharadwaj 2000; Bhatt & Grover 2005). Wade & Hulland (2004, 132), in turn, discussed the resource-based distinction between information technology (IT) and information systems (IS). While information technology is asset-based, information systems are comprised of a combination of resources in order to make productive use of information technology.

Based on existing IT capability literature, Table 10 summarizes alternative categorizations of firm-level IT resources that could act as factor inputs for IT capability (Pavlou & El Sawy 2006, 203). There are many similarities between the suggestions made by different authors. Technology resources (IT infrastructure), human IT resources, and IT relationship resources (IT partnerships), are present, under different terminologies, in most IT resource categorizations including those suggested by Ross et al. (1996), Ravichandran & Lertwongsatien (2005), Feeny & Willcocks (1998) and Bhatt & Grover (2005), respectively.

Based on this consensus, I classified the key IT resources critical to developing IT capability into (1) technology resources; (2) human IT resources; and (3) IT relationship resources. According to Ross et al. (1996, 31), these IT assets are all necessary and complementary dimensions of the firm's IT resource endowments which determine the quality of the firm's functional IT capabilities, such as IT system planning, delivery, and support.

Table 10 IT-related resources that combine to form IT capability

Author(s)	IT resources
Mata et al. (1995)	Access to capital; Proprietary technology; Technical IT skills; Managerial IT skills
Ross et al. (1996)	Human assets; Technology assets; Relationship assets
Powell & Dent-Micallef (1997)	Technology resources; Complementary human IT resources; Complementary business resources
Feeny & Willcocks (1998)	Design of IT infrastructure; Business & IT vision; Delivery of IS services
Bharadwaj (2000)	IT infrastructure; Human IT resources; IT-enabled intangibles
Sambamurthy et al. (2003)	IT investment scale; IT capabilities
Tippins & Sohi (2003)	IT objects; IT knowledge; IT operations
Benjamin & Levinson (1993)	Organisational resources; Technical resources; Business resources
Ravichandran & Lertwongsatien (2005)	IT infrastructure; IS human capital; IS partnership quality
Bhatt & Grover (2005)	IT infrastructure; IT business experience; Relationship infrastructure
Dehning & Stratopoulos (2003)	Managerial skills, Technical skills; Infrastructure
Armstrong & Sambamurthy (1999)	Size; Quality of senior leadership; Sophistication of IT infrastructure

Technology resources, or IT infrastructure, refer to the firm's shared IT assets: platforms, networks, hardware, telecommunications, datacenters, and software such as databases, middleware and applications (Broadbent, Weill &

Neo 1999; Silver et al. 1995). IT infrastructure is the base foundation upon which all applications can be built and integrated (Feeny & Willcocks 1998). Sophisticated IT infrastructure is essential for the effective and efficient development and integration of IT applications (Ross et al. 1996). The development of a high-quality IT infrastructure requires considerable investment in terms of time and expertise (Dehning & Stratopoulos 2003, 11), while the lack of such IT infrastructure may substantially restrict the firm's ability to develop information systems effectively and efficiently (Bharadwaj 2000).

IT infrastructure has been identified by several studies as an IT resource with value-creating potential (Bhatt & Grover 2005, 258), although some authors have claimed that IT infrastructure has become a commodity-like asset that can be freely purchased from the marketplace (Mata et al. 1995; Powell & Dent-Micallef 1997). According to Bharadwaj (2000, 172), however, this assertion should be dismissed as an overly simplistic view, which fails to acknowledge the idiosyncratic nature of an integrated IT infrastructure. Furthermore, a sophisticated IT infrastructure is an artifact of the firm's accumulated experience and expertise in IT project execution.

Human IT resources can be defined as the training, experience, relationships, and insights of the firm's employees in the IT function (Bharadwaj 2000, 173). Hall (1993, 616) argued that employee know-how is one of the most important contributors to firm success. Mahoney & Pandian (1992, 365), among others, suggested that human IT skills are important sources of advantage. Although IT employees are mobile resources easily acquired in factor markets (Wade & Hulland 2004), Bharadwaj (2000, 174) argued that human IT resources are relatively difficult imitate in terms accumulated organizational knowledge, suggesting their potential to be a source of SCA.

Human IT resources include all technical, business, managerial, and interpersonal skills related to the IT function (Mata et al. 1995). *Technical IT skills* refer to the expertise required to develop, maintain and utilize IT applications to support the firm's operations (Dehning & Stratopoulos 2003, 10; Mata et al. 1995, 498). Technical IT skills also refer to the ability to recognize future opportunities to apply new technologies (Ross et al. 1996). More specifically, technical IT skills include programming skills and system analysis, design and development (Bharadwaj 2000, 173). Technical IT skills are highly mobile IT resources and widely available in factors markets, and can be acquired relatively easily from external sources. Therefore, they are valuable in terms of competitive parity but are not likely to lead to SCA (Mata et al. 1995, 500) which was empirically supported by Dehning & Stratopoulos (2003).

Business IT skills refer to the ability of IT personnel to understand the goals and needs of business departments (Feeny & Willcocks 1998), ensuring that IT strategy and business strategy are appropriately aligned (Bhatt & Grover

2005, 260). Ross et al. (1996, 33), in turn, discussed the importance of business understanding and business problem-solving. Business understanding among IT personnel develops over time through frequent interaction and accumulated experiences with business units. Solving business problems, on the other hand, refers to the ability of IT staff to come up with creative technical solutions to improve business processes.

Managerial IT skills refer to the ability to plan, develop, manage, coordinate, and provide leadership for IT-related activities to enhance other business functions (Mata et al. 1995, 498). Managerial IT skills are particularly important in terms of facilitating co-operation between IT and business departments which is often problematic in firms (Mata et al. 1995, 499). Consequently, managerial IT skills are considered to be sources of SCA (Dehning & Stratopoulos 2003; Mata et al. 1995).

Interpersonal skills are important in creating and maintaining relations between IT and stakeholders within and outside the firm (Lee, Trauth & Farwell 1995). Furthermore, interpersonal skills are considered to be in shorter supply among IT personnel compared with, for example, their technical IT skills (Feeny & Willcocks 1998, 17). In any case, interpersonal skills facilitate the firm's IT activities by facilitating knowledge sharing across departmental and organizational boundaries.

Relationship resources are organizational resources which refer to all IT-related internal and external partnerships of the IT department. Mutual trust, reciprocal commitment, bilateral information exchange, goal congruence, sharing risk and responsibility, and lack of conflicts, have all been found crucial elements in building and maintaining beneficial relationships (Bharadwaj 2000; Bhatt & Grover 2005), which take years to develop through a socially complex history of co-operative interactions (Mata et al. 1995). Relationship resources are thus path-dependent, firm-specific, imperfectly imitable and substitutable. Therefore, are considered to be particularly important IT resources as they are not generally available in strategic factor markets (Wade & Hulland 2004, 121).

Relationship resources can be divided into internal and external partnerships (Ravichandran & Lertwongsatien 2005; Ross et al. 1996). *Internal partnerships* refer to the relationship between the IT department and the business units, which have been identified as an important IT resource (Swanson 1994). Bhatt & Grover (2005, 261) argued that without effective coordination between IT and business units, it is difficult to acquire, deploy and leverage IT resources effectively and efficiently.

Internal partnerships, which have also been referred to as synergy (Bharadwaj 2000), assimilation (Armstrong & Sambamurthy 1999) and relationship building (Feeny & Willcocks 1998), are crucial in converging over the traditional gaps between different functions and departments, and in supporting co-operation between these units to secure strategic alignment between IT and business strategy (Wade & Hulland 2004, 114), and to ensure needed functionalities and effective business solutions (Rockart et al. 1996, 47). To achieve these objectives, business units must be heavily involved in IS initiatives (Rockart et al. 1996, 54) where shared risk and responsibility require mutual trust and respect, and effective communication and coordination between the IT and business functions (Ross et al. 1996, 34; Feeny & Willcocks 1998, 13).

External partnerships, in turn, refer to the stakeholder relationships between the IT department and external third parties, such as IT software vendors and IT service providers (Benjamin & Levinson 1993). Similar to internal partnerships, mutual trust, reciprocal commitment, bilateral information exchange, goal congruence and lack of conflicts are important in building good external relationships. Feeny & Willcocks (1998) argued that the establishment, development and management of IT strategic partnerships and outsourcing are at the heart of the firm’s IT strategy. Firms rely on external partners for a significant part of the work done in IS projects (Rockart et al. 1996), suggesting that external partnerships are indeed an important organizational IT resource (Wade & Hulland 2004, 113).

In addition to the firm-level IT resources above, I propose *IT planning capability*[23] as a relevant firm-level concept for this study. The inclusion of IT planning capability is based on the rationale that it must precede IT system development capability. Deephouse, Mukhopadhyay, Goldenson & Kellner (1996), for example, stressed that IT project planning is an important determinant of IT project success.

IT planning capability has its theoretical roots in the strategic information systems planning (SISP) discourse in IS research (e.g. Venkatraman 1985; Segars & Grover 1998), and has been acknowledged as an important factor in conceptual (Rockart et al. 1996; Ross et al. 1996) and empirical studies (Powell & Dent-Micallef 1997; Ravichandran & Lertwongsatien 2005) in the IT capability field. Segars, Grover & Teng (1998) identified the key characteristics of successful IT planning as formalization of methodologies (rules and procedures to guide activities); comprehensiveness of solution search; participation of business units; and top management involvement.

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23 Similarly with IT system development, IT planning has been conceptualized as a combination of various resource inputs in existing literature (e.g. King 1988; Segars, Grover & Teng 1998). These resource inputs include, for example, IT planning skills, technical IT skills, computer-based planning models, adequate budgets, and a formalized planning process (Chang & King 2005). Hence, I refer to it as IT planning capability (Ravichandran & Lertwongsatien 2005).

SISP takes place at different levels, ranging from operational to strategic levels (King 1988, 103). At the strategic level, SISP success is assessed through the fulfilment of key strategic objectives, and the improvement of SISP capabilities (Segars & Grover 1998; Venkatraman & Ramanujan 1987). For the purposes of this study, the operational level of IT planning is of particular interest, which addresses issues related to the planning of individual information systems[24]. In this view, IT planning capability leads to clearly identified IT priorities and a plan for development and implementation (Powell & Dent-Micallef 1997) which ensures that IS initiatives are appropriately aligned with the business objectives set by line management (Ross et al. 1996; Rockart et al. 1996). Sound IT planning also ensures that technical and information output requirements related to individual information systems are addressed, ultimately leading to end-user satisfaction (Venkatraman 1985). Furthermore, co-operation between IT, line management and end-users can be improved through sophisticated IT planning (Ravichandran & Lertwongsatien 2005; Segars & Grover 1998).

In summary, the main implications for this study are:

- *firm-level IT resources (technology, human IT and IT relationship resources) and IT planning capability are antecedents of IT capability*

4.5 Project-level IT resources

Ross et al. (1996, 31) extended the traditional resource-based notion of organizational capabilities to the firm’s IT function, defining IT capability as a firm’s ability to identify systems meeting business needs, to deploy these systems in a cost-effective manner, provide long-term maintenance and support for these systems, and to have a positive impact on business objectives through the implementation of IT systems. Bharadwaj (2000), in turn, defined a firm’s IT capability as “its ability to mobilize and deploy IT-based resources in combination or co-present with other resources and capabilities (p. 171)”.

Ravichandran & Lertwongsatien (2005, 244) elaborated that IT capabilities are services delivered by the IT department to the organization which include IT planning, IT system development, IT support, and IT operations capabilities. These are functional capabilities, which Hall (1993) defined as “the

[24] King (1988, 105) included IS policies, IS development programs, and IS design-development procedures as operative-level outputs of IT planning. He also suggested that the appropriate evaluation measure is IT planning effectiveness, which refers to how well IT planning has met its goals. Goals include, for example, the identification of new IS opportunities; improved quality in the evaluation of IS proposals; and the business impact of IS initiatives (p. 107-108).

ability to do specific things; it results from knowledge, skill and experience of employees, and others in the value chain (p. 610)".

While the importance of IT management resources has been highlighted in IS literature, IT functional capabilities have been somewhat ignored. Ravichandran and Lertwongsatien (2005, 258) argued that one possible explanation is the implicit belief that IT functional capabilities are freely tradable commodity services that could be purchased from external sources, and should be primarily managed with a cost-reduction focus. However, this explanation does not consider that functional capabilities represent a unique combination of complementary resources deployed in firm-specific contextual settings. The customization of technology, and its adaptation to the business processes of the firm, suggests that IT system development is complex, valuable, and difficult to imitate (Melville et al. 2004, 301). In this study, the complementary resources forming CRM system development capability are referred to as project-level IT resources.

Operational IT capability literature offered few conceptualizations with regard to project-level IT resources. In the IS development context, only Karimi et al. (2007b) and Ethiraj et al. (2005) employed a resource-based perspective. Nevertheless, RBV offers a useful theoretical lens to draw influences from other streams of IS research and from CRM/SFA adoption literature in marketing.

Based on the literature review, I concluded that any conceptualization of CRM system development at the project level should include the following different, complementary factors: (1) project management resources; (2) consultant resources; (3) training resources; (4) top management support; and (5) user involvement[25]. Project management resources and consultant resources were derived from IS success research. Therefore, the following definitions will be borrowed from the IS discipline. With regard to user training, top management support, and user involvement, I will mainly refer to marketing scholars but also to supporting evidence from IS research.

Project management resources consist of the expertise, experience, skills, and methodologies that are needed in managing IS development throughout its lifecycle. These resources include business, technical, and managerial skills, which are often the result long-term interaction IT and client departments (Karimi et al. 2007b, 226).

Project management performs key processes such as planning and control (Wallace et al. 2004, 292). Poor planning and control by project management often leads to unrealistic schedules and budgets. Without accurate duration

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25 For a list of references categorized by each factor, see Appendix 2.

estimates, managers do not know what resources to commit to the development project. With regard to output quality, poor project management is likely to contribute to user needs and requirements not being met, or other dimensions of system quality (Wallace et al. 2004, 294). In addition, project management resources enhance the establishment of formal and informal communication between target users, project team members from different departments, and external organizations involved in the IS development project (McFarlan 1981).

The presence of knowledgeable and capable consultants is a significant resource in IS projects (Ramachandran & Gopal 2010). *Consultant resources* are particularly important in relation to the technological aspect of CRM system development. Developing sophisticated CRM systems require highly specialized knowledge and expertise which are not typically possessed by the firm's IT department personnel. Zmud (1980, p. 46) identified the use of specialized technologies and changes that alter system design as key problem areas in IS development projects. Therefore, firms usually outsource these resources from external IT vendors and/or IT service providers (Rockart et al. 1996, 49).

Training resources have been defined as the degree to which an organization has instructed target users in using the CRM technology in terms of quality and quantity (Schillewaert et al. 2005, 327). Firstly, training ensures that employees develop adequate skills in using the CRM/SFA technology in question (Morgan & Inks 2001, 466; Pullig et al. 2002, 409). Second, training should demonstrate how using the system relates to potential benefits for target users (Morgan & Inks 2001, 466). Individuals must perceive the benefits of training as outweighing the costs in terms of time and effort (Morgan & Inks 2001, 469). Third, user training helps reduce the ambiguity related to new technology, and facilitates learning on how to benefit from the new technology.

The success of an innovation is greatly influenced by organizational stakeholders, particularly senior management (Rogers 1995). In a similar vein, *top management commitment/ support* has been emphasized to be a key organizational factor explaining CRM/SFA success (Becker et al. 2009; Chen & Popovich 2003; Speier & Venkatesh 2002) and IS success in general (Barki et al. 1993; Järvenpää & Ives 1991). In the IS development phase, the importance of top management commitment has also been widely documented (Powell & Dent-Micallef 1997; Armstrong & Sambamurthy 1999; Feeny & Willcocks 1998).

In particular, top management is crucial in communicating the functionality of IT to stakeholders, and ensuring resource availability (Powell & Dent-Micallef 1997, 381). Organizational change management is more likely to be successful with full support coming from the highest levels of the organization (Cascio et al. 2010; Ross et al. 1996). Users are less likely to commit to CRM/SFA technology if management fails to display commitment (Morgan & Inks 2001, 466). Furthermore, top management brings visibility and credibility to the project, and ensures sufficient provision of necessary resources (Karimi et al. 2007b, 228).

User involvement[26] of business users has long been recognized as a key factor in IS project success (Barki & Hartwick 1994; Boynton, Zmud & Jacobs 1994; Franz & Robey 1986). User participation refers to various design-related activities the target user community performs during the system development process. User involvement leads to better understanding of the system, realistic expectations about system capabilities, thereby decreasing resistance and increasing commitment through a sense of ownership (Avlonitis & Panagopoulos 2005, 358; Morgan & Inks 2001, 467). The lack of user involvement, on the other hand, particularly in designing system specifications, is one of the most often cited risks affecting project performance (McFarlan 1981; Wallace et al. 2004).

In summary, the main implications for this study are:

- *project-level IT resources including project management, consultants, training, top management support, and user involvement, form a parsimonious conceptualization of CRM system development capability*

4.6 Summary of IT resources

In light of mixed results related to the relationship between IT resources and firm performance, Bharadwaj (2000) stressed the need for better theoretical models (p. 170). Based on recent theoretical and empirical developments made in the operational IT capability perspective, I argue that IT resources can only impact firm performance through performance improvements at the operative process level (Ray et al. 2005). In a similar vein, Ravichandran & Lertwongsatien (2005) demonstrated in their empirical study that firm performance is achieved through process-level functional IT capabilities, which represent the targeted use of IT resources. Based on these considerations, *I conceptualize CRM system development capability as a project-level construct*

[26] Barki & Hartwick (1989) provided a comprehensive analysis about the conceptual differences between user participation, a set of behaviors and activities, and user involvement, a psychological state, in IS, psychology and marketing research. Regardless of which term is used, IS research has consistently measured user participation/ involvement as a behavior in the system development process. Therefore, the terms will used interchangeably in the present study.

formed by a configuration of project-level IT resources which is affected indirectly by IT resources through the resource-picking and resource complementarity mechanisms.

In order to tackle these phenomena, I divided IT resources into (1) firm-level IT resources, representing the IT resource capacity of the firm, and (2) project-level IT resources, referring to IT resources specifically allocated to and realized jointly in the CRM system development project, forming higher-order resource bundle called CRM system development capability. In summary, I identified the following IT resources to be relevant to the present study (Table 11)

Table 11 IT resources relevant to CRM system development capability

Firm-level IT resources	**CRM system development capability**
Technology resources	Project management resources
Human IT resources	Consultant resources
Relationship resources	Training resources
IT planning capability	Top management support
	User involvement

As discussed earlier, firm-level IT resources are theorized to influence CRM system development capability through project-level IT resources indirectly following the resource-picking and resource complementarity mechanisms. Furthermore, firm-level IT resources are theorized to influence CRM system development capability only to the extent that they are actually used. In summary, firm-level IT resources are theorized to be antecedents of CRM system development capability.

Project-level IT resources, in turn, are theorized to act as resource inputs, which together form a unique, higher-order combination of resources called CRM system development capability. Following the static, equilibrium-oriented resource-based perspective, variations in resource inputs are theorized to explain variation in CRM system development capability.

In conclusion, I will present a research model in the following chapter, linking these resource-based concepts into an integrated model. The appropriate outcome variables will be added to research model to allow for the empirical assessment of the resource-based conceptualization of CRM system development. Firm-level IT resources in the research model will be represented by their empirical counterpart measures, which were adopted from existing IT capability studies.

5 RESEARCH MODEL AND HYPOTHESES

This dissertation posits that the key outcomes – (1) a firm's ability to develop a high quality CRM system, (2) and to ultimately achieve CRM acceptance among employees - is determined by the firm's CRM system development capability. Based on the theoretical mechanisms of resource-picking and resource complementarity, I present a research model (Figure 3) that conceptualizes CRM system development capability, its antecedents and consequences.

The research model conceptualizes links between five main theoretical groups:

- firm-level IT resources (five constructs)
- CRM system development capability (formed by five dimensions of project-level IT resources)
- CRM project performance (two constructs)
- CRM acceptance (two constructs)
- IT structural risks as moderators (three constructs)

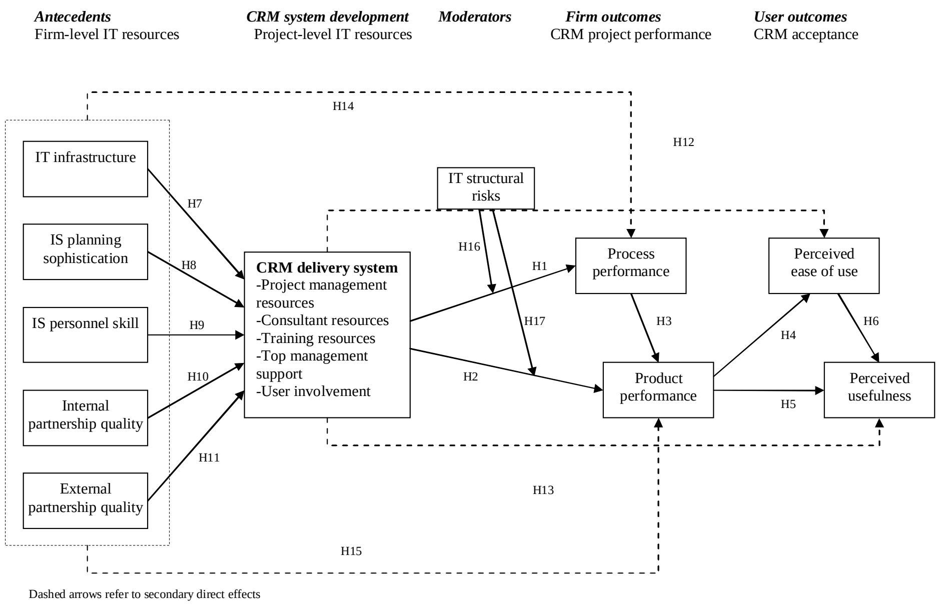

Figure 3 Research model

More specifically, the research model is a variance model operating under the general logic that higher levels of content in independent variables are associated with higher levels of content in dependent variables (Markus & Robey 1988). This study adopts resource-picking and resource complementarity mechanisms to explain relationships between different hierarchies of IT resources. Based on these resource-based mechanisms, key outcomes CRM project performance and CRM acceptance are achieved depending upon the organization's ability to pick and utilize IT resources at CRM project level to achieve superior CRM system development capability.

It is important to note that the concept *CRM delivery system serves as an empirical surrogate measure for CRM system development capability*. Firm-level IT resources, namely, technology resources, human IT resources, IT relationship resources, and IT planning capability are also represented by empirical counterpart measures, which were adopted from existing IT capability studies. More specifically, *IT infrastructure* is a surrogate measure for technology resources; *IS personnel skill* for human IT resources; *internal partnership quality* and *external partnership quality* for relationship resources; and *IS planning sophistication* for IT planning capability. The hypotheses proposed in this study are summarized in Table 12 below.

Table 12 Summary of proposed hypotheses

Hypothesis	Main effects
H1	CRM delivery system quality is positively associated with process performance.
H2	CRM delivery system quality is positively associated with product performance.
H3	Process performance is positively associated with product performance.
H4	Product performance is positively associated with perceived ease of use.
H5	Product performance is positively associated with perceived usefulness.
H6	Perceived ease of use is positively associated with perceived usefulness.
H7	IT infrastructure is positively associated with CRM delivery system quality.
H8	IS planning sophistication is positively associated with CRM delivery system quality.
H9	IS personnel skill is positively associated with CRM delivery system quality.
H10	Internal partnership quality is positively associated with CRM delivery system quality.
H11	External partnership quality is positively associated with CRM delivery system quality.
	Direct effects
H12	CRM delivery system quality is positively associated with perceived ease of use, which is mediated by product performance.
H13	CRM delivery system quality is positively associated with perceived usefulness, which is mediated by product performance.
H14a-e	H14: (a) IT infrastructure; (b) IS planning sophistication; (c) IS personnel skill; (d) internal partnership quality; (e) external partnership quality is positively associated with process performance, which is mediated by CRM delivery system quality.
H15a-e	H15: (a) IT infrastructure; (b) IS planning sophistication; (c) IS personnel skill; (d) internal partnership quality; (e) external partnership quality is positively associated with product performance, which is mediated by CRM delivery system quality.
	Moderating effects
H16a	The relationship between CRM delivery system quality and process performance is moderated by relative project size.
H16b	The relationship between CRM delivery system quality and process performance is moderated by application complexity.
H16c	The relationship between CRM delivery system quality and process performance is moderated by requirements uncertainty.
H17a	The relationship between CRM delivery system quality and product performance is moderated by relative project size.
H17b	The relationship between CRM delivery system quality and product performance is moderated by application complexity.
H17c	The relationship between CRM delivery system quality and product performance is moderated by requirements uncertainty.

The focal construct, CRM delivery system, is formed by a combination of project-level IT resources. The direct outcome variables of CRM delivery system are CRM process performance and CRM product performance (i.e. CRM system quality), which constitute CRM project performance. Hypotheses H1-H3 address these relationships.

Hypotheses H4-H6 test the relationships between the IT-oriented outcome variable, CRM product performance, and the marketing-oriented outcome variables, perceived ease of use and perceived usefulness (i.e. CRM acceptance).

Firm-level IT resources - IT infrastructure, IS personnel skill, internal partnership quality, external partnership quality, and IS planning sophistication - are conceptualized as antecedents of CRM delivery system quality. These antecedent relationships are tested through hypotheses H7-H11.

The direct relationships between CRM delivery system, perceived ease, and perceived usefulness are included as hypotheses H12-H13 to substantiate whether a direct relationship exists, while an indirect relationship is primarily hypothesized through the mediating construct CRM product performance. These foundational relationships H12-H13 are illustrated with dashed arrows following the example by Ahearne et al. (2008).

The direct relationships between firm-level IT resources, CRM process performance, CRM product performance are formulated into hypotheses H14-H15. Similarly with H12-H13, these direct effects are not expected to represent the primary action mechanism between firm-level IT resources and CRM project performance. Rather, CRM delivery system is expected to mediate this relationship. Therefore, the direct effects H14-H15 are also illustrated with dashed arrows.

Finally, the moderating effects of IT structural risks on the relationship between CRM system development capability, CRM process performance, and CRM product performance will be tested through hypotheses H16-H17.

Next, all hypotheses put forward in this study will be discussed and theoretically justified.

5.1 CRM system development capability and CRM project performance

Based on the literature review of relevant IS research, I found that any model conceptualizing CRM system development should include organizational resources such as top management support, user training, and user involvement; and human IT resources such as consulting resources and project management resources. Firstly, top management support is a significant driver of adequate resource allocations for the CRM project (Karimi et al. 2007b; Powell & Dent-Micallef 1997), and adequate stakeholder commitment (Cascio et al. 2010; Ross et al. 1996). Second, user training is necessary for employees to develop adequate skills in using the CRM application (Pullig et al. 2002), to learn how to benefit from CRM use, and to achieve employee buy-in (Morgan

& Inks 2001). Third, user involvement plays a crucial role in designing an appropriate CRM system that meets user requirements (Barki & Hartwick 1994), and facilitates user commitment through a sense of ownership (Avlonitis & Panagopoulos 2005; Morgan & Inks 2001). Fourth, consultants are necessary to CRM system development, which requires individuals with specialized knowledge and expertise to develop technological solutions (Ramachandran & Gopal 2010; Zmud 1980). Finally, project management performs key processes such as planning and control (Wallace et al. 2004) and plays a vital role in enhancing communication between different stakeholders in the development project (McFarlan 1981). These five project-level IT resources combine to form the complementary dimensions of CRM system development.

Drawing from resource-based theory, CRM system development is conceptualized as a higher-order resource, i.e. capability. Following the resource complementarity mechanism, project-level IT resources are expected to form a higher-order resource combination, which represents the firm’s CRM system development capability. Project-level IT resources are assumed to have synergistic effects on one another, and their rent-creating potential in isolation is limited. Project-level IT resources have a direct effect on the firm’s CRM system development capability as its complementary dimensions.

As CRM system development capability is the key concept in the present study, I will now provide a comprehensive analysis regarding (1) the conceptualization of CRM system development capability as a configuration of five dimensions; and (2) the validity of operational measures available in existing research to serve as an empirical surrogate of CRM system development capability.

CRM system development capability is closely related to the concept of innovation delivery system - which has been significantly influenced by resource-based theory - in innovation research. For the purposes of this study, the most appropriate operational measure of the CRM system development construct found in existing research was the concept “ERP delivery system” (ERPDS) developed for the enterprise resource planning (ERP) systems context (Karimi et al. 2007a). They compared Fichman’s (2004a) innovation configuration factors with critical success factors identified in ERP literature. Based on this review, ERPDS included four dimensions, namely, project management resources, consultant resources, training resources, and top management support. Karimi et al. (2007a) found empirical support for the higher-order ERPDS construct, and concluded that these dimensions were unlikely to result in improved ERP performance individually. Rather, the combined effect of complementary factors is a more realistic representation of IS development than measuring the effects of these factors on performance outcomes in isolation (Gemino et al. 2008; Akkermans & van Helden 2002; Wade & Hulland 2004).

In this study, all four dimensions of ERPDS were identified as important factors related to CRM system development. Due to strong support in CRM/SFA literature (e.g. Avlonitis & Panagopoulos 2005; Morgan & Inks 2001; Speier & Venkatesh 2002) and IS success research (e.g. Barki & Hartwick 1994; Boynton et al. 1994; McFarlan 1981), user involvement is included as a fifth dimension in the CRM context. As mentioned earlier, user involvement leads to better understanding of the CRM system, realistic expectations about system capabilities, thereby decreasing resistance and increasing commitment through a sense of ownership (Avlonitis & Panagopoulos 2005, 358; Morgan & Inks 2001, 467).

Therefore, encompassing five complementary dimensions, the empirical construct of CRM system development capability will be referred to as *CRM delivery system* (*CRMDS*). This term will be used because four out of five dimensions were adopted from Karimi et al.'s (2007a) original ERP delivery system construct. From a theoretical viewpoint, however, CRM system development capability and CRM delivery system are conceptually strikingly similar. In IT capability literature, system development capability is defined as the ability to develop high quality systems in a cost-effective manner (Ravichandran & Lertwongsatien 2005, 245), i.e. "the quality of the systems delivery process (p. 250)". In IT innovation literature, an innovation delivery system refers to "the means by which an innovation is supported, managed, and nurtured (Karimi et al. 2007a, 105)", which enable firms to innovate more efficiently and effectively (Fichman 2004a, 316). Based on these apparent similarities by definition, I argue that these concepts can be used interchangeably.

To elaborate on the justification of using these concepts interchangeably, it is useful to mention that Karimi et al. (2007b) developed a very similar construct to ERP delivery system called "IS resources", which they employed from a resource-based perspective in the ERP context. This construct was also conceptualized as a higher-order resource combination, which included knowledge resources (business process knowledge, project management knowledge); relationship resources (user involvement, top management involvement); and IT infrastructure resources. Compared with the dimensions of ERP delivery system, business process knowledge was similar to consultant resources, project management knowledge similar to project management resources, and top management involvement similar to top management support. Based on this comparison, it is evident that the concepts of innovation delivery system and system development capability are closely related. Similarly with the definition CRM system capability adopted in this study, Karimi et al.'s (2007b) concept IS resources was defined as a higher-order bundle of deployed project-level IT resources. In this study, however, IT infrastructure resources are defined as a firm-level IT resource and will thus be excluded from the CRM delivery system construct, which is a project-level phenomenon.

As CRM system development capability and its dimensions are conceptualized at the CRM project level, I have chosen to establish a direct relationship to IT project-level outcomes. Wade & Hulland (2004) argued that RBV research has been limited to firm-level outcomes, "particularly in the case of IS resources that affect the firm at many levels (p. 129)". Wade & Hulland (2004) concluded that it is thus particularly useful to employ process, project or department level performance measures. The most well-established IT project-level outcome measures are IT process performance and IT product performance which were developed by risk and project management theorists. Furthermore, the adaptation stage in Cooper & Zmud's (1990) innovation-diffusion model of IT implementation (Table 2) is theoretically very similar. Following their definition of adaptation, the direct output of CRM system development capability is the CRM application available for use (Cooper & Zmud 1990, 124). CRM acceptance, in turn, represents the next stage of IT implementation in their model. Next, I will provide further theoretical justification for the hypothesized relationship that exists between CRM system development capability and IT project performance.

To assess CRM system development success directly, I adopted two well-established measures of IS success, which have been developed in risk management theory: *process performance* and *product performance* (Nidumolu 1995). Together they constitute the concept of project performance (Barki et al. 2001). Process performance refers to project efficiency and is primarily assessed on the basis of meeting project budget and schedule estimates. Product performance is related to the quality of the developed information system itself, i.e. whether the system meets the needs of system users and the expected benefits to the organization.

CRM system development capability and CRM delivery system, as I defined it, have not been theoretically discussed or empirically tested in existing research. However, the five complementary dimensions forming CRM system development capability have been investigated as separate entities, both theoretically and empirically, in relation to process performance and product performance.

The role of project management is equally important to both aspects of project performance: while some project management resources are directed at delivering a high quality information system, others focus on ensuring a cost-effective and timely development process (Gemino et al. 2008, 37). Project management performs key processes such as planning and control (Wallace et al. 2004, 292), which are vital for meeting schedule and budget estimates. With regard to CRM system quality, project management enables user needs and requirements to be met by establishing formal and informal communication between target users, project team members, and external partners (McFarlan 1981). Furthermore, project management resources are are necessary to coordinate different areas of expertise with tasks (Bharadwaj 2000; McFarlan 1981).

Gemino et al. (2008, 34) reported that project management resources are significantly related to process and product performance (Gemino et al. 2008, 34), which is also supported by findings by Nidumolu (1995), Faraj & Sproull (2000), and Ethiraj et al. (2005). Based on this discussion, I expect project management resources to be a highly significant dimension in CRM system development capability.

The expertise of consultants, in turn, decreases the risk of unexpected technical problems, which would negatively affect both process and product performance through time delays, extra effort, and shortcomings in system design (McFarlan 1981; Ramachandran & Gopal 2010). Technological changes that alter system design, for example, is a key risk in IS development (Zmud 1980). Most importantly, consultants are responsible for transforming user needs into technological solutions. Therefore, consultant resources are a necessary factor to deliver high CRM system quality within acceptable monetary and time constraints.

User training resources help identify gaps between technology and user environment, and help avoid costly and time-consuming modifications during CRM system development. Thus, I argue that user training contributes to both process as well as product performance. User training in the system development phase is expected to influence product performance, which is expected to strengthen the effect of user training on CRM acceptance. In marketing research, training resources have been found to be an important organizational factor predicting CRM acceptance (Buehrer et al. 2005; Cascio et al. 2010; Schillewaert et al. 2005; Hunter & Perreault 2007). In these studies, user training primarily referred to user training provided in the CRM implementation phase.

Top management has a key role in facilitating project team co-operation across functional barriers (Leonard-Barton & Deschamps 1988), bringing credibility to change management efforts (Cascio et al. 2010; Ross et al. 1996), communicating the functionality of IT to stakeholders (Karimi et al. 2007b), and ensuring resource availability (Karimi et al. 2007b). These contributions are likely to result in improvements in terms of both process performance as well as product performance. Hence, I posit that top management support predicts process and product performance in the CRM context.

In IT capability literature, top management commitment has also been identified as a crucial factor in IS initiatives (Powell & Dent-Micallef 1997; Armstrong & Sambamurthy 1999; Ross et al. 1996). In other IS studies, top management support has been found to influence IT process performance (Barki et al. 2001; Wallace et al. 2004) and product performance (Barki et al. 1993). Top management support during CRM implementation has been found to be an important predictor of CRM acceptance (Cascio et al. 2010; Speier & Venkatesh 2002).

User involvement is valuable in defining system functional and design requirements, and, consequently, increases the likelihood that the delivered system meets user needs and requirements (Karimi et al. 2007b, 227). It also decreases the expenses and delays caused by modifying system requirements. Training resources and user involvement are expected to affect process and product performance in a similar fashion. However, user involvement addresses mainly requirements definition, while user training addresses the transferability of those requirements onto the target user community. Based on these considerations, I argue that user involvement has a positive impact on process performance and product performance.

User involvement of business users has long been recognized as a key factor in IS project success (Barki & Hartwick 1994; Boynton et al. 1994; Franz & Robey 1986). User involvement has been found to have a positive impact on process performance (Barki et al. 2001; Wallace et al. 2004) and product performance (Gemino et al. 2008). User involvement has also been reported to influence CRM acceptance (Avlonitis & Panagopoulos 2005; Morgan & Inks 2001; Speier & Venkatesh 2002).

In summary, building CRM system development capability/CRM delivery system deals with removing the barriers between the technology being developed and the organizational environment into which it is being brought (Karimi et al. 2007b, 225). The examination of complex phenomena such as CRM system development requires a holistic configuration of antecedent factors, which interact to produce an IT innovation efficiently and effectively. In this approach, the key research objective is to identify which factors are relevant in predicting these outputs (Fichman 2004a, 320).

Project management and consultant resources, on the one hand, are deployed to ensure that the technical challenges in CRM system development are dealt with effectively and efficiently. Training resources, top management support, and user involvement, on the other hand, are deployed to support organizational change and to identify the needs and requirements of the target user community.

Based on the resource complementarity mechanism, I argue that these five project-level IT resources are necessary pre-requisites of CRM project success in terms of cost-effective project delivery as well as a high quality CRM system. They are complementary to each other and do not work in isolation. For example, top management support would be of little use if technical issues could not be overcome due to poor consulting resources. In a similar vein, experienced and competent consultants would not be able to deliver a correctly specified CRM system without knowing the firm-specific user requirements, obtained through sufficient user involvement.

Therefore, the combined effect of input resources, namely, CRM system development capability/ CRM delivery system (CRMDS), is expected to have a collective impact on CRM project performance. Firms that possess high levels of these complementary project-level IT resources are expected to achieve higher levels of process performance, i.e. meeting schedule and budget targets, and product performance, i.e. CRM system quality. I hypothesize that:

H1: CRM delivery system quality is positively associated with process performance.

H2: CRM delivery system quality is positively associated with product performance.

In addition, process performance and product performance may have trade-offs as more time and money may be required to develop a better-quality system, which necessitates their measurement as separate entities. Developing a high quality system may require time and/or cost estimates to be overrun (Gemino et al. 2008, 17). On the other hand, efficiently completed IS projects below time and cost estimates may deliver poor system quality (Nidumolu 1995, 194).

Generally speaking, however, projects plagued by budget and cost overruns are less likely to result in a high quality system (Wallace et al. 2004, 294). Successful IS projects are often characterized by high process performance and high product performance. I expect that CRM systems delivered in a cost-effective manner is an indicator of, to a certain degree, of high CRM system quality. Therefore:

H3: Process performance is positively associated with product performance.

In summary, I expect to find positive relationships between CRM system development capability/ CRM delivery system, process performance, and product performance in Hypotheses H1-H3. In the next section, I will provide a theoretical rationale for the relationship between product performance, i.e. CRM system quality, and CRM acceptance. Hence, an IT-oriented CRM success measure is linked with a marketing-oriented CRM success measure.

5.2 CRM product performance and CRM acceptance

Product performance in risk and project management theory is conceptually similar to the more generally used terms of system and information quality in IS research. These concepts refer to the desired characteristics of the IT application itself, and the desirability of the information output generated by that IT application. Thus, I will use these concepts interchangeably in the following discussion.

An information system contains various features, which exhibit various degrees of system and information quality. As discussed in Chapter 3, perceived ease of use may be interpreted as perceptions of the most important aspects of system quality. For example, Doll & Torkzadeh (1988) measured system quality as an equivalent of ease of use (Rai et al. 2002, 56). In a similar vein, information quality has been closely linked to perceived usefulness, which has been referred to as the users' information requirements (Bailey & Pearson 1983), or the degree to which information output is essential for the user's job performance (Rai et al. 2002, 62).

An additional theoretical justification for the relationship between product performance and perceived usefulness is linked to user satisfaction studies. System quality and information quality are argued to be, *ceteris paribus*, necessary and sufficient antecedents of perceived usefulness (based on past experiences) and user satisfaction (Rai et al. 2002, 53). According to Seddon (1997, 249), attributes related to system and information quality have been adopted in most user satisfaction instruments (e.g. Ives, Olson & Baroudi 1983; Doll & Torkzadeh 1988) which is evidence to support the use of system and information quality (product performance) as predictors of user satisfaction. Applied to an IS context, user satisfaction is a subjective evaluation of the various outcomes of IS use evaluated on a pleasant-unpleasant continuum. Perceived usefulness, in turn, is an evaluation of the cost and benefits associated with IS use. While user satisfaction is a similar construct to perceived usefulness, it taps into a wider range of needs, costs and benefits. Seddon (1997, 249) used a cheap old computer as an example: an individual may perceive it as useful in processing information but may not be satisfied with it. Based on deductive logic, as system and information quality have been tested as antecedents of user satisfaction, they can consequently be adopted as antecedents of past-oriented perceived usefulness.

In light of the preceding analysis, I expect that product performance, i.e. system and information quality, will contribute to end-user perceptions of the CRM system's ease of use and usefulness. I hypothesize that:

H4: Product performance is positively associated with perceived ease of use.

H5: Product performance is positively associated with perceived usefulness.

Furthermore, Davis (1989, 333–334) argued that perceived ease of use is an antecedent rather than a parallel of perceived usefulness. This relationship has been confirmed beyond doubt by a plethora of empirical IS and marketing studies. Therefore:

H6: Perceived ease of use is positively associated with perceived usefulness.

In summary, the direct IT-oriented outcome of CRM system development capability, namely, product performance, is linked to CRM acceptance (past-oriented perceived ease of use and perceived usefulness), a marketing-oriented outcome in the CRM implementation phase. Next, I will provide rationales for the relationships between firm-level IT resources and CRM system development capability /CRM delivery system.

5.3 Firm-level IT resources as antecedents of CRM system development capability

In this study, I have theoretically derived that IT resources should be divided into firm-level IT resources, and project-level IT resources forming CRM system development capability, and posited that theoretical relationships exists between them. Testing the relationships between firm-level IT resources and CRM system development capability represents an unexplored area in empirical studies.

Firm-level IT resources are expected to improve the firm's resource-picking ability as well as have complementary effects on project-level IT resources. Following the resource-picking mechanism, firm-level IT resources are expected to have a positive impact on the firm's ability to pick the appropriate project-level IT resources for the CRM project. Following the resource complementarity mechanism, firm-level IT resources are also expected to have synergistic effects on project-level IT resources utilized during the CRM project. As firm-level IT resources represent the firm's IT resource capacity, the complementarity mechanism requires firm-level IT resources to be utilized to result in resource synergies. In summary, the resource-picking and resource complementarity mechanisms from firm-level IT resources to CRM system development capability are thus indirect through project-level IT resources.

Ravichandran & Lertwongsatien (2005), who that firm-level IT resources only affect non-IT core competencies and firm performance when channeled through functional IT capabilities as targeted resource inputs. Most empirical studies in IT capability literature represent the strategic resource perspective, which investigate the direct relationships between firm-level IT resources and firm performance or SCA (e.g. Bhatt & Grover 2005; Dehning & Stratopoulos 2003), or the indirect relationships through interactions with complementary non-IT resources (e.g. Bharadwaj 2000; Powell & Dent-Micallef 1997).

I conceptualize firm-level IT resources as antecedents of CRM system development capability. While Ravichandran & Lertwongsatien (2005) developed firm-level operational measures of functional IT capabilities (IT planning, development, operations and support), I focus solely on CRM system development capability with a more fine-grained construct encompassing five distinct dimensions, namely, project-level IT resources.

I argue that firm-level IT resources represent resource capacity, i.e. the firm's potential resources, which affect the allocation of project-level IT resources to the CRM system development project. While firm-level IT resources are resource capacity and thus, to some degree, unused in CRM system development, they are expected to influence CRM system development capability indirectly through project-level IT resources, which are realized resources allocated to CRM system development. Firm-level IT resources affect project-level IT resources following (1) the resource-picking mechanism, i.e. making right resource allocation decisions for the CRM project, and (2) the resource complementarity mechanism, i.e. enhancing the value-creating potential of CRM project resources through synergistic effects.

Based on IT capability literature, I identified technology resources, human IT resources, and relationship resources to have potential for value creation in the CRM system development context. In addition, I added IT planning capability as a necessary antecedent of IT development capability. In this study, technology resources are represented by IT infrastructure; human IT resources by IS personnel skill; relationship resources by internal partnership quality and external partnership quality; and IT planning capability by IS planning sophistication.

According to Karimi et al. (2007b, 231), the presence of high quality *IT infrastructure* is important to IS development by simplifying system integration across diverse applications. The absence of high quality IT infrastructure, on the other hand, may undermine a firm's system development capability, and increases the cost and duration of building or supporting IT solutions (Bharadwaj 2000, 172).

More specifically, I argue that IT infrastructure facilitates CRM system development by providing a foundation upon which the CRM application can be implemented more efficiently and effectively (Ravichandran & Lertwongsatien 2005, 247). Sophisticated IT infrastructure offers this by modularity, scalability, transparency and its ability to handle multiple applications without complications (Bhatt & Grover 2005). In particular, consultant resources benefit from high quality IT infrastructure in terms of easier technical execution. It might also be easier to recruit good consultants for up-to-date technologies.

Project management could also be positively influenced by a flexible infrastructure that brings a certain degree of flexibility and predictability to the CRM project. Consequently, top management support may also be easier to receive when the project is expected to be completed within a reasonable budget and schedule. The quality of user training may be enhanced if the firm's IT infrastructure enables seamless integration with other applications. In a similar vein, user involvement could be more beneficial when their input can be more readily transformed into technological solutions.

Empirical studies have found that IT infrastructure has an insignificant or weak positive influence on organizational outcomes (e.g. Bhatt & Grover 2005, Dehning & Stratopoulos 2003; Karimi et al. 2007b). However, I agree with Feeny & Willcocks (1998) and Ross et al. (1996) that IT infrastructure is crucial for the effective and efficient development and integration of IT applications such as CRM. Based on prior empirical findings, I expect that there IT infrastructure may have a weaker positive relationship with CRM system development capability than other firm-level IT resources. Based on the preceding discussion, I posit that the firm's IT infrastructure has the potential to influence the firm's CRM system development capability/ CRM delivery system:

H4: IT infrastructure is positively associated with CRM delivery system quality.

IT planning capability, i.e. *IS planning sophistication* (Ravichandran & Lertwongsatien 2005), is also expected to predict the CRM system development capability. Prior to the CRM initiation decision, firms should identify and analyze their business needs and seek the appropriate technology to satisfy those needs (Honeycutt et al. 2005, 315). IS planning sophistication increases the likelihood of properly aligning the priorities of both IT and business managers to achieve better outcomes. IT and business knowledge can be integrated in the planning process, resulting in higher system quality (Ravichandran & Lertwongsatien 2005, 245).

More specifically, IT planning capability may benefit project management resources through a well-executed to plan to guide the CRM system development phase. Consultant resources, in turn, may receive more useful information from the firm due to more complete IT and business information. Training resources may be better organised if they have been properly considered during IS planning. Top management support is often dependent upon a well-designed project plan. User involvement is more likely when IS planning has involved business units.

In an exploratory empirical study, Erffmeyer & Johnson (2001) found that firms with completed CRM/SFA initiatives most wished that they had executed the planning process better. In particular, they discovered that a competent IT department and inter-functional team effort were critical factors in CRM/ SFA planning. Therefore, sound planning prior to CRM system development is a vital stage, the lack of which has been identified as an impediment to CRM success (Honeycutt et al. 2005) and IS success in general (Deephouse et al. 1996).

Based on these considerations, I expect IS planning sophistication to have a positive relationship with CRM system development capability. Hence:

H5: IS planning sophistication is positively associated with CRM delivery system quality.

The importance of human IT resources of the firm's IT department, i.e. *IS personnel skill* (Ravichandran & Lertwongsatien 2005), has been well documented in IT capability literature (e.g. Mata et al. 1995). In a similar vein, I argue that the technical, business, managerial, and interpersonal skills possessed by the firm's IT staff are important predictors of CRM system development capability.

System development projects are often initiated by IS personnel whose technical, managerial, business and interpersonal skills are critical to project success (Ross et al. 1996). In conjunction with IS planning sophistication, IS personnel may also have a positive influence on CRM system development capability by bundling the appropriate complementary IT resources together. As a result, firms with high IS personnel skill are better equipped to develop IT applications efficiently (Bharadwaj 2000, 173).

More specifically, project management resources often include people from the firm's IT department, suggesting a positive relationship. Consultant resources work together with the firm's IT human resources, at least to some degree, during CRM system development and will benefit from skilful IT staff. If project management and consultant resources are both obtained from external sources, the significance of IS personnel skill is even greater as providers of firm-specific knowledge.

User training, in turn, is more likely to be initiated in the presence of skilled IS personnel recognizing its importance, and top management may support projects more willingly if they feel that IS personnel is competent. Furthermore, the CRM initiative may have been presented to top executives better in terms of technical, managerial and business knowledge, and interpersonal communication. The importance of user involvement may also be more easily recognised by skilled IS personnel.

Based on this analysis, I posit that IS personnel skill has a positive impact on the firm's CRM system development capability. Consequently, I hypothesize that:

H6: IS personnel skill is positively associated with CRM delivery system quality.

Swanson (1994, 1072) argued that an effective partnership between IT and client departments, i.e. *internal partnership quality* (Ravichandran & Lertwongsatien 2005), is a significant determinant of IS success. CRM system development is no different from other complex, inter-departmental undertakings: mutual trust, reciprocal commitment, bilateral information exchange, goal congruence and lack of conflicts are necessary conditions in order to achieve desired project outcomes.

The effective partnerships between IT and business managers are crucial in IS development to overcome inter-departmental gaps, which hinder co-operation. Internal partnership quality manifests itself in the CRM system development team environment. Collaboration is necessary to meet the objectives of IS projects, such as developing effective business solutions that meet user needs (Rockart et al. 1996). Participation of all relevant departments creates a sense of ownership and enhances support for the CRM initiative among stakeholders (Honeycutt et al. 2005, 316).

Project management and consultant resources are likely to benefit from the presence of internal partnership quality as business units provide valuable inputs into the CRM system development process. The quality of training is also expected to be enhanced by a good IS-business partnership. Top management support may be more easily achieved in the presence of good internal relationships between the IT function and business units. Finally, user involvement may particularly benefit from strong ties between IS and business unit staff.

Based on these considerations, I argue that internal partnership quality is an important antecedent of CRM system development capability. Hence:

H7: Internal partnership quality is positively associated with CRM delivery system quality.

External partnership quality is also expected to play an important role in CRM system development. CRM system development typically takes place in an inter-organizational setting: it involves the customization of software based on highly specialised knowledge, which seldom resides within the client organization (Ravichandran & Lertwongsatien (2005, 247). Firms must rely on software vendor and IT service provider relationships in IS projects, which are thus considered crucial IT relationship resources (Wade & Hulland 2004, 113). Similar to internal partnership quality, mutual trust, reciprocal commitment, bilateral information exchange, goal congruence and lack of conflicts are necessary conditions in order to achieve desired project outcomes.

External partnership quality is likely to benefit project management resources as an enabler of better co-operation, and sufficient knowledge acquired from partners. Consultant resources are expected to be strongly enhanced by external relationship quality because external partners are the sources who have provided those consultants for the CRM project. Similarly, training resources are often acquired from external sources, or from sources recommended by CRM project partners. Top management support is also likely to be positively influenced by good external relationships, increasing their expectation of CRM system development success. User involvement is also likely to be facilitated by good relationships with partnering IT vendors and/or IT service providers.

Based on this analysis, external partnership quality is expected to positively influence CRM system development capability. Thus, I put forward the following hypothesis:

H8: External partnership quality is positively associated with CRM delivery system quality.

In summary, Hypotheses H7-H11 were proposed to test the impact of firm-level IT resources as antecedents on CRM system development capability /CRM delivery system. These are the final hypotheses in the main effects research model. I will now present the hypotheses related to the secondary direct effects.

5.4 Direct effect of CRM system development capability on CRM acceptance

The main objective of this study is to investigate the link between CRM system development and CRM acceptance. Based on the previous discussion related to hypotheses H1-H3, I expect CRM delivery system quality to primarily impact CRM project performance. This theoretical action mechanism is consistent with risk and project management theory (Barki et al. 2001; Nidumolu 1995) and IT innovation research (Cooper & Zmud 1990). For example, organizational IT innovation theory on the adaptation stage views contextual factors combined into innovation delivery systems as processes aimed at producing the organizational IT innovation as its direct output, which in this case is the CRM application.

However, the objective of CRM system development is not only to create a superior CRM system but also one that will be accepted by the target user community. In hypotheses H4-H6, I posit that CRM product performance affects CRM acceptance, which is consistent with the action mechanisms presented within IS research (Rai et al. 2002).

Therefore, CRM product performance is expected to mediate the relationship between CRM delivery system quality and CRM acceptance. In other words, CRM system development capability needs to be transformed into a high quality CRM system in order to be perceived as easy to use and useful by the target user community. Although strong mediation effects by CRM system quality are expected to take place, it does not change the foundational relationship of this dissertation, which is assessing the impact of CRM system development on CRM acceptance. A direct relationship must exist for mediation effects to occur (Baron & Kenny 1986).

Consequently, the relationships between CRM delivery system, perceived ease, and perceived usefulness should be tested for a direct relationship, regardless of the main theoretical action mechanism suggesting an indirect relationship. Hence it is hypothesized in this study that:

H12: CRM delivery system quality is positively associated with perceived ease of use, which is mediated by product performance.

H13: CRM delivery system quality is positively associated with perceived usefulness, which is mediated by product performance.

In summary, the direct effects of CRM system development capability on CRM acceptance are assessed through hypotheses H12-H13. As perceived ease of use is an antecedent of perceived usefulness (Davis 1989), it is expected that the relationship between CRM delivery system quality and perceived ease of use will be stronger than the relationship between CRM delivery system quality and perceived usefulness.

5.5 Direct effects of firm-level IT resources on CRM project performance

This study asserts that key outcomes are achieved primarily through the targeted use of IT resources; which manifests itself through project-level IT resources utilized in the CRM system development project. In this view, firm-level IT resources are assumed to have an indirect impact on CRM project performance through CRM system development capability. Consequently, CRM delivery system quality is expected to strongly mediate the relationship between firm-level IT resources and CRM project performance.

Firm-level IT resources are also expected to have a direct, albeit significantly weaker direct impact on CRM project performance. Compared with the targeted use of IT resources, this direct effect is considered to be of secondary significance in this study. However, it is important to establish whether direct effects exist. Firstly, mediation testing would not be sensible without significant direct paths. Second, testing for direct effects of firm-level IT resources is important to assess whether firm-level IT resources have a greater impact on CRM project performance through their channeled use.

It is reasonable to assume that firms with superior strategic IT resources are more likely to achieve higher levels of CRM project performance. The strategic resource perspective in IT capability literature has argued that firm-level IT resources, such as technology resources, human resources, and relationship resources, and IT planning capability, are valuable and thus have rent-generating potential (e.g. Mata et al. 1995; Rockart et al. 1996). Following this rationale, firms with sophisticated IT infrastructures and IS planning capability, skilled IS personnel, and good internal and external partnerships, are more likely achieve higher levels of CRM process performance and CRM product performance. However, this study maintains that the direct impact of firm-level IT resources are expected to be weaker than the indirect effects through their targeted use in CRM system development. Therefore, it is hypothesized that:

H14: (a) IT infrastructure; (b) IS planning sophistication; (c) IS personnel skill; (d) internal partnership quality; (e) external partnership quality is positively associated with process performance, which is mediated by CRM delivery system quality.

H15: (a) IT infrastructure; (b) IS planning sophistication; (c) IS personnel skill; (d) internal partnership quality; (e) external partnership quality is positively associated with product performance, which is mediated by CRM delivery system quality.

In summary, hypotheses H14-H15 were formulated to investigate whether firm-level IT resources have direct effects on CRM project performance. Next, hypotheses related to the moderating effects are discussed.

5.6 IT structural risks as moderating effects

Structural risks are unique, contextual characteristics of individual IS development projects, have been acknowledged in risk and project management theory as important factors affecting IS project performance. In this study, structural IT risks are contextual factors that represent the conditions under which the CRM delivery system may result in differential outcomes in terms of CRM project performance.

Following Baron & Kenny's definition (1986, 1174), structural risks are thus conceptualized as moderators in this study. Firstly, I expect that these conditions will influence the direction and/or magnitude of the relationship between CRM system development capability and the two dimensions of project performance, namely, process performance and product performance. Second, it is reasonable to assume that these conditions are independent and correlated with neither CRM system development capability nor CRM project performance. In this study, structural risks include relative project size, application complexity, and requirements uncertainty.

According to McFarlan (1981), project size in terms of cost and duration increases the likelihood of IS project failure. The larger the budget and the more people involved in IS projects, the greater the risk (p. 143). While project size is a reference in absolute terms, *relative project size* is arguably a more appropriate measure. If the CRM project's size is great relative to previous IS development projects undertaken by the firm, it is likely to be subject to higher risk of failure. Gemino et al. (2008, 36), for example, found that project size had a negative effect on project performance. Therefore, I posit that:

H16a: The relationship between CRM delivery system quality and process performance is moderated by relative project size.

H17a: The relationship between CRM delivery system quality and product performance is moderated by relative project size.

Technological complexity has been found to be a significant factor inhibiting the success of IT innovations (Cooper & Zmud 1990, 128). The technological complexity of the CRM application, i.e. *application complexity*, refers to the technological challenges related to integrating the CRM system into the organizational environment. The more technological complexity is associated with the required IT infrastructure and integration solutions, the more process performance and project performance are likely to be negatively affected (Ramachandran & Gopal 2010, 188). Gemino et al. (2008, 36) also found that application complexity had a negative impact on project performance. Consequently, I hypothesize that:

H16b: The relationship between CRM delivery system quality and process performance is moderated by application complexity.

H17b: The relationship between CRM delivery system quality and product performance is moderated by application complexity.

Requirements uncertainty has been widely acknowledged in IS research to have a key impact on project performance because of the difficulty in obtaining requirements from users. Due to these challenges and its impact on other aspects, requirements analysis is arguably the most important phase of IS development projects. Firstly, inadequate understanding of user requirements may cause significant delays and risk system quality (Ramachandran & Gopal 2010, 188). Second, user requirements may change during the course of the CRM project. Third, requirements tend to be diverse across different users (Nidumolu 1995; Zmud 1980). Finally, the process of converting requirements into technical solutions may pose problems in the latter stages of the IS project, affecting project performance (Ramachandran & Gopal 2010). Thus, I hypothesize the following:

H16c: The relationship between CRM delivery system quality and process performance is moderated by requirements uncertainty.

H17c: The relationship between CRM delivery system quality and product performance is moderated by requirements uncertainty.

5.7 Control variables

Control variables are useful in detecting unexpected variances in dependent variables which are not caused by the theoretical constructs incorporated into the research model. Based on theoretical review and expert opinion, four control variables will be included to detect any observed heterogeneity not explained by the main variables in the research model. The effect of control variables on outcome variables - process performance, product performance, perceived ease of use, and perceived usefulness - will be assessed.

Firstly, *firm size* has been controlled for in a number of studies related to IS success or CRM technology success (e.g. Bhatt & Grover 2005; Mithas et al. 2005; Barki et al. 1993; Ravichandran & Lertwongsatien 2005). Second, *industry* may have an impact on CRM technology success and its effect will thus be controlled for (Becker et al. 2009; Mithas et al. 2005; Reinartz et al. 2004).

Third, *CRM contract type* could be an important source of variance in CRM project success. Contracts are broadly dichotomized to either fixed price, or time and materials (Gopal, Sivaramakrishnan, Krishnan & Mukhopadhyay 2003; Ethiraj et al. 2005). In a fixed price contract, the IT vendor and/or IT service provider bears most of the implementation risk, while time and materials contracts are more risky for client organizations (Ramachandran & Gopal 2010). In addition, a fixed price contract may tempt the vendor to assign less experienced or less skilled consultants to the project. These differences in incentive alignment and accountability may affect both process and product performance from the client organization perspective, which is adopted in the present study.

Fourth, the *time since the CRM system has been rolled out* (Karimi et al. 2007a) - the time since the CRM project was completed and the time CRM users have used the CRM technology - may have an effect on perceptual evaluations of CRM project performance by IT management, and of CRM acceptance by end-users (Speier & Venkatesh 2002; Jones et al. 2002).

6 METHODOLOGY

In order to test the research model and related hypotheses, methodological choices must be made regarding the data collection method, sampling, operationalization of constructs, and analysis methods. In this chapter, the methodological choices adopted in this study will be described and justified comprehensively.

The primary methodological approach in the present study is the quantitative survey method. Apart from questionnaire pre-testing, the empirical data was collected through an online email survey instrument. I will present the research process with regard to the methods employed in questionnaire pre-testing, sampling and data collection, data screening, estimation of non-response and common method biases, construct operationalizations, and statistical analysis method.

6.1 Questionnaire pre-testing

Prior to collecting survey data for the main empirical study, I took some pre-emptive actions, prior to data collection, to ensure the reliability and validity of the questionnaire instrument. Firstly, after an extensive review of literature, I adopted well-established scales (which best fit the theoretical rationales offered in this study) from empirical studies to form a preliminary version of the questionnaire instrument. Second, the questionnaire was subject to pre-testing. The main purpose of this procedure was to validate all constructs and related measurement items derived from theory by practitioners. The questionnaire was translated from Finnish to English and back from English to Finnish by a native speaker of both languages.

Nine experts (CIOs and IT directors) from different industries (manufacturing, IT & media, professional services, construction, public sector) with vast knowledge and experience with respect to firm-level IT resources and IS implementation projects were asked to respond to the questionnaire. I contacted them first by phone and sent them the online questionnaire via email. They were also explained in the email the domain and objectives of the research and asked to provide feedback to validate measures and some other concerns, which were listed as follows: (1) the appropriateness and relevance of measures with respect to the phenomena under investigation, (2) the understandability and clarity of all statements and questions, (3) the suitability of survey length and (4) who would be the most suitable person (by job title) to participate in the study. Based on their feedback, the pre-testing phase could potentially lead to the exclusion of irrelevant measures, the inclusion of relevant absent measures, and the elimination or modification of ambiguous measures. Feedback was received by phone or by email. All nine experts agreed that there were no irrelevant measures in the survey instrument; all measures were considered important and their exclusion could compromise the quality of empirical analysis and results. Survey length was deemed satisfactory by all industry experts (average time of completion was approximately nine minutes), which also accommodated the inclusion of all measures. The experts also proposed some additions to be included in the theoretical model such as CRM partner perspective, CRM post-implementation maintenance and development, and CRM lifecycle management. However, these suggestions either had no theoretical support in existing literature, or were beyond the scope of the present study, and were thus not considered. However, one control variable was added (contract type) to the final questionnaire, which has been found to be an important source of population heterogeneity in prior research (Ramachandran & Gopal 2010). All questions were regarded as clear and understandable, which was expected as all instruments had been adopted from existing literature. Most experts did not want to name a particular professional title holder (two did respond CIO) as the primary respondent. Rather, they stressed that whoever is the most familiar with the CRM project (who is usually also aware of firm-level IT resources to a high degree) should be targeted as the respondent in this study.

Importantly, expert opinion also serves as confirmation of the face and content validity of the constructs in the theoretical model (e.g. Rossiter 2002). After the above-mentioned minor modifications, I will now introduce the measures included in the final questionnaire.

6.2 Operationalization of constructs

All concepts in the theoretical model, with the exception of moderator project size, were operationalized as latent variables (LVs), or constructs[27]. Latent variables are abstract in nature: they are measured through observable manifest indicators. It is widely accepted in existing literature that

[27] The terms latent variable and construct will be used interchangeably in this study from this point forward. According to MacKenzie, Podsakoff & Podsakoff (2011, 297), if a variable is abstract and latent rather than concrete and observable, it is called a construct.

measurement with multiple items results in more accurate empirical testing (Churchill 1979). In order to further enhance the reliability and validity of adopted constructs, all 1st order constructs[28] were adopted from previous studies. When several options were available, I chose those operational measures, which best reflected the theoretical rationales offered in this study. I will often refer to the adopted constructs and their respective operationalizations with acronyms assigned to each one, respectively. The entire list of construct acronyms is presented in Table 13. Due to the importance and frequency of use of these acronyms throughout this dissertation, they are also available in Appendix 1 for easier access.

Table 13 Construct acronyms

Acronym	**Construct**
INF	IT infrastructure
ISP	IS planning sophistication
PS	IS personnel skill
IPQ	Internal partnership quality
EPQ	External partnership quality
CRMDS	CRM delivery system
PMR	Project management resources
CR	Consultant resources
TR	Training resources
TMS	Top management support
UI	User involvement
SPP	Subjective process performance
SPD	Subjective product performance
PEOU	Perceived ease of use
PU	Perceived usefulness
SIZ	Relative project size
APP	Application complexity
REQ	Requirements uncertainty

Although formed by 1st order latent variables adopted from previous studies, the core construct in this study, namely, CRM delivery system

[28] Latent variables are typically 1st order constructs, referring to the latent variable itself and its observable indicators. 1st order constructs will be discussed in further detail in Chapter 6.7.2.

(CRMDS), is a novel 2nd order construct[29]. As CRM delivery system is the most important construct in this study, a considerable amount of discussion is devoted to the assessment of CRM delivery system in this chapter.

This sub-chapter is organized as follows. First, I will introduce the operationalizations of the five constructs constituting CRM delivery system. The 1st order constructs forming CRM delivery system include project management resources (PMR), consultant resources (CR), training resources (TR), top management support (TMS), and user involvement (UI). Second, I will present the operationalizations of the antecedents of CRM delivery system, namely, firm-level IT resources including IT infrastructure (INF), IS planning sophistication (ISP), IS personnel skill (PS), internal partnership quality (IPQ), and external partnership quality (EPQ). Third, the operationalizations of the four outcome constructs, subjective process performance (SPP), subjective product performance (SPD), perceived ease of use (PEOU), and perceived usefulness (PU) are introduced. Fourth, operational measures for IT project risks including relative project size (SIZ), application complexity (APP), and requirements uncertainty (REQ), are presented. Unless stated otherwise, all items are measured on a 7-point Likert scale anchored by 1=”strongly disagree” and 2=”strongly agree”.

In the present study, CRM delivery system (CRMDS) is conceptualized as a bundle of project-level IT resources, which include project management resources (PMR), consulting resources (CR), training resources (TR), top management support (TMS) and user involvement (UI). All five dimensions of CRM delivery system are measured with three-item scales adopted from Karimi et al. (2007a) and Karimi et al. (2007b), which are summarized in Table 14, including construct and indicator (item) acronyms used throughout this study.

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[29] 1st order constructs can be conceptualized into a higher, 2nd order abstraction level when it is theoretically meaningful and parsimonious (Wetzels, Odekerken-Schroder & van Oppen 2009; Diamantopoulos, Riefler & Roth 2008). 2nd order constructs will be discussed in further detail in Chapter 6.7.2.

Table 14 Operational measures for CRM delivery system dimensions

Construct		Operational measures	References
Project management resources (PMR)	Pmr1	Formal project management tools and techniques were employed for this project.	Karimi et al. (2007a)
	Pmr2	Project managers in charge of the project were highly capable and experienced.	
	Pmr3	The implementation schedule was realistic.	
Consultant resources (CR)	Cr1	Experienced consultants guided us throughout the course of the project.	Karimi et al. (2007a)
	Cr2	External consultants were experienced in our business processes.	
	Cr3	External consultants brought considerable expertise and experience to our project.	
Training resources (TR)	Tr1	Significant time and resources were invested in training employees on using the new system.	Karimi et al. (2007a)
	Tr2	Adequate on-the-job training was provided to internal user groups to use the new system.	
	Tr3	Both technology and process training were provided to employees using the system.	
Top management support (TMS)	Tms1	Senior executives demonstrated a lot of enthusiasm and interest throughout the project	Karimi et al. (2007a)
	Tms2	Upper-level managers were personally involved in the project.	
	Tms3	The overall level of management support in this project was quite high.	
User involvement (UI)	Ui1	The user community was involved throughout the (ERP) implementation project	Karimi et al. (2007b)
	Ui2	Business users participated in determining systems needs and capabilities.	
	Ui3	Business users participated in identifying input/output needs.	

Project management resources (PMR) are measured with a scale that reflects the important elements of the employment of formalized project management techniques, the competence of project managers and realistic goal setting. The scale for consultant resources (CR) measures aspects such as the experience and expertise of consultants with regard to the CRM project and the client's business processes. Training resources (TR) are measured with a scale addressing the adequacy of time and other resources allocated towards familiarizing user groups with the use of the CRM system. Top management support (TMS) is measured with a scale which measures both emotional and actual involvement as well as overall involvement and support of this crucial stakeholder group. The fifth dimension of CRM delivery system, namely, user involvement (UI), which is proposed as an addition to Karimi et al.'s (2007a) conceptualization of ERP delivery system, is measured with a scale addressing end-users' contribution to various aspects of CRM system functionality.

The proposed antecedents of CRM delivery system are five distinct firm-level IT resources representing operationalizations for technological, human and organizational/relationship resources, which have been identified in resource-based literature as core IT resources possessed by the firm. These five antecedents include IT infrastructure (INF), IS planning sophistication (ISP), IS personnel skill (PS), internal partnership quality (IPQ) and external partnership quality (EPQ). The operational measures[30] are presented in Table 15 below. All scales were adopted from the empirical study by Ravichandaran & Lertwongsatien (2005) with the exception of the IT infrastructure scale, which was developed by Bhatt & Grover (2005).

[30] As opposed to the higher-order CRM delivery system construct, which is the core phenomenon under investigation in this study, firm-level IT resources are operationalized as first-order constructs. It is important to note that firm-level IT resources could also have been measured as higher-order constructs for a more fine-grained analysis. However, study constraints such as survey length required firm-level IT resources to be measured as first-order constructs.

Table 15 Operational measures for firm-level IT resources

Construct		Operational measures	References
IT infrastructure (INF)	Inf1	The extent to which systems are modular.	Bhatt & Grover (2005)
	Inf2	The extent to which systems are scalable.	
	Inf3	The extent to which systems are transparent.	
	Inf4	The extent to which systems are able to handle multiple applications.	
IS planning sophistication (ISP)	Isp1	Business units' participation in the IS planning process is very high.	Ravichandran & Lertwongsatien (2005)
	Isp2	IS planning is initiated by senior management; senior management participation in IS planning is very high.	
	Isp3	We have a formalised methodology for IS planning.	
	Isp4	Our planning methodology has many guidelines to ensure that critical business, organisational, and technological issues are addressed in evolving an IS plan.	
IS personnel skill (PS)	Ps1	Our IS staff has very good technical knowledge; they are one of the best technical groups an IS department could have.	Ravichandran & Lertwongsatien (2005)
	Ps2	Our IS staff has the ability to quickly learn and apply new technologies as they become available.	
	Ps3	Our IS staff has the skills and knowledge to manage IT projects in the current business environment	
	Ps4	Our IS staff has the ability to work closely with customers and maintain productive user or client relationships.	
Internal partnership quality (IPQ)	Ipq1	Critical information and knowledge that affect IT projects are shared freely between our business units and IS department.	Ravichandran & Lertwongsatien (2005)
	Ipq2	Our IS department and business units understand the working environment of each other very well.	
	Ipq3	There is a high degree of trust between our IS department and business units.	
	Ipq4	The goals and plans for IT projects are jointly developed by both the IS department and business units.	
	Ipq5	Conflicts between IS departments and business units are rare and few in our organisation.	
External partnership quality (EPQ)	Epq1	We seldom have conflicts with our IT vendors and service providers	Ravichandran & Lertwongsatien (2005)
	Epq2	We get timely information from our vendors about unexpected problems that could affect their ability to meet our technology needs.	
	Epq3	We can rely on our IT vendors and service providers to respond to our IT needs in a timely and effective manner.	
	Epq4	A very trusting relationship exists between the IS department and our key IT vendors and service providers.	
	Epq5	We have long-term partnerships with our key IT vendors and service providers.	

IT infrastructure is measured with 4-item scale (on a 7-point Likert scale from 1=”very low” to 7=”very high”) including statements related to different quality criteria for assessing the IT infrastructure of the firm. The four-item instrument related to IS planning sophistication aims to capture the degree of formalization, comprehensiveness, and participation of key stakeholders in the IS planning process. IS personnel skill is also measured with four items to assess business, technology, managerial and interpersonal skills of the staff in the IT department. The internal partnership quality scale includes five items which measure interdepartmental information sharing, familiarity, trust, co-operation and conflict issues. External partnership quality is also measured with a five-item scale addressing similar issues to internal partnership quality but in an inter-organizational context with respect to external IT partners.

There are four outcome variables in the research model. The operational measures for these outcome constructs are summarized in Table 16. CRM project outcomes, namely, CRM process performance and CRM product performance, are operationalized through subjective process performance (SPP) and subjective product performance (SPD), which are adopted from Wallace et al. (2004). Process performance and product performance were originally developed by Nidumolu (1995), and both have proved in empirical studies to have robust psychometric properties in terms of reliability and validity (Ramachandran & Gopal 2010, 197).

The other two outcome variables measuring CRM acceptance - perceived ease of use (PEOU) and perceived usefulness (PU) - are based on end-user perceptions after the completion of the CRM project, i.e. post-implementation outcomes related to client departments. Perceived ease of use and perceived usefulness have also exhibited excellent psychometric properties in a wide range of empirical studies. As all performance measures in this study are of widely recognized, it provides a solid foundation to test the newly introduced construct CRM delivery system.

Table 16 Operational measures for CRM project performance and CRM acceptance

Construct		Operational measures	References
Subjective process performance (SPP)	Spp1	The system was completed within budget.	Wallace et al. (2004)
	Spp2	The system was completed within schedule.	
Subjective product performance (SPD)	Spd1	The application developed is reliable.	Wallace et al. (2004)
	Spd2	The application is easy to maintain.	
	Spd3	The users perceive that the system meets intended functional requirements.	
	Spd4	The system meets user expectations with respect to response time.	
	Spd5	The overall quality of the developed application is high.	
Perceived ease-of-use (PEOU)	Peou1	My interaction with the system is clear and understandable	Avlonitis & Panagopoulos (2005)
	Peou2	Interacting with the system does not require a lot of my mental effort	
	Peou3	I find the system to be easy to use	
	Peou4	I find it easy to get the system to do what I want to do	
	Peou5	I find the system user friendly	
Perceived usefulness (PU)	Pu1	Using the system improves my performance in my job	Venkatesh & Davis (2000)
	Pu2	Using the system in my job increases my productivity	
	Pu3	Using the system enhances my effectiveness in my job.	
	Pu4	I find the system to be useful in my job.	

As the names indicate, measurement scales subjective process performance and subjective product performance (Wallace et al. 2004) are based on subjective evaluations. Process performance is a two-item scale, which intends to measure whether the CRM project met expectations in terms of budget and schedule. Product performance is measured with a five-item scale that aims to assess the quality of the completed CRM technology application. End-user perceptions perceived ease of use and perceived usefulness are also subjective measures. The five-item instrument for perceived ease of use (Avlonitis & Panagopoulos 2005) measures different aspects related to the ease of using the CRM system in question. Perceived usefulness, in turn, is measured with four items developed by Venkatesh & Davis (2000) which address the usefulness of the CRM system in the end-user's daily work.

Finally, the proposed moderators in the theoretical framework are structural IT project risks including project size, application complexity and requirements uncertainty, which have been developed by risk and project management theorists. The operational measures for all three are adopted from Gemino et al. (2008), and are shown in Table 17. Project size is operationalized with the only single-item measure adopted in this study, relative project size (SIZ). Comparing the size of the CRM project to prior IT projects carried out by the organization is a more informative measure than project size in absolute terms. Application complexity (APP) is measured with two items related to the integration needs of the CRM technology. Finally, requirements uncertainty (REQ) is measured with a three-item scale to assess the risks associated with heterogeneous and unstable end-user needs.

Table 17 Operational measures for structural IT project risks

Construct		Operational measures	References
Relative size (SIZ)	Siz1	How does the size of this project compare with others undertaken by the client organisation over the past three years?	Gemino et al. (2008)
Application complexity (APP)	App1	The application was required to integrate with other applications.	Gemino et al. (2008)
	App2	The technology was required to interface with other types of technology.	
Requirements uncertainty (REQ)	Req1	A lot of effort had to be spent in reconciling the requirements of various users.	Gemino et al. (2008)
	Req2	Users differed a great deal among themselves in the requirements to be met.	
	Req3	Requirements identified at the beginning of the project were quite different from those existing at the end.	

Based on theoretical review and expert opinion, I will include some control variables to detect any observed heterogeneity in the empirical data. The effect of control variables on outcome variables product performance, process performance, perceived ease of use and perceived usefulness will be assessed. First, firm size has been controlled for in a number of related studies (e.g. Bhatt & Grover 2005; Mithas et al. 2005; Barki et al. 1993; Ravichandran & Lertwongsatien 2005). In this study, firm size is expressed in terms of SBU annual turnover, which was divided into eight categories. Second, industry may have an impact on performance outcomes and is included as a control variable (Becker et al. 2009; Mithas et al. 2005; Reinartz et al. 2004). The first questionnaire included 13 industry sectors based on the official TOL2008 classification by Tilastokeskus (Statistics Finland 2008). Third, CRM contract type was controlled for with a binary variable, which divides CRM contracts into “time & materials”–based and “fixed” pricing schemes (Ramachandran &

Gopal 2010). Fourth, the time since the CRM system has been rolled out (Karimi et al. 2007a); i.e. the time CRM users have used the CRM technology, was controlled for with seven categories in terms of CRM use in years.

In conclusion, 17 constructs were operationalized with 59 individual items (indicators) in this study. The complete measurement and structural model encompassing all constructs can be found in Appendix 2. All operational measures were adopted from existing IS, marketing and strategic management literature. Furthermore, the content validity of the constructs and items was confirmed through the assessment by expert practitioners. In addition, four control variables were chosen to detect any observed heterogeneity in the sample. I will now proceed to describe the sampling considerations and the data collection process.

6.3 Sample and data collection process

In this study, the primary data collection method is the online survey method. The research design is cross-sectional in nature; i.e. measured in a single point in time due to limitations in research resources. More specifically, the empirical data was collected with two separate online questionnaires, which were filled out by different respondents within the organization. The first questionnaire was primarily intended for a single respondent from the IT department with sufficient knowledge related to firm-level IT resources and CRM project delivery. According to Huber & Power (1985), “if only one informant per organization is to be questioned, attempt to identify the person most knowledgeable about the issues of interest (p. 174)”. In this study, the key informants of participating organizations were identified based on the most suitable respondent named by each organization.

Ideally, it would have been better to gather empirical data from both customer and IT service provider and/or IT software provider regarding the CRM project as well as external partnership quality. Responses from the customer side may contain some bias: perceptions of the firm’s own personnel may be more positive and consultant resources more negative, for example.

The second questionnaire, in turn, was intended for multiple end-users of CRM, namely, marketing, sales and/or customer service personnel. Before describing the data collection process in more detail, it is important to discuss why and how the sample was chosen to be a valid representation of the population of interest, which could be defined as organizations based in Finland using CRM systems. The unit of analysis is the single CRM project.

Based on the population of interest, the objective of the sampling process was to form a sample of the most recent and sufficiently complex CRM system development projects carried out in Finland-based private companies, strategic business units (SBUs) and public sector organizations, excluding small businesses. It is important to elaborate further on the motivations for these sampling criteria.

"Most recent" refers to a firm's CRM system currently in use; firms often renew their CRM technology after a certain period of time to keep pace with technological advances. Concentrating on recent CRM initiatives is an important notion in the present study. New CRM technology is highly specialized and has shifted CRM development projects from being developed in-house towards being inter-organizational undertakings involving the client firm, IT service provider and/or CRM software provider. It is the objective in this study to solely investigate these co-operative CRM initiatives.

Furthermore, it is important to include only "sufficiently complex" CRM projects in the sample, i.e. excluding CRM initiatives that involve the mere purchase of out-of-the-box CRM software without any customization efforts to fit technology to meet the requirements of end-users and organizational processes. I controlled for the above-described CRM technology novelty and implementation complexity issues through the consultant resources topic in the first questionnaire[31]. If no consultants were involved in a specific CRM project, it was removed from the final sample in the data screening process.

Finally, I defined the target sample to include both private sector companies/SBUs as well as public sector organizations but excluding small businesses. SBUs are the unit of analysis in this study: CRM initiatives usually take place at the SBU level (or at the firm level when the firm has no SBUs) and different SBUs often have their own CRM systems. Small businesses were excluded from the sample as their CRM systems may not be sufficiently complex as discussed previously. Furthermore, IT service provider and CRM software companies were excluded because they would not need to co-operate with external partners in CRM projects. On the other hand, CRM projects follow a rather similar process regardless of whether the organization is from the private or the public sector in terms of CRM system delivery. They differ in the initial bidding phases of the CRM project: public tendering is a mandatory procedure by government agencies to invite suppliers to make offers, which is outside the domain of the present study. Therefore, including public

[31] Initially, I intended to exclude all cases below 50 end-users from the final sample. However, 71 (44%) out of 161 cases in the final sample were CRM system development projects related to end-user environments below the intended threshold of 50 users. Heterogeneity was controlled for among these sub-samples: Pearson's Chi-Square tests showed no significant differences among these groups with respect to outcome variables CRM process performance (0.514) and CRM product performance (1.000).

sector organizations in the sample was an intentional decision to provide more empirical data regarding CRM system development projects in Finland.

The next step in this study was to determine how the organizations fitting the sampling criteria could be effectively identified. For the private sector, I used the “Kauppalehti 2000” list of companies (2010). It names the 2000 largest Finnish companies and subsidiaries of foreign companies based in Finland in terms of turnover. The list is updated annually by a well-known Finnish business publishing company based on official corporate annual reports. The list also includes the number of employees for each company. I screened the list to eliminate companies with <100 employees in order increase the likelihood of detecting companies with larger CRM end-user environments. The smallest company in terms of turnover had annual revenues of 11 m€. After screening the “Kauppalehti 2000” list, I utilized the corporate database Fonecta Profinder to acquire further information. First, I drilled into each company profile to obtain the names of each company’s SBUs (whenever applicable). The database provided the job titles, phone numbers and email addresses of key personnel. If no such information was available, the SBU was excluded from the study. Based on informal feedback from practitioners, the respondent was chosen by job title in the following order of preference: chief information officer (CIO), IT director, chief executive officer (CEO), executive vice president (EVP), CRM manager/owner and IT manager. Fonecta Profinder is not updated in real-time but annually. Consequently, the contact information of some respondents was no longer valid. In these cases, another respondent was chosen.

For public sector organizations, I utilized the national Hilma database and the private Credita database, which report all public tender and procurement announcements in Finland. I screened the announcements for CRM initiatives from the past five years (2005-2010). The respondent was chosen based on the contact person named in each announcement.

Following the sampling procedures above, the total size of the preliminary sample was N=1062. A preliminary email regarding consent for participation (see Appendix 3) with a link to an online response form was sent to one recipient per organization. The Webropol online survey software was used to collect data in this stage as well as throughout the data collection process. The email contained an overview explaining the scope and objectives of the present empirical study with a hyperlink to the online form, which included the questions regarding (1) whether the respondent’s SBU had a CRM system; (2) if yes, would the respondent’s organization be willing to participate in the present online survey; and (3) if yes, would the respondent be the most suitable person to answer questions related to firm-level IT resources and the

CRM project. In addition, the respondents were requested to provide the name and contact information of the most suitable person to participate if applicable.

In order to maximize the response rate, informants were motivated to co-operate by following some of the suggestions put forward by Huber & Power (1985). The email included reassurances of confidentiality and the anonymity of results. In addition, it was mentioned that Tietotekniikan Liitto (The Finnish Information Processing Association), which is a 16.000-strong member association of Finnish IT professionals and companies, supported the study and thus arguably improved the credibility of the email to recipients. Respondents were also informed of the realistic time required to fill out the survey. As an incentive, each respondent was promised an electronic copy of the empirical results upon completion, along with explanations how the research results might be useful to them.

After the first email and two reminders, I received a total of 526 responses, which formed the sample in this study. 207 respondents gave their consent for participation, while 319 declined to participate in the survey. Therefore, 207 out of 526 organizations were sent the actual questionnaire, indicating a response rate of 39%. 140 out of 207 (68%) respondents regarded themselves as the most suitable respondent within their organization to participate in the survey while 67 named another person.

A cover letter (Appendix 4) with a hyperlink to the first online questionnaire (Appendix 5), which included all questions and statements related to background information (concerning organization and respondent), firm-level IT resources, and CRM delivery system resources and outcomes, was sent to 207 respondents shortly after the completion of the preliminary round described previously. The cover letter included the same information regarding the research, assurances of confidentiality, survey length and incentives as listed in the preliminary email. In addition, it was mentioned that the questionnaire could still be forwarded to another person deemed more suitable: the respondents saw the questionnaire for the first time so this precautionary measure was warranted. The importance of answering all questions was emphasized as well.

After three reminders via email, a total of 137 responses out of 207 had been submitted. Therefore, I contacted the remaining 70 respondents by telephone. After the completion of telephone contacting, the final number of responses before data screening was 189 (36%). After careful data screening, 21 answers were dropped for various reasons. Seven responses were dropped due to missing values. Another four answers were dropped due to no consultants being involved, implying an insufficient level of CRM project complexity. Finally, ten answers were excluded due to low respondent competency (see Kumar, Stern & Anderson 1993), which was measured in the questionnaire with two questions assessing how well the respondent is familiar with the firm-level IT resources and the CRM project on a three-point scale (not well; quite well; very well), respectively[32]. If either question was answered “not well” by the respondent, the case was eliminated from the final sample. The remaining usable responses contained 33 missing item values, which were filled with the imputation procedure with SPSS. In conclusion, the data collection process for the first questionnaire produced 168 usable responses for a response rate of 32%.

Next, the organizations still involved in the sample were contacted again with the second questionnaire, which was utilized to collect data related to perceived ease of use (PEOU) and perceived usefulness (PU) from CRM end-users. The second questionnaire was intentionally short with only nine Likert-scaled statements measuring the two CRM acceptance constructs. This design was necessary in order to achieve the target of receiving multiple answers from all 168 remaining cases. I utilized the corporate database Fonecta Profinder to identify potential end-users of CRM. As mentioned earlier, the database provided the job titles and email addresses of key personnel. Respondents were randomly chosen by job title including the following: sales director, sales manager, sales assistant, marketing director, marketing manager, marketing assistant, customer service manager and customer service agent. In Fonecta Profinder, the number of contacts with the above-mentioned job titles varied greatly between cases. In a few instances, there were no potential CRM end-users identified in the database and I searched for contacts through the organization’s own website. At least two CRM end-users per organization were included in the sample of the second questionnaire. This was important as individual end-user perceptions may differ substantially. As suggested by Van Bruggen, Lilien & Kacker (2002), collecting a minimum of two respondents or, ideally, 3-4 respondents per case was the objective in the data collection process for the second questionnaire (Appendix 7). In total, 931 questionnaires with a cover letter (Appendix 6) were sent to end-users in 168 organizations.

After three reminders, a total of 492 out of 931 (53%) responses from 161 organizations (out of a possible 168)[33] had been received. The number of usable responses fell to 487 (52%) after data screening: five questionnaires were eliminated due to missing values. The usable responses contained a total

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[32] According to Kumar et al. (1993, 1636), specific measures to assess respondent competency are preferable to global measures such as the informant’s tenure with the firm, for example. Furthermore, individual informant reports should be scrutinized further to exclude inadequately qualified informants (p. 1646). This procedure was carried out in this study.

[33] Seven organizations declined to participate in the second questionnaire. Four of them offered no reason while three organizations explained that their CRM system had been introduced very recently, implying that the assessment of end-user perceptions would have been pre-mature.

of nine missing item values, which were filled with the imputation procedure with SPSS. The responses of the first and the second questionnaires were linked manually based on email addresses. Thus, the anonymity of respondents was not compromised by an identifying variable (Podsakoff, MacKenzie, Lee & Podsakoff 2003, 887).

The distribution of the final sample of second questionnaire responses (N=487) varied between one and seven per case (referring to first questionnaire responses) as Table 18 shows below.

Table 18 Distribution of end-user responses across cases (N=161)

End-user responses	Cases
1	12
2	65
3	28
4	30
5	14
6	10
7	2

The objective was to obtain a minimum of two answers per case, which was achieved for 149 cases. However, the cases with one end-user response were also included in the final sample because valuable data may have been lost by excluding them. Furthermore, the final sample had undergone a stringent data screening process prior to reaching this point.

It was expected that CRM end-user perceptions would differ substantially, indicating the necessity of gathering data from multiple respondents[34]. Using multiple respondents averages out random error in individual responses and reduces the risk of systematic error, which is prevalent in a single-respondent context (Van Bruggen et al. 2002, 471). As recommended by Van Bruggen et al. (2002), I aggregated the responses of the second questionnaire (CRM end-user perceptions) into weighted averages in order to improve the quality of response data. Assigning weights further improves response accuracy by

[34] I performed the Cohen’s Kappa test for inter-rater reliability with SPSS, which measures respondent homogeneity. The test confirmed that CRM end-users from the same organization were significantly different, suggesting that aggregated response data would produce more accurate data. Although interrater reliability, which refers to the degree to which respondents are interchangeable (James, Demaree & Wolf 1984, 86), would be a desirable characteristic, CRM user perceptions are likely to differ vary between individuals. Various factors such as organizational and user characteristics (Avlonitis & Panagopoulos 2005; Zablah et al. 2004b) have an impact but were beyond the scope of the present study.

taking into account group consensus through aggregate mean values[35]. Following the weighted average procedure, higher weights were assigned to responses based on how close they were to the mean response of the organization, i.e. a response inaccuracy was determined by its deviation from the group's mean response. Using SPSS, I calculated the following values for all nine items related CRM end-user perceptions (Peou1–5 and Pu1–4) for each case in the final sample: the arithmetic means, response weights based on their absolute distance from the arithmetic mean (closer distance is reflected by higher weight), and, consequently, the weighted means for all nine items calculated on the basis of the following mathematic equation (Van Bruggen et al. 2002, 473):

$$WDMEAN_{xi} = \sum \left\{ X_{ij} \text{ x } WEIGHT_{xij} / (\sum WEIGHT_{xij}) \right\}$$

, where $WDMEAN_{xi}$ is the weighted mean of variable X in each group I, $WEIGHT_{xij}$ is the weight of response j of variable X in group I, and $\sum WEIGHT_{xij}$ is the sum of all response j weights of variable X in group I.

The weighted mean averages represent new sum variables for items Peou1-5 and Pu1-4, which incorporate the input of multiple respondents. From this point forward, whenever I discuss the constructs perceived ease of use and perceived usefulness, I will be explicitly referring to the weighted mean averages of these constructs[36].

In conclusion, the preliminary sample (N=1026) also included organizations which did not have CRM, effectively excluding them from the sample *a priori*. The sample encompassed 526 organizations, which included organizations actively using CRM systems. After data screening, 168 organizations had submitted usable responses for the first questionnaire. Sent to multiple respondents within these 168 organizations, the second questionnaire produced 487 usable responses (N=931) from 161 organizations with a 52% response rate. As a result, the final sample of usable responses in this study

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[35] As a test of the significance of multiple respondents, I tested an additional model (N=149) including only cases with a minimum of 2 respondents for end-user experience with PLS path modeling (an analysis method discussed later in this work). SPD explained more variance in PEOU (increased from 0.200 to 0.235) and PU (0.477 to 0.490, respectively) than in the main sample (N=161). Despite removing only 12 cases from the sample, there is a small but meaningful increase in explained variance. This finding may be considered as support for the appropriateness of measuring end-user experiences with the weighted averages of multiple respondents instead of a single respondent design.

[36] The sum variables were coded as Peou_Wall1-5 and Pu_Wall1-4 in SPSS, respectively. For single-respondent cases, no calculations were required but the variables were renamed for presentation consistency. For two-respondent cases, the weighted mean effectively is a simple arithmetic mean as both observations share the same absolute distance to the group's mean score.

was N=161, which represents a 31% response rate of the sample of 526. This response rate may be considered satisfactory, not least because of the multiple respondent design applied in this study. Furthermore, the final sample decreased due to a stringent data screening procedure in terms of organizational sampling criteria (use of consultants, for example), respondent competency and missing values. Finally, and perhaps most importantly, 93% of cases (N=149) in the final sample had multiple respondents for CRM end-user perceptions. Overall, the sampling and data collection process achieved satisfactory outcomes.

6.4 Common method bias

Common method bias occurs when observations for both independent and dependent variables are acquired from the same source (Podsakoff et al. 2003, 881). Therefore, single respondent designs should be avoided whenever possible. However, it is often not plausible to obtain data from multiple informants due to time and financial constraints (Van Bruggen et al. 2002). Single respondent studies are thus prevalent in social studies due to restraints related to collecting sensitive or specialized empirical data with limited resources.

Based on the recommendations by Podsakoff et al. (2003), a number of procedures to avoid common method bias were applied. First, respondents were assured of complete confidentiality and anonymity. Second, I adopted well-established measurement scales from existing literature. Third, the questionnaire was subject to expert opinion through pre-testing to ensure that the instruments were not ambiguous to the target audience. Fourth, the survey length was kept at an acceptable level. *Most importantly, the risk of common method bias was reduced by gathering data from different informants with two questionnaires*. Although the questionnaires collected data concerning different constructs, the responses from the first questionnaire (firm-level IT resources, project-level IT resources and CRM delivery system, structural IT project risks) were directly tested with the responses from the second questionnaire (perceived ease of use and perceived usefulness). The aggregated multiple respondent data collected with the latter questionnaire was expected to further reduce common method bias. Finally, a hypothesized interaction effect was supported, providing additional support for the lack of severe biases, since interaction effects cannot be artifacts of common method bias (see Siemsen, Roth and Oliveira 2010).

Based on the preceding discussion, it is reasonable to claim that common method bias will not affect the empirical data in this study, which was collected from multiple respondents. The majority of data, however, was collected from a single respondent with the first questionnaire. As a precaution, I conducted Harman's single-factor test to analyze common method bias. The procedure entailed a principal component factor analysis (PCA) on all measures related to the first questionnaire. Common method bias is considered to be present if only one factor emerges with an eigenvalue greater than one, or if the largest factor accounts for more than 50% of the total variance (Podsakoff et al. 2003, 889). With regard to the measures included in the first questionnaire, 11 factors had eigenvalues greater than one. Together they accounted for 76.2% of the total variance, while the largest factor accounted 26.5% of the total variance (see Appendix 8). In summary, Harman's one factor test implied that common method bias is not likely to be a concern in the present study. However, Podsakoff et al. (2003) cautioned that Harman's single-factor test does not guarantee the absence of common method bias.

As an additional measure, common method bias was controlled for by gathering both subjective and objective responses of one of the outcome variables, namely, process performance. Subjective process performance (SPP) was compared with an objective measure of process performance (OPP), an instrument adopted (with slight modifications in wording) from Gemino et al. (2008). The OPP measure, which was included in the first questionnaire, consisted of two parts in terms of CRM project budget and schedule (Table 19):

Table 19 Objective process performance (OPP) measures

Objective process performance (OPP)	
Opp1	In terms of cost the CRM project met the initial budget.
	In terms of cost the CRM project was less than the initial budget by this percentage: ___
	In terms of cost the CRM project was more than the initial budget by this percentage: ___
Opp2	In terms of schedule the CRM project met the initial schedule.
	In terms of schedule the CRM project was ahead of the initial schedule by this percentage: __
	In terms of schedule the CRM project was late against the initial schedule by this percentage: __

I compared subjective process performance SPP with its objective counterpart OPP through a correlation analysis with SPSS as well as through PLS path modeling. In the correlation analysis, Spp1 (budget) correlated with Opp1 highly significantly (0.72, $p<0.001$). Spp2 (schedule), in turn, correlated highly significantly with Opp2 (0.66, $p<0.001$). In PLS path modeling, process performance was installed as the predictor of OPP, which revealed a strong association between the constructs ($\beta=0.77$). Consequently, process performance explained 59% of the variance in OPP, suggesting that subjective process performance assessments by respondents displayed satisfactory reliability. However, one should bear in mind that data related to both constructs was collected from the same single respondent. In summary, the preceding analyses suggest that common method bias is not an issue in the present study, although this conclusion must be taken with some minor caution.

6.5 Non-response bias

In addition to common method bias, it is common practice to test the data for non-response bias. I performed tests for non-response bias from two different perspectives. First, I analyzed non-response bias among the population, which consists of organizations with completed CRM projects based in Finland. Second, I examined non-response bias among targeted respondents.

I assessed non-response bias by comparing respondent organizations with the whole population, which the sample was intended to measure. Finding a feasible solution was no easy task because the unit of analysis was the SBU. All sources of secondary data, such as Kauppalehti 2000 and Fonecta ProFinder B2B analytics, provide statistical information only at company level. In order to analyze the final sample's representativeness of CRM systems used in Finland, I manually screened the final sample to deduct multiple cases from single parent organizations, resulting in 152 out of 161 usable cases[37]. Next, I chose industry as the categorical variable to compare the final sample with the population. Company turnover was another viable choice but secondary data on industry was more readily available. I utilized Fonecta ProFinder B2B analytics (based on 2011 data) to categorize companies by industry with the following requirements: company turnover had to exceed 20 m€ and 100 employees, respectively. Some industry classifications had to be merged due to a different categorization between Fonecta

[37] Due to the low number of SBUs sharing the same parent company, I deemed it unnecessary to conduct further testing for data nestedness. In addition, informal discussions through email with three "shared parent SBUs" suggested that their CRM projects were entirely independent of the other SBU, and their CRM user environments were not directly connected (an indirect connection through a joint enterprise resource planning (ERP) system was mentioned).

ProFinder B2B and the official TOL 2008 industry classification by Tilastokeskus (Statistics Finland 2008).

However, it is not sufficient to compare the final sample with the population as the utilization of CRM differs substantially across industries. The national report “Use of information technology in enterprises 2010” by Tilastokeskus (Statistics Finland 2010) offered readily available information about the prevalence (%) of CRM systems by industry. Unfortunately, some industry categories used in this study were not included and the percentages are based on all company sizes. 29% of the smallest companies (10–19 employees) 62% of largest companies (>100 employees) and 36% of companies overall had CRM, respectively.

In the absence of more appropriate alternatives, I will make the assumption that the percentage of companies using CRM by industry is linear across company sizes. Utilizing the available statistics for the majority of industry categories used in this study, I analyzed non-response bias among the SBU population. Based on the number of companies by industry and the percentage of companies using CRM by industry, an estimate could be calculated regarding how many companies in the industry populations are expected to have CRM systems. All the data gathered with the above-mentioned processes are shown in Table 20.

Table 20 Data used for assessing non-response bias

Industry	**Sample[a]**	**Population†**	Companies (2011)	% of companies
Production	30	103	303	34 %
Construction	6	39	219	18 %
Transportation & Warehousing	7	27	136	20 %
Wholesale	23	n/a	n/a	64 %
Retail	5	27	98	28 %
Hospitality	3	9	54	17 %
Finance & Insurance	8	n/a	n/a	n/a
IT & Media	21	92	131	70 %
Professional services	33	122	239	51 %
Health & Social services	3	n/a	n/a	n/a
Public sector	8	n/a	n/a	n/a
Other	5	n/a	153	n/a
Total	152	419	1333	
Usable total for analysis	105	419	1180	

[a] company cases in final sample

† estimate of companies using CRM $\chi 2 = 3.761$, $p=0.7090$ (2-tailed)

As Table 20 indicates, I was able to roughly estimate the population for the following industry sectors: Production, Construction, Transportation &

Warehousing, Retail, Hospitality, IT & Media, and Professional services (business, scientific and technical services). These seven industry sectors accounted for 105 responses in the final sample, representing an estimated population of 419 (=the number of companies in the industry multiplied by (X) % of companies using CRM in the industry) companies in those seven industries. For example, although the Construction industry has far more companies in the population than IT & Media, the latter industry has a substantially higher expected number of cases since 70% of IT & Media companies are expected to use CRM, as opposed to 18% of companies in the Construction industry.

Using the responses and population estimates for the seven industries for which the information was readily available, I performed Pearson's Chi Square test to analyze whether the industry distribution of the final sample's usable cases for the non-response analysis (N=105) differed significantly from the estimated population's respective distribution (N=419). The results ($\chi2=3.761$, $p=0.7090$) indicated that the industry distribution was not significantly different between the sample and the population. Therefore, non-response bias is not likely to be an issue between the final sample and the population, which the sample is supposed to represent.

Next, I analyzed non-response bias among respondents. As it would have been extremely time-consuming to compare respondents with the actual non-respondents to detect non-response bias, I compared early respondents with late respondents. Late respondents are more likely to respond similarly to non-respondents than respondents (Armstrong & Overton 1977, 397). Therefore, this approach in non-response analysis is generally accepted in existing literature. I classified early respondents to those who replied prior to any reminders being sent and late respondents to those whose questionnaires were received after stimulus through reminders. This classification was done to the respondents of the first questionnaire as well as the second questionnaire. For the first questionnaire, 70 out of 161 questionnaires were received before the first reminder email was sent. I performed an independent samples T-test to compare the differences of variable means between early and late respondents. The results are summarized in Appendix 9 for group statistics and in Appendix 10 for the T-test scores. Based on two-tailed tests, no variables differed significantly between the two groups.

Using the same criteria as described above to divide the sample of the second questionnaire into two groups, the respondents were categorized into early respondents (N=268) and late respondents (N=219). Appendix 11 shows the group statistics and T-test scores for the second questionnaire. The results indicate that there were no significant differences between early and late respondents of the second questionnaire.

In conclusion, the analyses suggest that non-response bias is not an issue in the present study. However, certain assumptions had to be made before drawing comparisons between the final sample and the population, which could have a negative effect on the reliability of this particular analysis.

6.6 Descriptive sample statistics

Descriptive statistics were collected from the respondents of the first questionnaire regarding organizational, respondent, and CRM project characteristics. Turnover and industry sector information was gathered to describe the organization profiles in the sample. The categories are based on the the official TOL 2008 classification guidelines by Tilastokeskus (Statistics Finland 2008). Respondent profile information includes job title and number of years with current employer. Descriptives related to the CRM project include the time since CRM was rolled out, number of end-users, CRM type, number of staff in project team, number of consultants in project team, and the contract type of the CRM project.

Table 21 Organizations in final sample by turnover (m€)

Turnover	N	% of sample	Cumulative %
<5 m€	16	9,9	9,9
5-10 m€	8	5,0	14,9
11-20 m€	13	8,1	23,0
21-50 m€	30	18,6	41,6
51-100 m€	21	13,0	54,7
101-250 m€	29	18,0	72,7
251-500 m€	9	5,6	78,3
>500 m€	35	21,7	100,0
Total	161	100,0	

The organizations are categorized in terms of turnover in Table 21, which shows a relatively even distribution. 23% of cases fall below the 20 m€ threshold for companies, indicating that some SBUs are relatively small in size. On the other hand, 21.7% of cases are in the largest category (>500m€).

Table 22, in turn, lists the cases by industry sector. Production, wholesale, IT & media and professional services are the largest represented industry sectors in the final sample, ranging between 13% and 18.6%. As discussed previously in testing non-response bias, the industry sectors reflect the distribution of CRM use across industries in Finland. The industry sectors were further validated through an examination of secondary data after data collection.

Table 22 Organizations in final sample by industry sector

Industry	N	% of sample	Cumulative %
Production	30	18,6	18,6
Construction	6	3,7	22,4
Transportation & Warehousing	8	5,0	27,3
Wholesale	25	15,5	42,9
Retail	5	3,1	46,0
Hospitality	3	1,9	47,8
Finance & Insurance	9	5,6	53,4
IT & Media	21	13,0	66,5
Professional services	24	14,9	81,4
Education	10	6,2	87,6
Health & Social services	3	1,9	89,4
Public sector	11	6,8	96,3
Other	6	3,7	100,0
Total	161	100,0	

A crucial issue in this study was to reach the most knowledgeable respondents to provide answers to questions related to firm-level IT resources and the CRM project. While some of the originally targeted people responded to the questionnaire, others were identified by the original targeted respondent as more suitable informants. The appropriate respondent could vary by job title depending upon the circumstances of each organization, which is evident in Table 23.

Table 23 Respondents in final sample by job title

Job title	N	% of sample	Cumulative %
Sales/Marketing/Customer director	16	9,9	9,9
CEO/VP/Director	26	16,1	26,1
CIO	29	18,0	44,1
System/IT director/manager	44	27,3	71,4
Project director/manager	17	10,6	82,0
Development director	21	13,0	95,0
Other	8	5,0	100,0
Total	161	100,0	

In 9.9% of cases, the most suitable respondent was a member of senior management in the client department, i.e. the sales, marketing or customer director. Another notable finding is that, in some cases, originally targeted top

management C-level executives identified middle management level IT directors/managers (27.3%) as more suitable respondents, which is the main reason why they constitute the largest group among respondents in the final sample. The category “Other” included job titles such as quality director, CRM director, CRM expert and Business Intelligence (BI) expert.

Overall, the respondents were experienced in terms of the number of years with their current employer (Table 24). Over 40% of respondents had been with their current employer for more than 12 years. This was an expected as well as a desirable result: assessing firm-level IT resources and project-level IT resources employed in the CRM project set a high requirement for expertise, which may possibly explain the distribution of respondents towards the experienced end in terms of years with their current employer.

Table 24 Respondents in final sample by experience (years with current employer)

Experience	N	% of sample	Cumulative %
less than 2 years	11	6,8	6,8
2-4 years	29	18,0	24,8
5-8 years	23	14,3	39,1
9-12 yeras	33	20,5	59,6
over 12 years	65	40,4	100,0
Total	161	100,0	

Background data on CRM project characteristics was gathered from a number of perspectives. Some of them also serve the purpose of acting as control variables to examine any observed heterogeneity in the final sample. Furthermore, number of consultants was used for data screening purposes in order to eliminate transactional CRM purchases from the more complex inter-organizational CRM initiatives.

Over two thirds (67.1%) of CRM systems in the final sample had been rolled out within the last 4 years (Table 25). This is not surprising as CRM is upgraded frequently to take advantage of technological advances in the CRM field.

Table 25 CRM systems in the final sample by recentness (time in years since system rollout)

Time since CRM was rolled out	N	% of sample	Cumulative %
less than a year	27	16,8	16,8
1-2 years	37	23,0	39,8
3-4 years	44	27,3	67,1
5-6 years	32	19,9	87,0
7-8 years	7	4,3	91,3
9-10 years	5	3,1	94,4
over 10 years	9	5,6	100,0
Total	161	100,0	

Information regarding the size of CRM systems in the final sample was collected in terms of the number of end-users using the current CRM. As Table 26 shows, 44.1% of CRM systems in the final sample are used by fewer than 50 users, which may be considered small CRM environments. Large CRM systems of more than 200 end-users accounted for 17.4% of the total number of cases. Therefore, large-scale CRM systems are still relatively scarce among organizations based in Finland. One potential explanation might be that SBUs have their own CRM systems instead of organization-wide CRM solutions.

Table 26 CRM systems in the final sample by size (number of users)

Number of CRM end-users	N	% of sample	Cumulative %
less than 25	39	24,2	24,2
25-49	32	19,9	44,1
50-99	29	18,0	62,1
100-149	20	12,4	74,5
150-199	9	5,6	80,1
200-249	4	2,5	82,6
250-499	17	10,6	93,2
500-1000	6	3,7	96,9
over 1000	5	3,1	100,0
Total	161	100,0	

CRM-on-Premise, which refers to locally hosted CRM, was the dominant choice of CRM type (86.3%) among organizations in the final sample (Table 27). The CRM-on-Demand, which is based on the cloud computing philosophy, has not become popular in Finland to date. However, it was important to collect data on CRM type since the CRM delivery system may have different mechanisms with antecedents and consequences depending upon CRM type. These possible differences could not be assessed in path analysis due to the small number of observations for CRM-on-Demand, but Pearson's Chi-Square was examined to detect differences between CRM types and low and high categories of process performance and product performance. No significant differences were found.

Table 27 CRM systems in the final sample by CRM type

CRM type	N	% of sample	Cumulative %
CRM On Premise	139	86,3	86,3
CRM On Demand	22	13,7	100,0
Total	161	100,0	

The number of staff and consultants involved in the CRM project are presented in Table 28 below. The majority of CRM projects involved less than five members of staff (68.9%) and external consultants (82.6%). The relatively small project team sizes reflect the size of CRM environments in terms of the number of end-users. In addition, the categorizations were perhaps, in retrospect, wrongfully adopted from existing ERP-related studies, which are typically larger projects than CRM projects.

Table 28 CRM systems in the final sample by project team size

Staff in CRM project team	N	% of sample	Cumulative %
1-4 people	111	68,9	68,9
5-9 people	36	22,4	91,3
over 10 people	14	8,7	100,0
Total	161	100,0	
Consultants in CRM project team	N	% of sample	Cumulative %
1-4 people	133	82,6	82,6
5-9 people	14	8,7	91,3
over 10 people	14	8,7	100,0
Total	161	100,0	

Finally, data was collected concerning the contract type adopted for the execution of CRM projects. This instrument, which also acts as a control variable in this study, was adopted from Ramachandran & Gopal (2010). It is a binary variable, which categorizes the CRM contract type into time & materials –based and fixed billing contracts. Practitioners suggested the inclusion of contract type due to its importance as a strategic managerial decision which may affect the performance of CRM delivery systems. As Table 29 shows, organizations in the final sample employed both contract types quite evenly.

Table 29 CRM systems in the final sample by contract type

CRM contract type	N	% of sample	Cumulative %
Time & Materials -based contract	88	54,7	54,7
Fixed contract	73	45,3	100,0
Total	161	100,0	

In conclusion, the descriptive statistics regarding organizations, respondents and CRM projects in the final sample displayed useful information, some of which will used for testing the sample for observed heterogeneity by applying them as control variables.

6.7 Primary analysis method

The primary analysis method in this research is structural equation modeling (SEM), which is one of the multivariate analysis techniques (Hair, Black, Babin & Anderson 1995). SEM has become the leading analytical approach in contemporary marketing research (e.g. Bagozzi 1994). SEM owes its popularity to the fact it allows researchers to examine multiple causal relationships simultaneously. Thus, SEM accommodates research that aims to unravel complex phenomena and inter-relationships between concepts in complete theoretical models. Regression analysis, conversely, can only focus on testing simple theoretical models.

SEM can help researchers in the investigation of abstract concepts by measuring *latent (unobservable) variables (LVs)* at the observation level and by testing relationships between latent variables at the theoretical level (Baumgartner & Homburg 1996). The observation level in a structural equation model is called the *measurement model* (or *outer model* in PLS terminology, see next sub-chapter). The theoretical level, in turn, is referred to as the *structural model* (or the *inner model*, respectively). Latent variables in the structural model may be *exogenous* or *endogenous* constructs. Exogenous constructs are independent and do not have paths pointing at them. Endogenous constructs, on the contrary, are dependent constructs that are explained by other constructs in the structural model (Hair, Ringle & Sarstedt 2011; Hair, Sarstedt, Ringle & Mena 2011). Accordingly, the analysis in SEM follows a two-step approach. First, the measurement models are estimated using appropriate reliability and validity criteria. Second, the structural model is assessed after the successful completion of the analysis of the measurement models (Anderson & Gerbing 1988).

This sub-chapter is organized as follows. Next, I will briefly discuss two distinct methods in SEM, namely, Covariance-based SEM (CB-SEM; Jöreskog 1973) and Partial Least Squares SEM (PLS-SEM; Wold 1982). A discussion follows regarding the two distinct types of latent variables in SEM, reflective measurement models and formative measurement models (Bollen & Lennox 1991). Third, I will provide a description of multidimensional, higher-order latent variables – one type of a multidimensional 2^{nd} order latent variable is the key construct in this study. Finally, I will discuss the justification of the choices of measurement model perspectives taken in this study.

6.7.1 Comparison between Partial Least Squares SEM and covariance-based SEM

Historically, CB-SEM has been the standard SEM method in marketing research as well as behavioral sciences in general. It is parameter-based and the underlying assumption of the traditional CB-SEM is that the indicators used to measure latent variables are reflective in nature (Chin 1998). Confirmatory theory testing is the primary objective of CB-SEM, which is facilitated by CB-SEM's emphasis on parameter estimates (Hair, Ringle et al. 2011, 140). However, CB-SEM imposes strict requirements on empirical data (Fornell & Bookstein 1982): PLS-SEM was developed as a response (Hair, Sarstedt et al. 2011). Prediction and theory development are the primary objectives of PLS-SEM. Unlike CB-SEM, PLS modeling aims to maximize the explained variance of the dependent endogenous variables in the structural model (Hair, Ringle et al. 2011, 139). In addition to reflective latent variables, PLS is well-equipped to estimate formative latent variables as well. According to Hair, Ringle et al.'s (2011) review on SEM methods used in marketing research publications, and Henseler, Ringle & Sinkovics's (2009) corresponding review on international marketing, empirical studies adopting PLS path modeling have increased rapidly in recent years.

CB-SEM and PLS-SEM should not be regarded as competing but as complementary analysis methods (Hair, Ringle et al. 2011; Jöreskog & Wold 1982). Despite their differences, one cannot claim one to be superior over the other. CB-SEM and PLS-SEM yield very similar results when the measurement and structural models are theoretically sound and properly specified (Hair, Ringle et al. 2011, 142). The choice of which one to apply should be based one's unique research setting with regard to the theoretical and empirical characteristics of the research and objectives (Reinartz, Haenlein &

Henseler 2009). These characteristics include structural model complexity, measurement model perspective (reflective vs. formative), sample size, and the normality of data distribution (Hair, Ringle et al. 2011, 144). I chose PLS modeling because it is the most appropriate approach to the study of complex structural models, formative measurement models, smaller sample sizes, and new theory development (e.g. Hair, Sarstedt et al. 2011; Chin 1998). I will now elaborate on these arguments.

In the proposed structural model of the present study, there are 14 reflective 1st order latent variables (and three more reflective moderator latent variables), five of which form a 2nd order formative latent variable, and eleven proposed path relationships. In their review of marketing research using PLS-SEM, Hair, Sarstedt et al. (2011) reported that the average number of latent variables and path relationships used in structural models were 8.4 and 10.6, respectively, in the past decade. In CB-SEM studies, these numbers are typically lower. In light of these figures, the proposed model in the present study may be described as a rather complex one, which PLS modeling can handle well.

The focal construct in the proposed model is formative, which PLS-SEM can handle better than CB-SEM[38] (Hair, Ringle et al. 2011; Hair, Sarstedt et al. 2011). The final sample size after screening is 161 usable responses, which falls below recommended thresholds for CB-SEM. According to Hair, Sarstedt et al. (2011), PLS-SEM can achieve high levels of statistical power even with sample sizes as small as 100, provided that sample size meets the minimum requirement criteria suggested by Barclay, Higgins & Thompson (1995): The minimum sample size should be ten times the maximum number of paths leading to any measurement model (number of formative indicators) or to any construct in the structural model (number of path relationships pointing to a dependent construct), whichever number is greater. In this study, the 2nd order formative construct CRM delivery system has a total of 14 indicators after instrument purification, setting the minimum at N=140. Thus, the minimum sample size requirement for PLS-SEM is met in this study, which would not be the case if CB-SEM was applied. Finally, the objective of the research, confirmatory theory testing versus prediction and theory development, is an important difference between CB-SEM and PLS-SEM. As this study clearly represents the latter approach, PLS-SEM is adopted as the primary analysis method.

[38] Formative indicators may be included in CB-SEM but researchers must follow specific model constraints, which often contradict theoretical considerations. Thus, PLS-SEM provides more flexibility when formative latent variables are included (Hair, Sarstedt et al. 2011).

6.7.2 Measurement model perspectives

The investigation of latent variables, or constructs, has gained popularity in marketing research since the seminal work by Churchill (1979). Latent variables cannot be directly observed; instead, they are measured directly through observable manifest measures. The measurement model posits the nature of the relationship between the latent variable and its manifest measures, which are referred to as indicators or items (Diamantopoulos, Riefler & Roth 2008, 1204). What Churchill (1979) was referring to when he provided instructions for developing measures for marketing constructs is now known as the reflective measurement model[39]. Reflective measurement models have become the unchallenged measurement perspective of choice in marketing research, and their choice often goes unquestioned (Diamantopoulos & Winklhofer 2001).

A formative measurement model was first introduced by Curtis & Jackson (1962) and Blalock (1964). However, compared to reflective models, the use of formative models in empirical studies remains scarce (Diamantopoulos et al. 2008, 1203). The lack of popularity of formative models in marketing research, IS research and other behavioral sciences has probably been influenced by the lack of practical guidelines how to create, estimate and validate formative models, in sharp contrast to standardized development procedures that have been developed for reflective measures over the years (Petter, Straub & Rai 2007; Diamantopoulos et al. 2008, 1208). Publications that have addressed these issues have appeared only fairly recently, with arguably the most notable contributions coming from Diamantopoulos & Winklhofer (2001), Edwards (2001), Rossiter (2002), Jarvis, MacKenzie & Podsakoff (2003), MacKenzie, Podsakoff & Jarvis (2005), and Diamantopoulos & Siguaw (2006), respectively. The scarcity of empirical models with formative structures may also be due to the fact that choice of measurement perspective is still often ignored by researchers (Diamantopoulos & Winklhofer 2001; Diamantopoulos 2006), despite increasing evidence in literature about the undesirable consequences of model misspecification (e.g. Jarvis et al. 2003; Diamantopoulos & Winklhofer 2001). In recent years, though, scholars have begun to challenge the “blind adherence” to the reflective approach with its strict emphasis on exploratory factor analysis and internal consistency (Coltman, Devinney, Midgley & Venaik 2008, 1251). Indeed, formative measurement models have been increasingly applied by researchers in IS, management and (international) marketing research (for a list of examples, see Diamantopoulos et al. 2008, 1206; Petter et al. 2007, 637).

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[39] In PLS terminology, reflective measurement models are also referred to as Mode A. Formative measurement models, in turn, are referred to as Mode B (Hair, Ringle et al. 2011, 141).

The formal specification of a reflective measurement model is (Diamantopoulos et al. 2008 (p. 1204):

$$x_i = \lambda_i \eta + \varepsilon_i$$

“where x_i is the *i*th indicator of the latent variable η, ε_i is the measurement error for the *i*th indicator, and λ_i is a coefficient (loading) capturing the effect of η on x_i.”

The reflective measurement model assumes that the direction of causality is from latent variable to its indicators (Figure 4, left). Thus they are manifestations of the underlying latent variable and thus called *effect* indicators. The latent variable is assumed to be the common cause of all its indicators; any variance in the latent variable causes variance in all of the indicators simultaneously. All variances are assumed to be positively inter-correlated (Diamantopoulos et al. 2008).

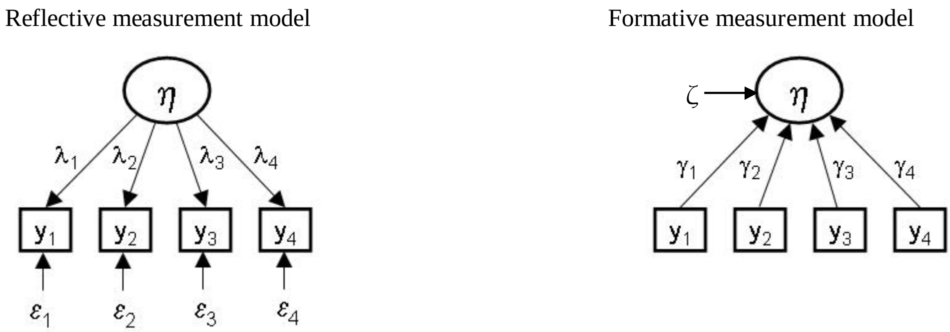

Figure 4 Reflective and formative measurement model

Diamantopoulos et al. (2008, 1205) also provided a formal specification for a formative measurement model:

$$\eta = \sum \gamma_i x_i + \zeta$$

“where γ_i is a coefficient capturing the effect of indicator x_i on the latent variable η, and ζ is a disturbance term.”

In the formative measurement model (Figure 4, right) indicators are thought to form or cause the underlying latent variable. Hence, they are called *cause* indicators. Contrary to reflective indicators, formative indicators are independent and need not correlate (Hair, Ringle et al. 2011, 146).

Therefore, the reflective measurement model represents a simple regression equation where the latent variable is the predictor variable and its indicators are dependent variables. The formative measurement model, in turn, represents a multiple regression equation where the latent variable is the dependent variable and its indicators are predictor variables (Diamantopoulos et al. 2008, 1205).

The previous discussion covered the specification of 1st order measurement models. Measurement models can also be conceptualized into higher-order, more abstract levels (e.g. Wetzels, Odekerken-Schroder & van Oppen 2009). A higher-order latent variable is a construct, whose domains can be conceptualized under an overall abstraction that is theoretically meaningful and parsimonious (Diamantopoulos et al. 2008, 1205). However, there is a trade-off between parsimony, and precision and accuracy (Edwards 2001).

In higher-order measurement models, there are at least two levels of analysis. The first level conceptualizes the link between the indicators and the 1st order latent variable, which acts as an indicator (dimension) for the 2nd order latent variable. There are formative or reflective specifications available for all levels, resulting in four types of 2nd order measurement models (Jarvis et al. 2003). Type I refers to 1st order formative, 2nd order formative constructs, which have also been called aggregate models and composite models (Edwards 2001; Law, Wong & Mobley 1998). Reinartz et al. (2004) and Bruhn, Georgi & Hadwich (2008) are examples of the empirical application of Type I constructs. Type II, in turn, refer to 1st order reflective, 2nd order formative measurement models. The key formative construct in this study is such a construct. Empirical studies including Type II constructs have emerged rather recently (Lin, Sher & Shih 2005; Ruiz et al. 2008; Ulaga & Eggert 2006). Type III is a 1st order formative, 2nd order reflective construct, which is virtually non-existent in empirical studies. Finally, Type IV constructs are 1st order reflective, 2nd order reflective, which have been also been referred to as factor models (Law et al. 1998; Law & Wong 1999). Type IV has been dominant in empirical studies compared with Types I-III due to the absence of the formative measurement perspective.

6.7.3 Measurement model specification and implications

Based on the discussion of the direction of causality and expectations regarding inter-item correlations, it is evident that reflective and formative measurement models are fundamentally different[40]. Jarvis et al. (2003) highlighted the

[40] For an ontological discussion, see Borsboom, Mellenbergh & van Heerden (2003).

differences between reflective and formative measurement models with a pragmatic checklist, which was simultaneously intended to be used as a set of decision rules to avoid measurement model misspecification. In addition to causality and correlations, reflective and formative measures can be distinguished in terms of (1) item interchangeability; (2) the nomological net of indicators; and (3) measurement error assessment.

Since reflective items are causes of the same underlying latent variable, they are interchangeable. Formative indicators, however, tap into distinct facets of the construct's domain: eliminating an indicator potentially alters the construct (Bollen & Lennox 1991, 308). It can lead to the elimination of those very items that are most meaningful to the latent construct (Jarvis et al. 2003, 202). Therefore, removing any formative indicators must be theoretically justifiable and should not be done on the basis of empirical findings.

In reflective measurement models, measurement error is estimated at the reflective indicator level; any deviation from a linear correlation with the latent variable is considered measurement error at the indicator level. In formative measurement, indicators are assumed to be error-free, i.e. there is no indicator measurement error (Hair, Ringle et al. 2011, 146). Instead, the error term, or disturbance term, is assessed at construct level. This can be a problematic issue because it is, in most cases, not realistic to assume error-free indicators (Diamantopoulos et al. 2008, 1211). If the assumption of error-free indicators cannot be accepted, employing a formative measurement model may not be advisable.

The error term represents the surplus meaning (measured at construct level) not captured by its formative indicators included in the model, I.e. the impact of unknown causes not explicitly included in the model[41] (Jarvis et al. 2003; Diamantopoulos 2006). In practice, researches are seldom able to collect a complete census of formative indicators, which is necessary to identify all possible causes of a formative latent variable. In empirical research, error term is always present. Diamantopoulos et al. (2008) and Diamantopoulos (2006) discussed dealing with the error term simply by fixing it to zero, which effectively means assuming that all explicitly included formative indicators capture the whole domain of the formative latent variable. However, this assumption is neither theoretically nor empirically justifiable. If the error term is fixed at zero[42], it is not a formative latent variable but a formative composite variable. The theoretical justification for a formative composite variable is not as

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41 It is also important to emphasize that the error term does not include measurement error of the formative indicators or the set of formative indicators, which has been falsely claimed in existing literature (for an extensive discussion, see Diamantopoulos 2006).

42 In PLS modeling, error terms for formative constructs are always fixed at zero.

stringent as it is for a formative latent variable (MacKenzie, Podsakoff & Podsakoff 2011). The core construct in this study, CRM delivery system, is a formative composite variable - not a formative latent variable (see Chapter 6.10.2 for a detailed analysis) - from a theoretical, empirical as well as technical viewpoint.

Jarvis et al. (2003) pointed out that formative indicators do not necessarily have the same antecedents and consequences. This is a key issue in this study on both sides of the argument. On the consequences side, by conceptualizing CRM delivery system as a formative composite variable it is implicitly assumed in this study that the formative dimensions of CRM delivery system jointly contribute to the same consequences. I will test this assumption in conjunction with formative measurement model assessment. On the antecedents side, conversely, it is implicitly assumed that the formative dimensions of CRM delivery system have different antecedents as the opposite claim would be theoretically untenable. I will discuss and present a solution by Cadogan & Lee (2010) in Chapter 6.10.2, which enables taking into account different antecedent relationships in structural model assessment.

Unfortunately, studies show that measurement models have often unintentionally been misspecified. According to Jarvis et al. (2003), approximately one third of scales in marketing research have suffered from this issue. In IS research, a “remarkably similar degree of misspecification” has occurred (Petter et al. 2007, 632). As a potential consequence of misspecification, scale validity may be brought into question. Invalid scales entail the danger of false interpretations of statistical results: structural equation models may be strongly biased if any given measurement model is misspecified. Diamantopoulos et al. (2008, 1209) summarized six studies assessing the consequences of measurement model misspecification (Law & Wong 1999; Edwards 2001; Jarvis et al. 2003; MacKenzie et al. 2005; Albers & Hildebrandt 2006; Diamantopoulos & Siguaw 2006): significant biased effects on parameter estimates were detected. This was quite a logical consequence considering that inter-item correlation is a desirable characteristic with reflective scales and problematic with formative scales (Diamantopoulos et al. 2008, 1210). Goodness-of-fit indices, on the other hand, surprisingly failed to detect measurement model misspecification. This is an alarming finding as measurement model misspecification remains undetected in overall model fit estimation. This emphasizes the importance of theoretical justification in measurement model specification even more (Diamantopoulos et al. 2008, 1211). Therefore, all scales were subject to the procedures put forward by Jarvis et al. (2003) to avoid the concerns raised above. Similarly, the higher-order construct CRM delivery system in this study was scrutinized following the same procedure.

6.7.4 Measurement perspective justification

Determining the measurement perspective is a crucial issue in SEM, which should be based on theoretical rationale (e.g. Diamantopoulos & Winklhofer 2001; Jarvis et al. 2003) and parsimony, which refers to the total number of items comprising the respective measures (Diamantopoulos & Siguaw 2006, 264). No construct is inherently reflective or formative: any given construct can be conceptualized from both measurement perspectives. Socioeconomic status (SES; Hauser & Goldberger 1971) is a popular example in methodological literature. Regardless of measurement perspective, the theoretical conceptualization is confirmed with empirical testing to substantiate its appropriateness through criterion validity, which may also include a comparison between reflective and formative measures of the same construct on the dependent criterion variable (Diamantopoulos & Siguaw 2006, 264).

There is an ongoing debate concerning whether reflective measurement models are more appropriate *per se* to investigate marketing phenomena. At one extreme, Howell, Breivik & Wilcox (2007) explicitly consider reflective measurement models less problematic and advise to use them whenever possible. In a similar vein, Wilcox, Howell & Breivik (2008) pinpoint the conceptual and methodological challenges encountered with formative measurement models. Bagozzi (2011) concluded that formative measurement requires sacrifices with respect to the generalizability of empirical findings.

At the other extreme, Bollen & Lennox (1991) argued for the existence of formative constructs, demonstrating that some concepts such as SES are essentially formative in nature. Bollen (2007) responded to Howell et al.'s (2007) criticisms, claiming that measurement model problems are related to model misspecification rather than the inferiority of formative measurement.

In this study, all 1st order measurement models were adopted from existing literature, and they are all reflective in nature. Following the guidelines suggested by Jarvis et al. (2003), they were all deemed correctly specified as reflective measures from a theoretical perspective. Based on careful theoretical consideration, I conceptualized the CRM delivery system as a 1st order reflective, 2nd order formative construct. In this view, project-level IT resources (PMR, CR, TR, TMS, UI) represent different facets of the 2nd order formative construct. Although the five dimensions of CRM delivery system do not represent an exhaustive list of components, they have received the most theoretical support to justify their inclusion into the formative CRM delivery system construct. As the dimensions were not identified through a census, they form a formative composite variable, not a formative latent variable. Following Jarvis et al. (2003), CRM delivery system is clearly formative in nature: its dimensions will not necessarily co-vary, the causality flows from the dimensions to the construct, and the dimensions are not interchangeable as the meaning of CRM delivery system would alter. Consequently, the formative 2nd order composite variable is a coherent description which depicts the multidimensional nature of CRM delivery system.

According to Pavlou & El Sawy (2006, 206), a higher-order construct can more parsimoniously explain the cumulative effect as opposed to multiple distinct effects of individual facets. Theory suggests that CRM delivery system dimensions are inherently intertwined and should not be assessed in isolation; therefore, the composite variable is theoretically justified (Karimi et al. 2007b). Although the different facets that constitute CRM delivery system may vary in importance from one CRM project to another, it may be very difficult to achieve success in the absence of any given dimension identified in existing literature. In IT capability literature, this logic has been applied by Pavlou & El Sawy (2006) in conceptualizing IT leveraging competence in new product development, and by Bharadwaj (2000) in conceptualizing firm-wide IT capability, for example.

As for model parsimony, CRM delivery system incorporates the multidimensional phenomenon of CRM delivery system from five separate constructs into a single construct. Model parsimony, when theoretically justifiable, has been supported by scholars (e.g. Cenfetelli & Basselier 2009) as it allows the researcher to focus on a single structural effect as opposed to multiple effects. Consequently, fewer parameters need to be estimated in the model. Individual indicators can still be assessed based on their weights, i.e. their contributions to the formative composite construct (Cadogan & Lee 2010, 14).

In summary, the reflective measurement models were considered correctly specified from a theoretical viewpoint. In a similar vein, the formative 2nd order composite variable was theoretically justified to be an appropriate measurement perspective for CRM delivery system. Results from empirical testing, which follows next, may provide further evidence in justifying *a priori* choices based on theory.

6.8 Assessment of reflective measurement models

In assessing how well constructs are measured by their indicators, individually or jointly, researchers need to distinguish between reflective and formative measurement perspectives (Hair, Sarstedt et al. 2011). Thus, I will first discuss reflective measurement model assessment and proceed to formative measurement model assessment in the following sub-chapter.

For reflective measurement model assessment, I followed the procedure recommended by Churchill (1979, 66). Firstly, I carried out an exploratory factor analysis (EFA[43]) with SPSS 19 to purify the reflective measures and ensure sufficient discriminant validity. After concluding EFA, I tested the final set of reflective measures with different reliability and validity criteria recommended in existing methodological literature. These tests were conducted with both SPSS 19 as well as Smart-PLS 2.0 M3 (Ringle, Wende & Will 2005).

6.8.1 Reflective measure purification

The content validity of all measures was confirmed through theoretical justification and expert opinions gathered in the pre-test phase of the questionnaire instrument. I tested all main effects in EFA. All indicators (except moderator indicators) presented in the theoretical model were included as they are all reflective in nature. This was done to ensure that all operational measures of theoretical concepts were distinctive entities and possessed sufficient discriminant validity, a lack of which can result in collinearity and multicollinearity issues. Some indicators had to be dropped due to these issues, after which a final purified set of indicators used in model testing was achieved.

In the preliminary stages of EFA, it became evident that some indicators were loading into other factors than originally expected or into multiple factors. Isp1 was loading into both factors ISP and internal partnership quality, while Isp2 was loading into factors IS planning sophistication and top management support. As a result, both indicators had to be dropped to avoid collinearity issues. In addition, indicators Ps3 and Ps4 loaded equally (approximately 0.5) into factors IS personnel skill and internal partnership quality, which led to their exclusion from the final set of indicators. Unfortunately, IS planning sophistication and IS personnel skill consequently diminished into constructs comprised of two indicators, which is below the recommended level of three indicators (Diamantopoulos et al. 2008). Consequently, the impact of independent variables IS planning sophistication and IS personnel skill may also decrease in the assessment of the structural model. IS planning sophistication, IS personnel skill and internal partnership quality, which were all borrowed from Ravichandran & Lertwongsatien (2005), passed EFA criteria in their research. However, there is a possible explanation for the exclusion of the above-mentioned indicators in the current study. Ravichandran & Lertwongsatien (2005) had conceptualized all three

[43] In EFA, the number of factors is not predetermined by the researcher. The number of factors is calculated by a computer program such as SPSS, and then compared with the theoretically derived constructs *a priori* (Gefen & Straub 2005, 92).

constructs as dimensions of higher-order formative constructs in their research and, consequently, performed separate EFA analyses for each formative construct. Therefore, the possible overlaps discovered in this study may have gone unnoticed by Ravichandran & Lertwongsatien (2005).

Finally, Pmr3 loaded into factor process performance and was hence eliminated. Pmr3, was adopted from Karimi et al. (2007b) in which the outcome constructs did not include process performance. In retrospect, it is not surprising that the indicator “The implementation schedule was realistic.” loaded with process performance, which includes the indicator Spp2 “The system was completed within schedule.”. As the management of implementation schedule is an important aspect of project management resources, I considered retaining Pmr3 based on theoretical grounds, but eventually the decision was made to remove Pmr3 to avoid compromising empirical results.

The EFA based on the final set of measures is presented in Table 30 below. It is based on principal component analysis (PCA) with varimax rotation, which are the most commonly applied method and rotation, respectively, in social sciences (Costello & Osborne 2005, 3). The KMO statistic measures sampling adequacy that contributes to yielding distinct and reliable factors. The KMO score was 0.828, with values above 0.8 considered to be very good (Field 2005). Bartlett’s test of sphericity was highly significant ($p<0.0001$), confirming the robustness of EFA results.

Table 30 Exploratory factor analysis (varimax rotation) with purified set of measures

	Component													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Inf1	,765													
Inf2	,814													
Inf3	,753													
Inf4	,748													
Isp3		,867												
Isp4		,825												
Ps1			,895											
Ps2			,862											
Ipq1				,693										
Ipq2				,785										
Ipq3				,836										
Ipq4				,661										
Ipq5				,705										
Epq1					,834									
Epq2					,828									
Epq3					,858									
Epq4					,836									
Epq5					,586									
Pmr1						,608								
Pmr2						,563								
Cr1							,814							
Cr2							,814							
Cr3							,839							
Tr1								,840						
Tr2								,813						
Tr3								,647						
Tms1									,850					
Tms2									,826					
Tms3									,884					
Ui1										,831				
Ui2										,848				
Ui3										,820				
Spp1											,884			
Spp2											,864			
Spd1												,717		
Spd2												,738		
Spd3												,676		
Spd4												,676		
Spd5												,753		
Peou1_Wall													,832	
Peou2_Wall													,794	
Peou3_Wall													,883	
Peou4_Wall													,728	
Peou5_Wall													,779	
Pu1_Wall														,838
Pu2_Wall														,841
Pu3_Wall														,852
Pu4_Wall														,777

According to Field (2005, 637), the value of significant factor loadings depends directly on sample size. For samples ranging from 100 to 200 (N=161 in this study), the critical threshold for significant loadings is 0.512. As Table 30 shows, factor loadings ranged between 0.608 and 0.895, exceeding the minimum loading requirement. Values below 0.4 were excluded from the table as suggested by Hair et al. (1995). Finally, communalities are recommended to be above 0.5 (Costello & Osborne 2005, 4). Appendix 12 lists the communalities for the indicators in the final set, which were all above 0.69 and thus considered satisfactory.

In conclusion, five indicators were eliminated from the original set of 53 indicators. The remaining 48 indicators comprised the final purified set of observable measures for a total of 14 latent constructs proposed in the theoretical framework in this study (excluding moderators). The final set of measures showed satisfactory levels of discriminant validity. As the next step, these measures will now be placed under further scrutiny through reliability and validity testing.

6.8.2 Reliability and validity of reflective measures

The criteria used for reflective measurement model assessment have been well-established over the years since the previously mentioned Churchill (1979) article. Reflective measurement model assessment in the context of PLS-SEM has adopted the same procedures as CB-SEM - issues regarding the reliability and validity of reflective measures. I will first present the reliability analysis criteria, followed by the validity analysis criteria. I will also present the results of the reliability and validity analyses.

To assess reliability at the individual item level, *loadings* express the shared variance between the indicator and its underlying latent variable. Similar to CB-SEM, indicator loadings above 0.7 are considered acceptable for reflective indicators in PLS modeling (Hair, Ringle et al. 2011). According to Hulland (1999, 198), even an indicator with a value as low as 0.4-0.5 may be included in the model if there is a strong theoretical rationale behind it. In addition, Hair, Ringle et al. (2011, 145) argued that indicators with 0.4-0.7 loadings should only be considered for removal if it leads to an increase in composite reliability above the suggested threshold value of 0.7.

In contrast with CB-SEM, indicator loadings in PLS modeling may vary to some extent based on their contribution to the predictive power of the underlying latent variable in a structural model. In other words, PLS-SEM estimates loadings of exogenous constructs' indicators based on their prediction of endogenous constructs, not their shared variance with other indicators of the same construct as in reflective measurement model assessment. Thus, indicator loadings express their contribution to the path coefficients (Hair, Ringle et al. 2011, 140). To highlight this point with individual item loadings, I executed the PLS algorithm with SmartPLS 2.0 M3 (Ringle et al. 2005) on all reflective measurement models in isolation as well as on the main effects model without direct effects or moderating effects (both with the final purified set of indicators). A detailed table of indicator-level descriptive statistics (means, standard deviations, standard errors) and loadings are presented in Appendix 13. As the table shows, all indicator loadings in the final set are well above the suggested cut-off point of 0.7 with the exception of Epq5 (0.66 when estimated in isolation). In the proposed model, the loading (0.70) of

Epq5 was higher. This suggests that it contributed sufficiently to the predictive power of external partnership quality and will thus be included[44].

At the construct level, Cronbach's alpha and composite reliability are the most commonly applied *internal consistency reliability* tests. Internal consistency refers to the correlation among the indicators comprising the set. Cronbach's alpha is the basic statistic for determining internal consistency (Churchill 1979, 70). Values over 0.7 considered acceptable (Nunnally 1978). Composite reliability is another criterion to assess internal consistency. They differ in that Cronbach's alpha assumes that all indicators are equally reliable while composite reliability does not. For this reason, composite reliability is regarded as a more suitable criterion in PLS modeling, which prioritizes indicators. Composite reliability values exceeding 0.7 are considered acceptable. (Hair, Ringle et al. 2011; Hair, Sarstedt et al. 2011)

Validity testing for reflective measurement models focuses on *convergent validity and discriminant validity*. The convergent validity refers to the extent to which a latent variable correlates highly with its manifest indicators. According to Fornell & Larcker (1981, 45-46) convergent validity can be evaluated with the average variance extracted (AVE) measure, which shows the amount of indicators' variance explained by the underlying construct. The recommended values of AVE are above 0.5. Discriminant validity, in turn, refers to the extent to which a latent variable shares variance with its manifest indicators rather than other constructs in the structural model. First, Fornell & Larcker (1981) suggested that AVE could also be utilized to evaluate discriminant validity, which is usually referred to as the Fornell & Larcker criterion: each construct's AVE should be higher than its squared correlation with any other construct (A mathematically identical alternative is to state that each construct's square root of AVE should be higher than its correlation with any other construct.).

The internal consistency reliability analysis was conducted with IBM SPSS 19 software with the exception of composite reliability, which was automatically calculated by SmartPLS 2.0 M3 (Ringle et al. 2005). SmartPLS also provides AVE calculations, which were utilized in assessing convergent and discriminant validity. Cronbach's alpha was calculated with both programs and produced identical results, which further validates the reliability of the analyses. The internal consistency reliability and convergent validity of all reflective latent variables are presented in Table 31. The mean values represent the mean values of the reflective indicators of each latent variable.

[44] The exclusion of Epq5 increased the composite reliability of EPQ from 0.92 to 0.94. As the original composite reliability was well above the threshold value of 0.7, there was no need to eliminate the indicator Epq5.

Table 31 Reliability (SPSS) and convergent validity (PLS) of reflective measurement models

	N	Minimum	Maximum	Mean	Std. Error	Std. Dev.	Cronbach a	Comp.rel.	AVE
INF	161	1,50	7,00	4,62	,084	1,07	,812	,876	,639
ISP	161	1,00	7,00	4,05	,115	1,45	,802	,910	,835
PS	161	1,00	7,00	4,81	,095	1,21	,854	,932	,872
IPQ	161	1,40	7,00	4,58	,085	1,08	,866	,904	,653
EPQ	161	1,20	6,80	4,32	,088	1,12	,883	,915	,685
PMR	161	1,00	7,00	4,68	,101	1,28	,633	,831	,714
CR	161	1,00	7,00	4,27	,106	1,35	,891	,932	,821
TR	161	1,67	7,00	4,39	,093	1,19	,786	,875	,701
TMS	161	1,00	7,00	4,68	,112	1,42	,900	,937	,833
UI	161	1,00	7,00	4,70	,111	1,41	,883	,928	,811
SPP	161	1,00	7,00	4,58	,132	1,68	,834	,923	,857
SPD	161	1,00	7,00	4,66	,098	1,24	,908	,931	,731
PEOU	161	1,70	6,70	4,46	,074	,93	,927	,945	,774
PU	161	2,00	7,00	4,92	,081	1,03	,951	,964	,872

In terms of Cronbach’s alpha, composite reliability and AVE, all reflective measurement models displayed good levels of internal consistency reliability and convergent validity. The only exception is project management resources, which had a Cronbach’s alpha score of 0.633. However, this is partially due to the fact that project management resources has only two indicators after the elimination of Pmr3: Cronbach’s alpha increases as the number of indicators increases. As mentioned earlier, the composite reliability is considered a more important measure of internal consistency in the context of PLS-SEM. project management resources’s composite reliability (0.831) was quite good, and its AVE (0.714) was also well above the recommended threshold of 0.5. Despite a below-par Cronbach’s alpha, project management resources can therefore be considered an acceptable measure in terms of internal consistency.

Finally, the results for discriminant validity at the structural level are presented in Table 32 based on the Fornell & Larcker criterion.

Table 32 Discriminant validity of reflective measurement models (PLS)

	EPQ	INF	IPQ	ISP	PEOU	PS	PU	TR	UI	CR	PMR	SPD	SPP	TMS
EPQ	**0,828**													
INF	0,286	**0,800**												
IPQ	0,377	0,287	**0,808**											
ISP	0,213	0,216	0,342	**0,880**										
PEOU	0,175	0,138	0,224	0,101	**0,934**									
PS	0,227	0,253	0,369	0,307	0,045	**0,934**								
PU	0,045	0,065	0,108	0,070	0,676	0,032	**0,837**							
TR	0,164	0,074	0,265	0,192	0,153	0,096	0,102	**0,900**						
UI	0,163	0,229	0,322	0,134	0,219	0,183	0,123	0,307	**0,906**					
CR	0,268	0,221	0,366	0,194	0,118	0,112	0,047	0,398	0,290	**0,845**				
PMR	0,233	0,266	0,415	0,354	0,192	0,226	0,092	0,387	0,461	0,486	**0,855**			
SPD	0,367	0,232	0,390	0,137	0,447	0,205	0,429	0,417	0,451	0,494	0,485	**0,926**		
SPP	0,161	0,102	0,178	0,006	0,166	0,080	0,116	0,221	0,204	0,295	0,319	0,427	**0,913**	
TMS	0,108	0,161	0,381	0,226	0,056	0,222	0,096	0,359	0,343	0,260	0,299	0,340	0,166	**0,914**

√AVE in **bold**

The numbers in bold represent the square root of each construct’s AVE. In all columns, the number in bold is greater than the numbers below it, which represent the construct’s correlations with other constructs. Therefore, the Fornell & Larcker criterion for discriminant validity is met. As a matter of fact, a closer examination of the table reveals that the discriminant validity of all constructs is very good: all constructs would pass the far more stringent test of comparing AVE (as opposed to √AVE) directly to all correlations with other constructs in the model.

As an additional precautionary measure, Chin (1998) recommended that discriminant validity should also be assessed at the indicator level through the examination of cross loadings: each indicator should load highest on the construct it is intended to measure. The examination of the cross loadings matrix (Appendix 14) showed no issues with discriminant validity at the indicator level. Therefore, all reflective measurement models displayed a satisfactory degree of discriminant validity at both construct level as well as indicator level.

In conclusion, the final purified set of reflective indicators and their underlying latent reflective measurement models displayed acceptable results in terms of reliability and validity criteria. Next, I will move onto assessing the 1st order reflective, 2nd order formative measurement model proposed in this study, namely, CRM delivery system.

6.9 Assessment of formative measurement models

The discussion here will concentrate on the Type II multidimensional model, i.e. the 1st order reflective, 2nd order formative measurement model. CRM delivery system (CRMDS), the core concept in this study, is this type of multidimensional construct.

The formative indicators (dimensions) of CRM delivery system are 1st order reflective latent variables, which were subject to the reflective measurement model assessment process - along with all the other reflective latent variables - discussed previously.

After the estimation of the 1st order reflective latent variables, the 2nd order formative latent variable needs to be estimated. The 1st order reflective latent variables act as formative dimensions of the 2nd order construct (Cadogan & Lee 2010), which in this case is CRM delivery system. From this point forward, project management resources (PMR), consultant resources (CR), training resources (TR), top management support (TMS), and user involvement (UI), will be treated as formative dimensions instead of reflective measurement models. The assessment of CRM delivery system follows the procedures presented below regarding formative measurement model estimation.

As mentioned earlier, the estimation of the formative measurement model has been lagging behind its reflective counterpart. Hair, Sarstedt et al. (2011) expressed their concern about the still prevalent application of reflective measurement model criteria for formative measurement model assessment in marketing research. Several influential articles have surfaced in the last decade since Diamantopoulos & Winklhofer (2001) addressed the issue. In the present study, the estimation of formative models is presented based on the recommendations by Bollen (2011), MacKenzie et al. (2011), Hair, Sarstedt et al. (2011) and Hair, Ringle et al. (2011). They have provided guidelines to address the following issues: multicollinearity, external validity assessment, and reliability and validity assessment criteria.

6.9.1 Multicollinearity

Whereas high inter-correlations are desirable with reflective measurement models, they pose problems to formative measurement models through *multicollinearity* (Diamantopoulos & Siguaw 2006). Multicollinearity causes estimation difficulties of formative indicator weights and path coefficients due to multiple regression links from the formative indicators to the latent variable (Diamantopoulos et al. 2008, 1212). Thus, assessing the distinct influence of indicators becomes ambiguous, making indicator validity assessment problematic by producing biased results and unstable indicator weights (MacKenzie et al. 2005; Cenfetelli & Bassellier 2009).

The two most common measures for assessing variable collinearity and multicollinearity are variance inflation factor (VIF) and tolerance. These measures reveal the degree to which each independent variable is explained by other independent variables. The tolerance value of an independent variable indicates its variability not explained by other independent variables. Thus, a low tolerance value suggests high collinearity, which is not desirable in formative constructs (Hair et al. 1995, 127).

The formal specification of the tolerance value of variable x is:

$$(TOL^{x}) = 1 - R^{2}$$

, where R^2 is the coefficient of determination for the prediction of variable x by other independent variables. VIF is directly related to tolerance inversely (VIF = 1 / TOL) and it expresses the effect of other independent variables on the coefficient of determination (Hair et al. 1995, 152).

A low tolerance value or a high VIF value suggests that an indicator should be subject to elimination. Diamantopoulos & Siguaw (2006) suggested that the cut-off point could be at VIF > 10 or its tolerance equivalent. Hair, Ringle et al. (2011) and Hair, Sarstedt et al. (2011) recommended more stringent VIF>5 and TOL<0.2 thresholds for formative indicator elimination, respectively.

Multiple regression analysis in SPSS was used to determine multicollinearity of the formative indicators in the CRM delivery system construct. Since the formative indicators of CRM delivery system are represented by latent variables project management resources, consultant resources, training resources, top management support and user involvement, they are referred to as formative dimensions. For the purposes of formative measurement model assessment, these dimensions were calculated as sum variables. The results are shown in Table 33 below.

Table 33 Multicollinearity among formative dimensions of CRM delivery system (SPSS)

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	**Tolerance**	**VIF**
(Constant)	3,714	,129		28,801	,000		
PMR	,217	,159	,131	1,362	,175	**,659**	**1,516**
CR	-,153	,152	-,092	-1,005	,317	**,726**	**1,377**
TR	,149	,150	,090	,994	,322	**,740**	**1,352**
TMS	-,347	,145	-,210	-2,402	,018	**,800**	**1,250**
UI	,059	,150	,036	,391	,696	**,739**	**1,353**

All formative dimensions passed the VIF and tolerance tests easily with tolerance and VIF values ranging between 0.66–0.80 and 1.25–1.52, respectively. These numbers not only suggest that multicollinearity is not an issue, but also emphasize that all formative dimensions are clearly tapping into distinct facets of CRM delivery system.

6.9.2 External validity assessment

In particular, there is one significant difference between formative and reflective measurement models as far as validity assessment is concerned. While reflective measurement models with three or more indicators can be estimated in isolation (Diamantopoulos et al. 2008, 1205), the statistical validity assessment of a formative measurement model requires a larger model that incorporates its consequences on effect indicators or another latent variable (Diamantopoulos & Winklhofer 2001). Furthermore, there must be at least two emitted paths leading to consequences from the formative measurement model. According to Diamantopoulos et al. (2008), there are three alternative approaches which have been suggested in existing literature: (a) adding two reflective indicators to the formative construct; (b) adding two reflective constructs that are not causally linked, for example, outcome constructs of the formative construct; (c) a mix of the two above-mentioned approaches by adding one reflective indicator and one reflective outcome construct.

The most commonly applied conceptual interpretation of option (a), i.e. adding at least two reflective indicators to the formative construct, is called the multiple indicators and multiple causes (MIMIC) model (Jöreskog & Goldberger 1975). It is considered a desirable approach to assessing the external validity of formative constructs. Having both formative and reflective indicators for a construct allows freedom for the research to head in whatever direction without theoretical or technical constraints. Unfortunately, no reflective measure has been introduced for CRM delivery system in prior literature[45], which captures the same exact dimensions of CRM delivery system proposed in this study. Thus, MIMIC was not performed to identify or validate the 2nd order formative construct CRM delivery system. The parameter estimates and external validity of formative variables are as much dependent on the choice of external outcome variables as they are on their own formative indicators. Most studies that did include the MIMIC procedure were able to pick well-established reflective measures (e.g. Ruiz et al. 2008; Cadogan, Souchon & Procter 2008; Ulaga & Eggert 2006; Lin et al. 2005).

Consequently, I decided to use option (b), the use of reflective outcome variables, to identify the formative measurement model CRM delivery system. In CB-SEM, this approach requires at least two reflective, causally unrelated outcome variables. In PLS modeling, however, one reflective outcome variable is sufficient for external validity assessment purposes. The natural choice was CRM product performance (SPD). It has been theoretically justified in this study that product performance is closely linked to CRM delivery system and, consequently, it is theoretically justified to assume this relationship applies to the proposed formative measurement model CRM delivery system. Product performance is a well-established reflective outcome variable in IS research. Furthermore, product performance is an integral part of the structural model and not added for purely validity assessment purposes, which could compromise the parameter estimates of the formative measurement model (Diamantopoulos et al. 2008, 1214; for an extensive review, see Howell et al. 2007).

As the formative measurement model in this study, CRM delivery system, is a higher-order (1st order reflective, 2nd order formative) construct, some additional procedures are required for model estimation. In PLS modeling, 2nd order constructs can be measured in two ways. The first option is a procedure called the hierarchical component model, i.e. the repeated indicators technique, suggested by Wold (1982) and Lohmöller (1989). The second option is to model the 1st order constructs as formative dimensions of the 2nd order construct, in which case these dimensions are the sum variables of the 1st order constructs' indicators (Chin, Marcolin & Newsted 2003). Without the application of one of these techniques, one could not determine the validity and significance of each individual formative indicator/dimension in relation to the 2nd order formative construct. As the former enables measurement with original indicators without calculated sum variables, it was chosen as the more

[45] Karimi et al. (2007a) did not apply the MIMIC approach to their ERP delivery system construct.

suitable alternative[46]. Furthermore, the hierarchical component model is consistent with the model testing technique applied in this study, which was suggested by Cadogan & Lee (2010) on how to estimate structural models with endogenous formative latent constructs. I will discuss Cadogan & Lee's (2010) technique in further detail in Chapter 6.10.2.

Since the 2nd order construct CRM delivery system is formative, I added an outcome construct to the hierarchical component model (Figure 5). As mentioned earlier, I ruled out the MIMIC technique due to the lack of well-established reflective indicators for CRM delivery system.

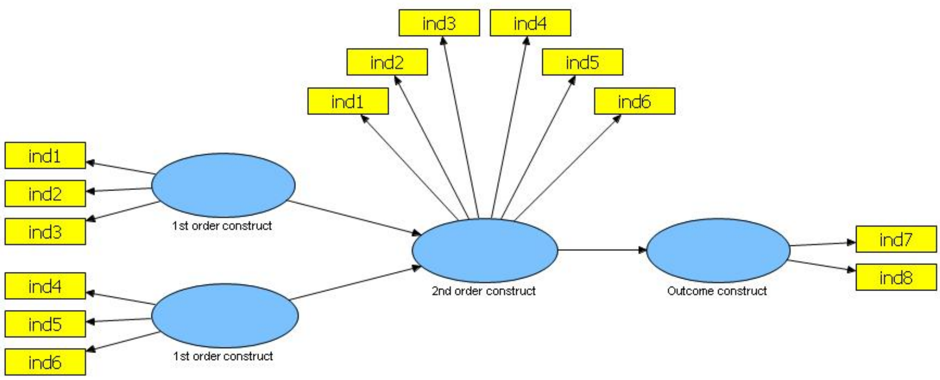

Figure 5 The hierarchical component model for estimating higher-order formative measurement models

Following the hierarchical component model procedure, the 2nd order factor CRM delivery system is directly measured by the observed indicators for all the 1st order reflective latent variables: project management resources, consultant resources, training resources, top management support and user involvement. These 1st order latent variables act as the formative dimensions of CRM delivery system. In the hierarchical component model, the 1st order reflective latent variables are conceptualized separately. An arrow is drawn from each of the five reflective 1st order latent variables (formative dimensions) to the 2nd order factor CRM delivery system, in which all observed indicators are repeated (see Appendix 15). Each standardized path coefficient from the 1st order reflective latent variables (formative dimensions) to the 2nd order CRM delivery system construct represents the weight of that formative

46 In SPSS analyses, sum variables were used to test formative measurement model assessment further. The use of sum variables will be mentioned when applicable.

dimension. The significance of those weights can then be calculated through the bootstrapping procedure (weights and bootstrapping are discussed in more detail next). The outcome variable in the estimation of CRM delivery system is product performance. Based on the hierarchical component model described above, I will now present the results of the reliability and validity analyses for CRM delivery system.

6.9.3 Reliability and validity of formative measures

Traditional reliability assessment measures based on internal consistency from classical test theory do not apply to formative measurement models because no inter-item correlations are required to exist. Hence, some have argued that no reliability assessment should be performed on formative measurement models (e.g. Jarvis et al. 2003; Rossiter 2002; Hair, Ringle et al. 2011). In a similar vein, scholars have pointed out that convergent validity is not a meaningful concept as far as formative constructs are concerned (e.g. Diamantopoulos & Winklhofer 2001; Hair, Sarstedt et al. 2011). However, Diamantopoulos et al. (2008) suggested that calculating the correlations between the formative latent variable and each of its indicators separately could be a basic test to indicate a degree of reliability. Therefore, I conducted a Pearson correlation test with SPSS to assess the significance of correlations between CRM delivery system and its five dimensions, which were calculated as sum variables. These correlations are presented in Table 34.

Table 34 Correlations of CRM delivery system and formative dimensions (SPSS)

Correlations							
		PMR	CR	TR	TMS	UI	CRMDS
PMR	Pearson Correlation	1	,456**	,374**	,295**	,448**	,757**
	Sig. (2-tailed)		,000	,000	,000	,000	,000
	N	161	161	161	161	161	161
CR	Pearson Correlation	,456**	1	,397**	,260**	,290**	,696**
	Sig. (2-tailed)	,000		,000	,001	,000	,000
	N	161	161	161	161	161	161
TR	Pearson Correlation	,374**	,397**	1	,357**	,304**	,701**
	Sig. (2-tailed)	,000	,000		,000	,000	,000
	N	161	161	161	161	161	161
TMS	Pearson Correlation	,295**	,260**	,357**	1	,346**	,629**
	Sig. (2-tailed)	,000	,001	,000		,000	,000
	N	161	161	161	161	161	161
UI	Pearson Correlation	,448**	,290**	,304**	,346**	1	,686**
	Sig. (2-tailed)	,000	,000	,000	,000		,000
	N	161	161	161	161	161	161
CRMDS	Pearson Correlation	,757**	,696**	,701**	,629**	,686**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	
	N	161	161	161	161	161	161
**. Correlation is significant at the 0.01 level (2-tailed).							

As Table 34 shows, CRM delivery system correlates with all its formative dimensions within the range 0.629–0.757 and all correlations are highly significant. On the other hand, the formative dimensions of CRM delivery system are correlated far less with each other than with the CRM delivery system construct, which they are hypothesized to cause. Therefore, one could argue that all five dimensions are, simultaneously, distinct facets of but clearly related to the CRM delivery system construct. Although this particular test provides some evidence that "causal" relationships exist between the formative dimensions and the formative construct, it should be interpreted with caution. However, it provides an interesting comparison point to the results related to formative dimension loadings in Table 35, which were estimated with the hierarchical component model technique in PLS path modeling, and calculated as a function of the predictive power of each formative dimension on the core outcome variable of CRM delivery system, namely, CRM product performance (SPD).

While reflective measurement models have the benefit of classical test theory validity criteria, validity testing for formative constructs is still a relatively new research topic. It is currently a controversial, hotly debated issue: some academics (most notably Rossiter 2002) argue that validity assessment is not applicable concerning formative constructs, while the majority stress that validity must be established statistically regardless of measurement perspective (Diamantopoulos et al. 2008, 1215). I agree with the latter majority view: the results of indicator validity and construct validity assessments are discussed next.

The purpose of formative indicator validity assessment is to determine whether formative indicators theorized to contribute to an underlying formative construct do so in a statistically significant manner. Indicator validity should be assessed through the analysis of formative indicators' absolute importance (indicator loadings) and relative importance (indicator weights), and the statistical significance of indicator weights.

Even though indicator weights and their significance are the core aspect of formative indicator assessment, indicator loadings (usually associated with reflective measurement models) have more recently been suggested as an additional measure in formative indicator validation[47]. Indicator loadings express formative indicators' absolute contribution to the formative construct as well as their contribution to the prediction of dependent variables (Hair, Ringle et al. 2011, 140). Indicator weights, in turn, capture the indicators' contribution to the overall formative construct. There is no threshold value to determine the validity of a formative indicator based on its weight alone. Therefore, the statistical significance of indicator weights should be tested with the bootstrapping procedure (Henseler et al. 2009).

Bootstrapping involves creating a large number of random samples based on the original sample. Bootstrapping also provides standard error estimates based on the standard deviations in the original sample. I adopted the recommended guidelines for bootstrapping, according to which the number of bootstrap samples is 500 and the number of cases in each sample should be equal to the number in the original sample (N=161). The resulting t-values for two-tailed significance tests (as the direction of causality cannot be determined) are interpreted at >3.29 ($p<0.001$), >2.58 ($p<0.01$), >1.96 ($p<0.05$) and >1.64 ($p<0.10$), respectively (e.g. Chin 1998, Henseler et al. 2009, Hair, Ringle et al. 2011). As the 5% significance level is generally accepted as a statistically significant and theoretically meaningful path in marketing research, I will adopt $p<0.05$ as the minimum requirement in evaluating the reliability and validity of measurement (outer) models and structural (inner) paths.

In conjunction with formative indicator validity, formative construct validity will also be assessed. Construct validity, by definition, refers to the

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[47] Ideally, both indicator loadings and weights are significant. If both are insignificant, it becomes difficult to justify the inclusion of an indicator without empirical support. However, if theory strongly speaks for the inclusion of an indicator, it could be retained in a formative measurement model (Hair, Ringle et al. 2011, 146).

extent to which the construct describes what it is intended to measure. Rossiter (2002) considers content validity, which is based on expert opinions, to be a sufficient criterion for construct validity. However, Diamantopoulos et al. (2008, 1216) dismiss this view by emphasizing that the validity of the formative construct is defined through its relationships with other related constructs, i.e. its external validity. I will assess the external validity, also referred to as predictive validity or criterion validity (Diamantopoulos & Siguaw 2006, 264), of CRM delivery system with respect to product performance. The external validity of CRM delivery system as the predictor of the dependent outcome variable product performance is determined by the coefficient of determination R^2, the standardized beta coefficient β and the statistical significance of β, which is expressed as a t-value.

R^2 represents the degree of explained variance of an endogenous construct by its predictor(s) (Hair, Sarstedt et al. 2011). The judgment of R^2 value interpretation varies across disciplines. According to Hair, Ringle et al. (2011, 147), R^2 values of 0.75, 0.50 and 0.25 for endogenous variables may be considered substantial, moderate or weak, respectively. Although no universally agreed threshold value exists, standardized paths exceeding 0.20 are generally regarded as significant. The t-value acquired with the bootstrapping procedure ultimately determines whether the path is statistically significant. The results of the formative indicator and construct validity analyses including loadings, weights, t-values, standard errors, standardized beta coefficients and R^2 values are presented in Table 35. Since the formative indicators of CRM delivery system are represented by latent variables, they are referred to as formative dimensions.

Table 35 Validity assessment of CRM delivery system (PLS)

	loading	**weight**	**t-value**	**SE**	**β**	**R²**
Construct validity						
CRMDS → SPD			14,71**	0,044	0,64	0,410
Dimension validity						
PMR → CRMDS	0,70	0,19	10,98**	0,017		
CR → CRMDS	0,72	0,35	9,87**	0,035		
TR → CRMDS	0,70	0,27	10,51**	0,026		
TMS → CRMDS	0,66	0,30	10,29**	0,029		
UI → CRMDS	0,71	0,33	10,99**	0,030		

**. Significant at the 0.01 level (2-tailed)
*. Significant at the 0.05 level (2-tailed)

Therefore, the loadings between formative dimensions and formative construct represent correlations between latent variables in a hierarchical component model[48]. All five formative dimensions' loadings were within the range 0.66–0.72, which may be described as an acceptable result. All dimension weights, in turn, were positive and highly significant ($p<0.001$). The hierarchical component analysis is best suited for components that have an equal number of manifest indicators for each dimension, which resulted in smaller weight for project management resources. When the model was tested for explorative purposes with all three indicators for project management resources (Pmr3 was dropped during EFA), the weight of project management resources increased to 0.25 but remained the smallest weight among the five dimensions. Most importantly, though, project management resources remained a significant contributor to CRM delivery system even with two manifest indicators. The construct validity criteria, namely, the standardized path coefficient to the criterion variable CRMDS→SPD ($\beta=0.64$, t-value 14.71) is highly significant, resulting in 41% ($R^2=0.410$) of product performance's variance being explained by CRM delivery system. Considering that the criterion variable is an outcome variable of CRM delivery system, not a reflective measure of the same construct (MIMIC), the amount of explained variance may be considered good for external validity assessment purposes. In conclusion, the formative construct CRM delivery system and its dimensions project management resources, consultant resources, training resources, top management support, and user involvement meet the external validity criteria put forward in existing literature.

Although the above-mentioned criteria are considered sufficient in existing literature, Diamantopoulos et al. (2008) suggested that examining the direct correlations of formative indicators with outcome variable(s) is a useful additional measure. They argued that significant direct correlations between formative indicators and outcome variables provide further proof of the appropriateness of individual formative indicators. Based on Diamantopoulos et al.'s (2008) recommendation, the Pearson test for correlation is presented in

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[48] The hierarchical component model also conceptualizes CRM delivery system as a 1st order reflective construct in terms of 14 manifest indicators (which comprise CRM delivery system's five formative dimensions). For the purposes of complete reporting, I also calculated the loadings of all individual indicators in relation to CRM delivery system (see Appendix 16). Indicator loadings ranged between 0.49 and 0.71 and were all positive and significant. Lower values were not surprising due to the multidimensional nature of CRM delivery system. As a precaution, I removed two indicators with the lowest loadings (Pmr1=0.50; Tr1=0.49) both simultaneously and separately from the model to assess consequences on the CRMDS→SPD path and R^2. These tests produced no significant effects, although it is worth mentioning that removing PMR1 (formal project management tools and techniques) did result in a weak increase in CRMDS→SPD, which was unexpected. In conclusion, I decided not to eliminate Pmr1 due to theoretical and empirical rationale. Furthermore, the negative effect on SPD was weak.

Table 36 below. The formative dimensions of CRM delivery system were calculated as sum variables.

Table 36 Direct correlations between formative dimensions of CRM delivery system and key outcome variable (PLS)

Correlations							
		PMR	CR	TR	TMS	UI	SPD
SPD	Pearson Correlation	,420**	,495**	,410**	,336**	,450**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	
	N	161	161	161	161	161	161

**. Correlation is significant at the 0.01 level (2-tailed)

All correlations were positive and clearly significant ($p<0.01$), ranging between 0.336 and 0.495. The correlations were relatively similar in magnitude, which could be argued to provide validity to the implicit assumption that all five dimensions of the CRM delivery system composite contribute to the consequences of CRM delivery system. This is an important implication in this study because it is a focal theoretical assumption in this study that the facets of the formative composite variable not only jointly form the composite, but also jointly pose an impact on the outcome variables. Next, I will further elaborate on this important issue.

In 1st order formative measurement model estimation, indicator weights and t-values are clearly determined by indicators' contribution to the predictive power of the construct on outcome variable(s). In the hierarchical component model for 2nd order constructs, however, the repeated indicators construct lays between formative dimensions and outcome variable(s), resulting in weights being primarily determined by each formative dimension's contribution to the (repeated indicators) formative construct. As the dimensions make their contribution to a construct that they form themselves, the estimation of weights is more parameter-oriented as in CB-SEM than prediction-oriented as in PLS modeling. Therefore, it is important to examine the direct correlations between formative dimensions and the outcome variable(s) in the context of a 2nd order formative construct.

Diamantopoulos et al. (2008, 1212) made further recommendations to assess discriminant validity as neglecting it would not be theoretically justifiable. They recommended examining the correlation matrices of the formative indicators with all exogenous indicators in the structural model. Furthermore, MacKenzie et al. (2005) called for discriminant validity to be tested against other latent variables in the model to by examining correlation matrices to detect similar problems. The inter-item correlations of the formative dimensions of CRM delivery system (Appendix 17), as well as latent variable correlations of the CRM delivery system construct (Table 37) appear to be well below any suggested thresholds that might indicate discriminant validity problems.

Table 37 Correlations of CRM delivery system with other latent variables

	Correlations CRMDS
EPQ	0,27
INF	0,28
IPQ	0,50
ISP	0,30
PS	0,24
SPD	0,63
SPP	0,34

Based on the preceding discussion, I argue that the construct validity of CRM delivery system has proved to be acceptable in terms of content validity, external validity and discriminant validity. In conclusion, both reflective and formative measurement models have met sufficient reliability and validity requirements, concluding the first of the two-step process in SEM. I will now proceed to the second step, namely, structural model evaluation with PLS-SEM.

6.10 Assessment of the structural model

Whereas measurement model estimation deals with the relationship between a latent variable and its observable indicators (or dimensions), structural model estimation concentrates on the relationships between latent variables in the research model. First, I will introduce the evaluation criteria used assessing structural model quality in PLS-SEM. Second, I will discuss the challenges posed by having a formative construct in an endogenous position and propose a solution to overcome these issues. Third, I will briefly describe the methodological procedures required to assess mediating and moderating effects.

6.10.1 Structural model evaluation criteria in PLS-SEM

The evaluation criteria for determining the quality of the structural model differ somewhat between CB-SEM techniques, such as LISREL, and PLS modeling. In PLS-SEM, the focus is on variance-based, non-parametric criteria (Hair, Sarstedt et al. 2011; Henseler et al. 2009). The primary criteria for structural model assessment in PLS-SEM are the explained variances of endogenous constructs (R^2 values), the strength of standardized path coefficients (β) coupled with significance testing (t-values), and overall model quality with the goodness-of-fit (GoF) index.

The interpretation of β and t-values will follow the same guidelines as previously presented in conjunction with formative measurement model assessment. Contrary to external validity assessment, R^2 values above 0.100 will be considered meaningful in the context of model testing.

In comparison to CB-SEM, one disadvantage of PLS-SEM is the lack of a global goodness-of-fit (GoF) measure (Hair, Sarstedt et al. 2011). Tenenhaus, Esposito Vinzi, Chatelin & Lauro (2005) proposed a global GoF index, which equals the square root of the weighted (based on the number of indicators of each construct) average of communalities and the average of R^2 values (Tenenhaus et al. 2005, 173):

$$\text{GoF} = \sqrt{(\text{weighted average communality X average } R^2)}$$

Communality expresses the amount of explained variance in the measurement models and R^2 in the structural model, respectively. In the words of Tenenhaus et al. (2005, 173), GoF is an “operational solution to this problem as it may be meant as an index for validating the PLS model globally”.

However, the appropriateness of a global GoF measure has been questioned because acceptable R^2 values depend on research context and the construct’s role in the model – whether it is the mediating construct or the key outcome construct, for example (Hair, Ringle et al. 2011; Hair, Sarstedt et al. 2011). Furthermore, Hair, Ringle et al. (2011) point out that GoF is also inappropriate in the case of formative constructs and single indicator constructs. Formative constructs are likely to have low communality, which is an equivalent measure to AVE, because formative indicators do not necessarily share their variance. Reflective constructs, on the contrary, are designed to be internally consistent. It is also worth mentioning that single indicator constructs (although not present in this study) are not subject to communality or AVE and thus GoF could not be calculated for such models. Despite the structural model including a 2nd order formative construct, I will also present GoF values and take them into account when choosing the best model among alternative models. One should bear in mind, though, that GoF values are likely to be lower due to the lower communality of the formative construct.

There are no instructions in existing literature how to treat 2nd order constructs when calculating GoF. The decision is the researcher’s to make and it should not be based on the maximization of GoF values. In this study, the key objective is to develop a 2nd order formative composite variable, which could provide a more parsimonious conceptualization of the phenomenon under investigation without losing the precision and accuracy related to estimating relationships in its nomological network at the 1st order level (Edwards 2001). I take the position in this study that the 1st order reflective measurement models forming the five distinctive facets of multidimensional construct CRM delivery system will be treated as formative dimensions. The fact that the dimensions are measured as latent variables is primarily for the purposes of more accurate measurement (as demonstrated by Ulaga & Eggert 2006, for example), which contributes to the reliability and the validity of CRM delivery system. As I conceptualize the 1st order latent variables as accurately measured formative dimensions, only the communality and R^2 values of CRM delivery system will be included in the GoF calculations.

6.10.2 Modeling endogenous formative latent constructs

In the proposed structural model (Appendix 2) of the present study, the key construct CRM delivery system is a 2nd order formative latent construct in an endogenous position. Before moving onto the presentation of results, it is necessary to discuss the specific problems related to the assessment of such a construct. I will also present a solution applied in this study.

In structural model assessment, the concept of the external validity of the formative measurement model is extended to nomological validity. Nomological validity refers to integrating the formative construct into its entire proposed nomological network (MacKenzie et al. 2005). This is a problem with endogenous formative constructs due to different nomological networks of antecedents and consequences (Jarvis et al. 2003). Diamantopoulos et al. (2008, 1216) voiced their concerns about "the conceptual plausibility of formatively-measured constructs occupying endogenous positions in structural models", and emphasized the urgency of making additional contributions to this important and unresolved issue. In a similar vein, Cadogan & Lee (2010) demonstrated the inappropriateness of developing theory about antecedents to endogenous formative constructs at the aggregate level (i.e. path relationships between latent variables). Rather, antecedents' relationships to the dependent formative construct should be assessed at the formative indicator/dimension level (i.e. path relationship from latent variable to indicator), which would be unorthodox in SEM. I will now discuss Cadogan & Lee's (2010) article on why and how to assess the endogenous 2nd order formative construct correctly. As their novel approach has not yet been applied in published articles, the following discourse is based on their article unless stated otherwise.

Cadogan & Lee (2010, 3–4) identified two important issues, which speak for assessing the relationships between antecedents and formative indicators, not the formative construct. The first issue is related to the conceptual distinction between formative latent variable and formative composite variable. Theoretically, the relationship between antecedents and formative latent variable can be assessed at the formative construct level. However, a formative latent variable requires a census of all possible causes, which is usually empirically unrealistic. Thus, in most cases the construct is not a formative latent variable but in fact a formative composite variable. A formative composite variable is merely a collection, not a census of formative indicators. In the case of a formative component variable, antecedents can be only assessed based on their correlations with the specific set of formative indicators proposed to form the formative composite variable. Unfortunately, there is no generalizability in such results[49]. Consequently, the solution is to assess relationships between antecedents and formative indicators.

The second issue is related to the different nomological networks of formative indicators' antecedents. In other words, formative indicators may be influenced by common antecedents in different magnitudes, or they may have different antecedents altogether. Thus, examining the relationships from antecedents to a formative composite variable may conceal significant relationships or display non-existent relationships. As a result, empirical findings regarding antecedent relationships would be ambiguous at best. In a similar vein with the first issue, the solution is to assess relationships between antecedents and formative indicators, not the formative composite variable.

Cadogan & Lee (2010, 7–8) argue that any variation in a formative construct must occur either due to variation in one or more formative indicators[50], and/or due to variation in unknown indicators (error term). While this ambiguity is inherent to a formative latent variable, a formative composite variable allows parameters to be explicitly estimated in the absence of the error term. Thus, hypothesized antecedent relationships and indicator weights can only be empirically tested with a formative composite variable. On the other hand, results related to endogenous formative composite variables

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[49] Cadogan & Lee (2010, 14) argued that there are certain conditions under which the antecedent relationships can be modeled at the formative construct level. When the formative indicators have highly similar relationships to their antecedents, it can be empirically justified.

[50] Cadogan & Lee (2010, 21-22) noted that the most important distinction between an antecedent and a formative indicator is that the former can only influence an endogenous formative variable indirectly through the latter; formative indicators, on the contrary, define the formative variable and thus cause it directly.

cannot be extended to endogenous formative latent variables, which cannot be tested empirically under any circumstances (Cadogan & Lee 2010, 9).

As the formative dimensions of CRM delivery system have an important role in assessing the relationships between antecedents and CRM delivery system in the structural model, it is important to be able to estimate their measurement error. A type II 2nd order measurement model[51] (Jarvis et al. 2003), namely, a 1st order reflective 2nd order formative model, does not suffer from this problem concerning the lack of estimation of item-level measurement error with formative constructs (Diamantopoulos 2006, 15). In this view, choosing Cadogan & Lee's (2010) recommendation to evaluate a 2nd order formative composite construct is supported by the fact that all formative dimensions' (1st order reflective measurement models) measurement error can be estimated. Furthermore, the parameters of the formative dimensions can be reliably estimated with respect to antecedents as their values remain stable. More robust estimation allows for developing more generalizable theory. However, Bagozzi (2011) argued that using formative measurement models inevitably leads to a degree of compromise in terms of the generalizability of empirical results, which should be taken into account in making generalizations of the empirical findings in this study.

In summary, the appropriate approach is to test antecedent-endogenous formative composite variable relationships at the formative indicator level. As Cadogan & Lee (2010, 19) put it, "if the items (formative indicators) are logically formative, then … item level modeling is most appropriate". With regard to CRM delivery system, this is the case from a theoretical viewpoint as well as from an empirical viewpoint, which is supported by the results of the structural model assessment presented later in this work. The conceptualization of an endogenous 2nd order formative composite variable with antecedent relationships measured at the formative dimension level (Cadogan & Lee 2010, 31) is presented in Figure 6.

[51] Edwards & Bagozzi (2000) introduced a "spurious model" with multiple common causes, which represents a conceptual example of an attempt to tackle the issue of measurement error estimation with formative measurement models. Latent variables are intentionally included to enable the estimation of measurement error at the indicator level. This is achieved by assigning each formative indicator a single reflective indicator of its respective latent variable. Its conceptual justification is questionable, though (Diamantopoulos 2006, 10; Diamantopoulos et al. 2008, 1211).

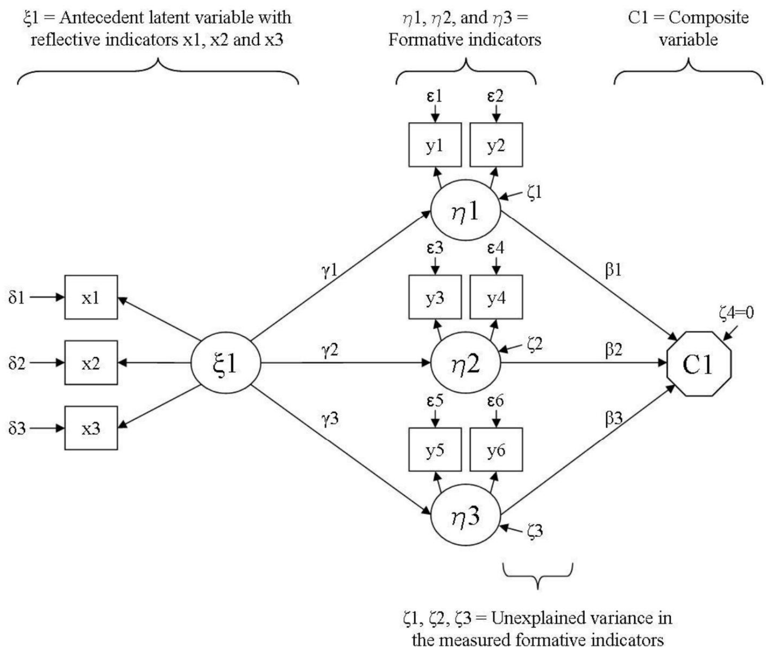

Figure 6 Endogenous 2nd order formative composite variable with antecedent relationships at the formative dimension level

In Figure 6, C1 represents the endogenous formative composite variable (error term ξ4=0), which is shaped like a hexagon to distinguish it from a formative latent variable. The exogenous reflective antecedent variable (ξ1) with three indicators influences C1 only through reflective latent variables η1, η2 and η3, which act as C1's formative dimensions. Therefore, path coefficients (γ1-3) and measurement error (ξ1-3) are estimated at the formative dimension level. Dimension weights (β1-3) represent the contributions of the formative dimensions to the composite variable. In conclusion, I will test and discuss the hypothesized relationships between CRM delivery system and its antecedents (H7-H11) through project management resources, consultant resources, training resources, top management support and user involvement at the formative dimension level (see Appendix 2).

6.10.3 Assessment of mediating and moderating effects

Moderating effects (for an extensive review, see Carte & Russell 2003) serve an important purpose in the validation process of the structural model. Although it is often an implicit assumption in empirical research, samples are seldom homogeneous. Sample heterogeneity can be tested through observed heterogeneity, which is identified through theoretical considerations prior to data collection. Observed heterogeneity can be tested with the inclusion of moderators and/or control variables.

By definition, a moderator influences the direction and/or magnitude of the (causal) relation between a predictor and a dependent outcome variable. Moderators can be qualitative (categorical) or quantitative (interval or scale) variables. Furthermore, they are independent and, ideally, uncorrelated with either the predictor or the outcome variable (Baron & Kenny 1986). Figure 7 illustrates the role of the moderator variable.

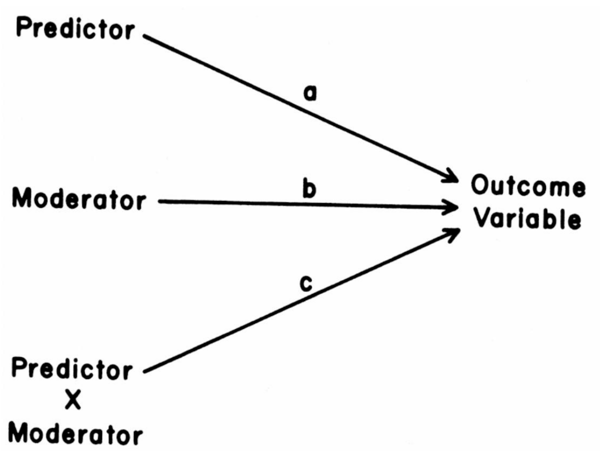

Figure 7 Moderator model (adopted from Baron & Kenny 1986)

Path "a" represents the relationships between predictor and outcome, Path "b" between moderator and outcome, and Path "c" between the interaction of predictor/moderator and outcome. Moderating effects can be investigated by examining whether the interaction path is significant.

In this study, there are three moderating constructs with six moderating relationships. Testing moderation has proved to be problematic in the context of SEM (Chin 1998, Chin et al. 2003). There are two ways to test moderating effects in PLS modeling: multigroup analyses and interaction terms. The interaction model (Chin et al. 2003) represents are more recent and advanced method. Following this procedure, moderating effects are tested as part of the overall main effects model with interaction terms, which are formed by cross-multiplying all standardized indicators of the predictor and the moderator under investigation. Unfortunately, each moderator must be tested separately as PLS modeling does not accommodate simultaneous moderator testing. The three proposed moderators in this study – relative project size (SIZ), application complexity (APP), and requirements uncertainty (REQ) - were all measured with 7-point Likert scales, allowing for the application of the interaction model, which requires continuous variables. However, Chin et al. (2003, 203) warned that smaller sample sizes should be avoided as they did not produce significant results in their simulations, which could also have an impact on the empirical findings in this study.

Investigating mediator effects, in turn, seeks to shed light on the mechanisms of the relationships between variables (Baron & Kenny 1986). A mediator is always causally linked to a predictor, which is its antecedent. The mediator model is presented in Figure 8 below. There are two causal paths influencing the outcome variable. The direct path from predictor to outcome is path “c”. The outcome is also influenced by the indirect mediator path “b”, which is preceded by the path “a” from predictor to mediator.

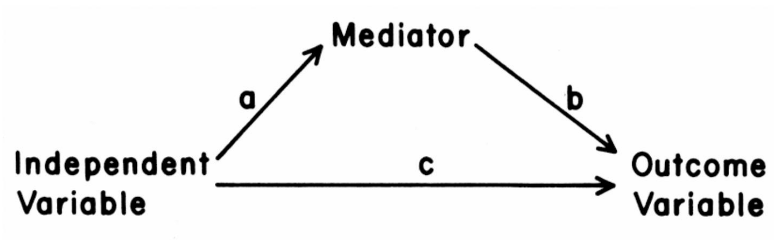

Figure 8 Mediator model (adopted from Baron & Kenny 1986)

There are four potential mediating constructs in the proposed research model. Following Baron & Kenny (1986), I will perform tests for mediating effects because they provide important information about the mechanisms how constructs interact with each other. The most significant potential mediating variable in this study is the focal construct CRM delivery system (CRMDS), which is hypothesized to mediate the relationship between firm-level IT resources and CRM product performance (SPD). In addition, CRM process performance (SPP) is expected to partially mediate the relationship between CRM delivery system and product performance partially (a direct path CRMDS→SPD is also hypothesized). Product performance, in turn, is hypothesized to mediate the relationships between CRM delivery system and CRM acceptance measures, namely, perceived ease of use (PEOU) and perceived usefulness (PU). In addition, perceived ease of use is expected to partially mediate the relationship between product performance and perceived usefulness.

I will test these potential mediating effects with Baron & Kenny’s (1986) widely accepted method. They (p. 1176) suggested four conditions, which must be met to determine whether a variable acts as a mediator: (1) the path between predictor and mediator must be statistically significant; (2) the path between mediator and outcome variable must be statistically significant; (3) the direct path between predictor and outcome variable is significant when the paths to/from mediator are excluded; (4) in the presence of paths to/from mediator, the direct path between predictor and outcome variable becomes insignificant. Full mediation occurs when conditions (3) and (4) are fulfilled. Partial mediation occurs when condition (4) is not fulfilled; i.e. the direct path remains significant despite the presence of the mediating variable but decreases substantially. In either case, mediation only occurs if all three paths - between predictor, mediator and outcome variable - are relatively strong.

7 RESULTS

The empirical results of this work encompass the assessment of hypothesized main effects, direct effects, and moderating effects based on PLS path analysis carried out with SmartPLS 2.0 M3 (Ringle et al. 2005) software. The main effects paths were incorporated into hypotheses H1-H11, direct effects into H12-H15, and moderating effects into H16-H17, respectively. Six alternative structural models were used to tackle the hypotheses put forward in this study:

(1) Main effects model
(2) Direct effects model 1
(3) Direct effects model 2
(4) Full model
(5) Purified model
(6) Interaction model

Table 38 presents the results related to five of these structural models. The interaction model was excluded because no significant moderating relationships were found in the structural model in PLS path analysis. The table includes the following data: standardized path coefficients (β), path significances (t-values), standard errors (SE) and explained variances (R^2). Furthermore, the results related to discovered mediation effects can be found in the last column of the table.

Table 38 Alternative structural models (PLS)

	Main effects model (excl. direct effects)			Direct effects model 1 (CRMDS)			Direct effects model 2 (Firm-level IT resources)			Full model (incl. direct effects)			Purified model			Mediation
	β	t-value	SE	β	t-value	SE	β	t-value	SE	β	t-value	SE	β	t-value	SE	
Dependent: PMR	*R^2=0,241†*			*R^2=0,241†*						*R^2=0,239†*			*R^2=0,225†*			
INF	0,13	1,80*	0,073	0,13	1,80*	0,073				0,13	1,68*	0,076				
ISP	0,25	2,99***	0,083	0,25	2,99***	0,083				0,25	2,89***	0,086	0,26	3,20***	0,083	
PS	-0,01	0,07	0,088	-0,01	0,07	0,087				-0,01	0,06	0,089				
IPQ	0,28	3,05***	0,093	0,28	3,05***	0,093				0,28	2,96***	0,096	0,31	4,24***	0,074	
EPQ	0,00	0,01	0,082	0,00	0,01	0,084				0,00	0,00	0,081				
Dependent: CR	*R^2=0,169†*			*R^2=0,169†*						*R^2=0,168†*			*R^2=0,134†*			
INF	0,10	1,42	0,074	0,10	1,35	0,077				0,10	1,33	0,077				
ISP	0,07	0,67	0,098	0,07	0,71	0,091				0,07	0,72	0,090				
PS	-0,07	0,83	0,085	-0,07	0,82	0,086				-0,07	0,85	0,080				
IPQ	0,29	3,01***	0,096	0,29	3,02***	0,096				0,29	2,89***	0,100	0,37	4,93***	0,074	
EPQ	0,13	1,51	0,088	0,13	1,44	0,093				0,13	1,51	0,088				
Dependent: TR	*R^2=0,083†*			*R^2=0,083†*						*R^2=0,083†*			*R^2=0,068†*			
INF	-0,01	0,13	0,091	-0,01	0,13	0,091				-0,01	0,12	0,092				
ISP	0,12	1,25	0,097	0,12	1,23	0,098				0,12	1,27	0,094				
PS	-0,04	0,43	0,087	-0,04	0,44	0,084				-0,04	0,43	0,085				
IPQ	0,21	2,31**	0,092	0,21	2,34**	0,091				0,21	2,21**	0,096	0,26	2,95***	0,088	
EPQ	0,06	0,64	0,095	0,06	0,64	0,094				0,06	0,64	0,095				
Dependent: TMS	*R^2=0,164†*			*R^2=0,164†*						*R^2=0,165†*			*R^2=0,145†*			
INF	0,05	0,50	0,092	0,05	0,51	0,089				0,05	0,56	0,094				
ISP	0,09	1,11	0,085	0,09	1,13	0,084				0,09	1,11	0,085				
PS	0,07	0,74	0,096	0,07	0,74	0,096				0,07	0,69	0,102				
IPQ	0,33	3,62***	0,092	0,33	3,66***	0,091				0,33	3,53***	0,094	0,38	4,77***	0,080	
EPQ	-0,06	0,73	0,088	-0,06	0,65	0,098				-0,06	0,68	0,094				
Dependent: UI	*R^2=0,126†*			*R^2=0,126†*						*R^2=0,126†*			*R^2=0,103†*			
INF	0,14	1,45	0,096	0,14	1,41	0,099				0,14	1,46	0,095				
ISP	0,00	0,01	0,091	0,00	0,01	0,089				0,00	0,01	0,090				
PS	0,05	0,52	0,097	0,05	0,54	0,093				0,05	0,52	0,097				
IPQ	0,26	2,71***	0,095	0,26	2,69***	0,096				0,26	2,59***	0,100	0,32	3,73***	0,086	
EPQ	0,02	0,18	0,090	0,02	0,18	0,087				0,02	0,18	0,087				
Dependent: 2nd order CRMDS	**R^2=0,289[a]**			**R^2=0,297[a]**						**R^2=0,287[a]**			**R^2=0,272[a]**			
PMR	*0,19*◦	10,09***	0,019	*0,19*◦	10,21***	0,019				*0,19*◦	10,27***	0,019	*0,19*◦	10,06***	0,019	
CR	*0,36*◦	9,01***	0,040	*0,34*◦	9,23***	0,037				*0,36*◦	9,93***	0,036	*0,36*◦	9,95***	0,036	
TR	*0,27*◦	9,58***	0,029	*0,28*◦	10,98***	0,025				*0,28*◦	10,59***	0,026	*0,27*◦	10,04***	0,027	
TMS	*0,29*◦	9,13***	0,032	*0,30*◦	8,81***	0,034				*0,29*◦	9,52***	0,030	*0,29*◦	9,23***	0,031	
UI	*0,33*◦	9,92***	0,033	*0,33*◦	10,08***	0,033				*0,33*◦	9,90***	0,033	*0,32*◦	10,46***	0,031	
Dependent: SPP	**R^2=0,115**			**R^2=0,114**			**R^2=0,054**			**R^2=0,134**			**R^2=0,115**			
CRMDS	0,34	4,09***	0,083	0,34	4,34***	0,078				0,34	3,85***	0,089	0,34	4,42***	0,077	
INF							0,07	0,68	0,102	0,01	0,09	0,093				
ISP							-0,09	0,83	0,108	-0,13	1,48	0,085				
PS							0,01	0,09	0,107	0,01	0,13	0,098				
IPQ							0,15	1,49	0,101	0,01	0,14	0,098				
EPQ							0,10	1,05	0,100	0,09	0,93	0,095				
Dependent: SPD	**R^2=0,443**						**R^2=0,336**			**R^2=0,489**			**R^2=0,443**			
CRMDS	0,54	8,50***	0,064							0,49	5,87***	0,083	0,54	8,14***	0,072	**Partial b**
INF							0,10	1,04	0,093	0,02	0,32	0,075				
ISP							-0,01	0,17	0,070	-0,08	1,26	0,065				
PS							0,03	0,37	0,084	0,03	0,43	0,079				
IPQ							0,23	2,41**	0,093	0,05	0,67	0,077				**Full**
EPQ							0,19	2,63***	0,074	0,19	2,69***	0,070				
SPP	0,24	3,35***	0,073				0,34	4,53***	0,075	0,22	3,22***	0,068	0,23	3,30***	0,070	
Dependent: PEOU	**R^2=0,200**			**R^2=0,042**			**R^2=0,199**			**R^2=0,208**			**R^2=0,199**			
CRMDS				0,20	2,61***	0,080				-0,12	1,40	0,087				**Full**
SPD	0,45	6,45***	0,069				0,45	6,53***	0,068	0,52	5,59***	0,093	0,45	6,80***	0,066	
Dependent: PU	**R^2=0,477**			**R^2=0,457**			**R^2=0,477**			**R^2=0,493**			**R^2=0,477**			
CRMDS				-0,01	0,20	0,063				-0,16	2,04**	0,079				
SPD	0,16	2,58***	0,062				0,16	2,58***	0,062	0,27	3,27***	0,082	0,16	2,60***	0,062	**Partial c**
PEOU	0,61	9,46***	0,064	0,68	13,13***	0,052	0,61	9,38***	0,065	0,59	9,36***	0,063	0,61	9,56***	0,063	

***. Path is significant at the 0.01 level (2-tailed)
**. Path is significant at the 0.05 level (2-tailed)
*. Path is significant at the 0.10 level (2-tailed)
† R^2 of formative dimension of CRMDS; not considered in model fit assessment
[a] R^2 calculated by conceptualizing CRMDS as a 1st order construct with 14 indicators representing PMR, CR, TR, TMS and UI
◦ formative dimension (in cursive) weight
b CRMDS→SPD increased to 0.63 when SPP was excluded from main effects model
c SPD→PU increased to 0.43 when PEOU was excluded from main effects model

In the main effects model, seven hypotheses received support, three were rejected and one received partial support. In the direct effects models, two hypotheses were supported and ten were rejected. Five out of six hypothesized moderating relationships were rejected, and one received support. Table 39 summarizes the empirical results with regard to the proposed hypotheses in this study.

Table 39 Summary of results regarding hypotheses

Hypothesis	Path	β	t-value	Conclusion
	Main effects			
H1	CRMDS → SPP	0,34	4,09***	Supported
H2	CRMDS → SPD	0,54	8,50***	Supported
H3	SPP → SPD	0,24	3,35***	Supported
H4	SPD → PEOU	0,45	6,45***	Supported
H5	SPD → PU	0,16	2,58**	Supported
H6	PEOU → PU	0,61	9,46***	Supported
H7	INF → CRMDS	0,12[a]	1,55	Rejected
H8	ISP → CRMDS	0,13[a]	1,65	Partial support ◦
H9	PS → CRMDS	0,01[a]	0,10	Rejected
H10	IPQ → CRMDS	0,40[a]	4,55***	Supported
H11	EPQ → CRMDS	0,06[a]	0,71	Rejected
	Direct effects			
H12	CRMDS → PEOU	0,20	2,61***	Supported
H13	CRMDS → PU	-0,01	0,20	Rejected
H14a	INF → SPP	0,07	0,68	Rejected
H14b	ISP → SPP	-0,09	0,83	Rejected
H14c	PS → SPP	0,01	0,09	Rejected
H14d	IPQ → SPP	0,15	1,49	Rejected
H14e	EPQ → SPP	0,10	1,05	Rejected
H15a	INF → SPD	0,10	1,04	Rejected
H15b	ISP → SPD	-0,01	0,17	Rejected
H15c	PS → SPD	0,03	0,37	Rejected
H15d	IPQ → SPD	0,23	2,41**	Supported
H15e	EPQ → SPD	0,19	2,63***	Rejected †
	Moderating effects			
H16a	CRMDS * SIZ → SPP	0,24	0,98	Rejected
H16b	CRMDS * APP → SPP	-0,26	0,86	Rejected
H16c	CRMDS * REQ → SPP	0,30	0,99	Rejected
H17a	CRMDS * SIZ → SPD	-0,15	0,94	Rejected
H17b	CRMDS * APP → SPD	0,18	1,86	Supported b
H17c	CRMDS * REQ → SPD	-0,12	0,72	Rejected

***. Path is significant at the 0.001 level (2-tailed)
**. Path is significant at the 0.01 level (2-tailed)
*. Path is significant at the 0.05 level (2-tailed)
[a] Total effect on CRMDS as a 1st order construct with 14 indicators representing PMR, CR, TR, TMS and UI
◦ effect on formative dimension ISP→PMR supported ($p<0.01$)
b Interaction effect ($p<0.05$) supported in regression analysis
† direct effect is not mediated by CRMDS

This chapter is organized as follows. In Chapter 7.1, I will discuss the results regarding the proposed *main effects model* and related hypotheses. The main effects model includes all hypothesized primary paths (H1-H11) put forward in this study. The main effects model does not include the direct paths conceptualized in the direct effects models, which are introduced next.

In Chapter 7.2, the results of two direct effects models will be analyzed. These direct effects models depict secondary direct relationships (Ahearne et al. 2008), which are expected to be mediated by the indirect paths in the main effects model. *Direct effects model 1* proposes direct paths H12-H13 from CRM delivery system to perceived ease of use and perceived usefulness. Product performance is excluded from this structural model to determine whether a significant direct relationship exists between CRM system development capability and CRM acceptance, which form the foundational link of this dissertation.

Direct effects model 2 conceptualizes secondary direct paths H14-H15 between firm-level IT resources and CRM project outcomes, process performance and product performance. Consequently, the direct effects model will help determine whether the inclusion of CRM delivery system is justified. This study posits that the channeled use of IT resources predicts key outcomes better than firm-level IT resources.

In order to test for mediation effects, the *full model* including both indirect as well as direct paths will be tested in conjunction with the direct effects models. This is the most rigorous model to assess whether paths significances remain significant for the purposes of mediation testing. In relation to direct effects model 1, product performance is hypothesized to mediate the relationships between CRM delivery system and CRM acceptance measures (H12-H13. In relation to direct effects model 2, CRM delivery system is hypothesized to mediate the relationship between firm-level IT resources and CRM project performance (H14-H15).

In the third sub-chapter, I will present the results for the *interaction model* to assess proposed moderating effects and related hypotheses H16-H17. The interaction model is the main effects model with interaction terms added. In the fourth sub-chapter, a discussion regarding control variables is presented.

In Chapter 7.5, I will summarize the results and draw conclusions with respect to the hypotheses and, consequently, present the *purified model*, which excludes all insignificant paths.

Finally, I will employ the strategy of comparing the five alternative, competing models in Table 38 to ensure rigorous testing of model fit (Hair et al. 1995, 626). The model comparison approach has often been applied in existing empirical studies in marketing (e.g. Ahearne et al. 2008; Guenzi, Georges & Pardo 2009). After model comparisons on the basis of evaluative criteria, I will choose the “best” model in terms of model fit with this particular empirical data set.

7.1 Main effects model

I will analyze and present the results of the main effects model in three parts: (1) the relationships between CRM delivery system (CRMDS) and two direct project outcome measures, subjective process performance (SPP) and subjective product performance (SPD), in H1-H3; (2); the relationships between product performance and CRM acceptance, which consists of perceived ease of use (PEOU) and perceived usefulness (PU), in H4-H6; and (3) the relationships between CRM delivery system and antecedents including IT infrastructure (INF), IS planning sophistication (ISP), IS personnel skill (PS), internal partnership quality (IPQ), and external partnership quality (EPQ), in H7-H11. I will also briefly analyze mediation effects whenever applicable.

Although the results of the main effects model are based on the entire nomological network of paths proposed in this study, I will not present the results of the entire path model (Appendix 2) in figure format due to model complexity. Following Cadogan & Lee’s (2010) conceptualization, there are a total of 25 paths from antecedents to CRM delivery system’s dimensions alone. Although admittedly unconventional, *I will present figures derived from the main effects model regarding the hypotheses in question for demonstrative purposes*. The complete results of the main effects model can be found in tabula r form in Table 38. The table also shows that the formative dimension (in cursive) weights of CRM delivery system remained virtually unchanged and highly significant across all path models.

In addition, the latent variable correlations in the main effects model are presented in Table 40. All indicator loadings and significances (measurement models) of the main effects model can be found in Appendix 18.[52]

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[52] As indicator loadings may vary in PLS modeling, all indicator loadings should be re-assessed in model testing based on the same criteria as discussed in the evaluation of measurement models. This procedure ensures that measurement model reliability and validity have not deteriorated in the context of the entire structural model.

Table 40 Correlation matrix of latent variables in the main effects model

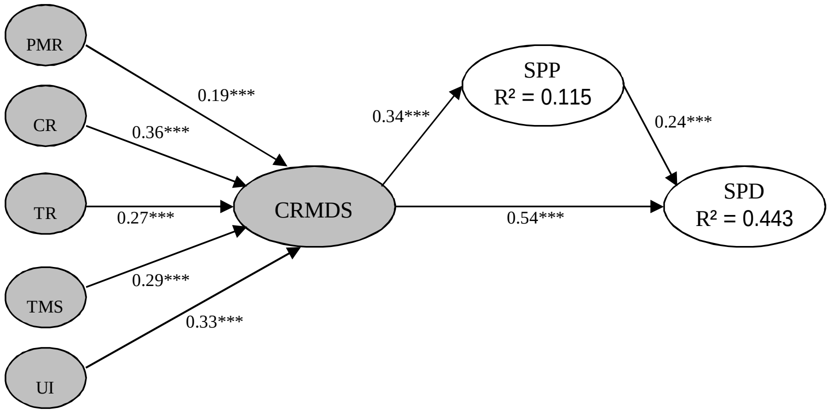
	CRMDS	EPQ	INF	IPQ	ISP	PEOU	PS	PU	SPD	SPP
CRMDS	1									
EPQ	0,26									
INF	0,27	0,29								
IPQ	0,49	0,38	0,29							
ISP	0,30	0,21	0,22	0,34						
PEOU	0,20	0,18	0,14	0,22	0,10					
PS	0,23	0,23	0,25	0,37	0,31	0,05				
PU	0,13	0,04	0,07	0,11	0,07	0,68	0,03			
SPD	0,63	0,37	0,23	0,39	0,14	0,45	0,21	0,43		
SPP	0,34	0,16	0,10	0,18	0,01	0,17	0,08	0,12	0,43	1

These two data tables reveal only minor changes compared with the results presented in the assessment of the measurement models, suggesting that the empirical data is stable also in the context of a larger model.

7.1.1 CRM delivery system and CRM project performance

One of the most important objectives of this study is to investigate the predictive power of the newly introduced focal construct CRM delivery system on CRM process performance and particularly CRM product performance, which in contrast have been widely-adopted outcome measures in IS success studies. Importantly, formative measurement model estimation confirmed that all five proposed dimensions, derived from theory, significantly contribute to the proposed composite construct CRM delivery system.

In H1 and H2, I hypothesized that CRM delivery system is positively associated with subjective process performance (SPP) and subjective product performance (SPD), respectively. Furthermore, I proposed in H3 that process performance is positively associated with product performance. All three hypotheses received strong support. As illustrated in Figure 9, the paths from CRM delivery system (in grey) to process performance (0.34, $p<0.001$) and product performance (0.54, $p<0.001$) reflected highly significant relationships while the latter was stronger as expected. Process performance had a significant positive influence on product performance (0.24, $p<0.01$), which was also an expected result *a priori*.



***. Path is significant at 0.001 level (2-tailed); ** at 0.01 level (2-tailed)

Figure 9 CRM delivery system and CRM project performance (derived from main effects model)

CRM delivery system alone explained 12% of the variance in process performance and 39% in product performance, respectively. Considering that there is only one predictor, although a 2nd order composite, both R^2 values are satisfactory in the context of IS or marketing research. The explained variance in product performance increased to 44% when the impacts of CRM delivery system and process performance were both controlled for.

Based on Baron & Kenny's (1986) four conditions of mediation effects (see chapter 6.10.3.), I tested for process performance's expected partial mediation on CRMDS→SPD with the main effects model (Table 38). As Figure 9 shows, Baron & Kenny's (1986) first three conditions were met but the final fourth condition was not fulfilled as CRMDS→SPD remained significant in the presence of process performance. Therefore, process performance partially mediates the relationship between CRM delivery system and product performance.

More specifically, CRMDS→SPD decreased from β=0.63 (12.15) when process performance was excluded to β=0.54 (8.50) when process performance was included. The R^2 value of product performance, in turn, fell from 0.443 to 0.391 when process performance was removed. Cohen (1988) defined effect sizes as small (>0.02), medium (>0.15) or large (>0.35). The effect size in this case is small (0.093), which suggests that the mediating impact of process performance on the relationship between CRM delivery system and product performance is relatively mild. This could be described as an expected result. While process performance indicates that project success has been achieved in terms of budget and schedule, this does not necessarily imply that product performance success is achieved simultaneously. In fact, sometimes process performance and product performance can even be counterproductive.

However, process performance is a crucial part of overall CRM project performance, particularly from a managerial viewpoint, and thus an integral part of the model in the present study. To summarize, process performance and product performance are distinct IT-oriented success measures that may or may not be correlated, depending upon the execution of each individual CRM initiative. The result discussed here, mild partial mediation effects, could be interpreted as result that underlines the fact that process performance and product performance always need to be assessed as separate entities in the context of CRM projects – success in one does not necessarily imply success in the other. Striking an acceptable balance between budget, schedule and CRM application quality is an issue of great importance to firms.

Based on these empirical results, the conclusions drawn in this study are:

H1: CRM delivery system quality is positively associated with process performance. SUPPORTED

H2: CRM delivery system quality is positively associated with product performance. SUPPORTED

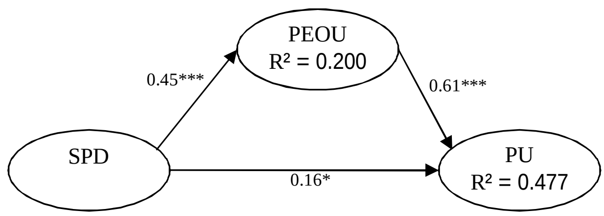
H3: Process performance is positively associated with product performance. SUPPORTED

CRM delivery system received strong support for being associated with both process performance (H1) as well as product performance (H2). Process performance also received strong support for influencing product performance (H3) and hence process performance partially mediates the relationship between CRM delivery system and product performance with a small effect size. It is also worth noting that the reliability of these findings was further enhanced by the measurement of objective process performance (OPP), which confirmed subjective process performance (SPD) data.

7.1.2 CRM product performance and CRM acceptance

Next, I examined whether the core IT outcome, CRM product performance (SPD), predicted marketing-oriented measures of CRM success, namely, CRM acceptance by employees in sales, marketing and customer service. In addition to testing the empirical validity of the CRM delivery system concept in terms of its content and predictive power, it is an equally important objective of this work to investigate whether CRM system development and CRM product performance are linked to perceptual end-user measures, which included perceived ease of use (PEOU) and perceived usefulness (PU). Similar to process performance and product performance, the reliability and validity of the path analyses were arguably improved by adopting well-established outcome measures perceived ease of use and perceived usefulness.

In H4 and H5, I hypothesized that product performance is positively associated with perceived ease of use and perceived usefulness, respectively. In H6, I posited that perceived ease of use is positively associated with perceived usefulness, a relationship which has been confirmed in a number of empirical studies. All three hypotheses received strong support (see Figure 10). The beta coefficient of SPD→PEOU (0.45, $p<0.001$) was highly significant. SPD→PU (0.16, $p<0.05$) was weaker but significant, which was an expected result. Perceived ease of use had a very strong effect on perceived usefulness (0.61, $p<0.001$) which was a finding consistent with prior research.



***. Path is significant at 0.001 level (2-tailed); ** at 0.01 level (2-tailed)

Figure 10 CRM product performance and CRM acceptance (derived from main effects model)

Product performance explained 20% of the variance in perceived ease of use. Product performance and perceived ease of use together predicted almost half of the explained variance in perceived usefulness (0.477), which is a good result. Given the strength of SPD→PEOU in comparison to SPD→PU, perceived ease of use might have substantial mediating effects on the relationship between product performance and perceived usefulness, which was expected *a priori*.

To investigate further, I performed tests to determine perceived ease of use's expected partial mediation on SPD→PU. Baron & Kenny's (1986) first three conditions were satisfied. The fourth condition failed as the path SPD→PU remained significant when the mediator perceived ease of use was controlled for. Hence, perceived ease of use partially mediated the relationship between product performance and perceived usefulness. SPD→PU decreased from β=0.43 (5.91), when perceived ease of use was excluded, to β=0.16 (2.58) when perceived ease of use was included. In the absence of perceived ease of use, the R^2 value of perceived usefulness fell from 0.477 to 0.183, resulting in a very large effect size (0.562). The effect size suggests that the partial mediation of perceived ease of use on the relationship between product performance and perceived usefulness was substantial, which was an expected result. This finding can be interpreted as strong support to previous findings in marketing studies (e.g. Avlonitis & Panagopoulos 2005), which have found that perceived usefulness is primarily achieved through perceived ease of use.

In conclusion, all three hypotheses received strong support. Hence:

H4: Product performance is positively associated with perceived ease of use. SUPPORTED

H5: Product performance is positively associated with perceived usefulness. SUPPORTED

H6: Perceived ease of use is positively associated with perceived usefulness. SUPPORTED

7.1.3 Firm-level IT resources as antecedents of CRM delivery system

Based on IT capability literature, I identified five distinct antecedents that are expected to have a positive influence on CRM delivery system. In hypotheses H7-H11, I formally proposed that IT infrastructure (INF), IS planning sophistication (ISP), IS personnel skill (PS), internal partnership quality (IPQ) and external partnership quality (EPQ) are positively associated with CRM delivery system quality. As suggested by Cadogan & Lee (2010), I examined each antecedent's effect on CRM delivery system at the formative dimension level in order to recognize the effect mechanism between constructs. There were no precise *a priori* assumptions regarding through which formative dimensions each antecedent would contribute to the CRM delivery system composite construct. I also tested the effects of each antecedent on CRM delivery system at the construct level to provide an overall assessment of each antecedent's influence on CRM delivery system. Only the proposed relationship between internal partnership quality and CRM delivery system (H10) received full support. The relationship between IS planning sophistication and CRM delivery system (H8), in turn, received partial support due to a significant relationship through one formative dimension of CRM delivery system, project management resources (PMR). On the other hand, H7, H9 and

H11 were rejected. I will now analyze the results in more detail for all five antecedents, which include project management resources (PMR), consultant resources (CR), training resources (TR), top management support (TMS), and user involvement (UI). As mentioned earlier, all relevant statistical information can be accessed in Table 38.

There were no significant paths between IT infrastructure (INF) and the dimensions of CRM delivery system. The path from IT infrastructure to project management resources (INF→PMR; 0.13, $p<0.10$), received weak support but did not achieve the 5% significance level requirement set prior to data analysis in this study. Apart from INF→TR (-0.01), all remaining paths INF→CR (0.10), INF→TMS (0.05) and INF→UI (0.14) were positive and non-significant. The overall impact of IT infrastructure on CRM delivery system quality was also positive but insignificant (0.12).

The *a priori* expectation was that IT infrastructure would be positively associated with CRM delivery system because IT infrastructure not only reflects the overall importance of IT within the organization but also facilitates the technological integration of the CRM system into the organizational environment. However, the empirical findings suggest that prior investments in IT infrastructure did not predict CRM delivery system quality. Thus:

H7: IT infrastructure is positively associated with CRM delivery system quality. REJECTED

IT infrastructure was not positively associated with CRM delivery system and hence H7 is rejected. Based on this empirical data, there seems to be a weak and insufficient positive association which does not to warrant support for H7 but further research could be done to investigate whether the positive influence would be significant in another empirical setting such as ERP system development, for instance.

Although IS planning sophistication (ISP) did not significantly affect consultant resources (CR; 0.07), training resources (TR; 0.12), top management support (TMS; 0.09) and had no association with user involvement (0.00), IS planning sophistication and project management resources (PMR) had a significant path (0.25, $p<0.01$), suggesting that IS planning sophistication positively influences CRM delivery system through the formative dimension project management resources. The overall effect of IS planning on CRM delivery system at construct level was positive but not statistically significant (0.13, $p<0.10$).

The positive relationship between IS planning sophistication and project management resources was an expected result as both of these IT resources are characterized by a formal methodological guidelines. It was reasonable to expect that an organization that employed formal planning in IT projects would, consequently, invest in good CRM project management resources and apply formal project management methods. However, it was an equally unexpected result that IS planning sophistication did not impact consultant resources, training resources, top management support and user involvement to a significant degree. There are some possible explanations for these results. Firstly, the elimination of two items in the operational measure of IS planning sophistication affected the specific contribution of IS planning sophistication. Although one should be able to remove items from reflective measurement models without consequences, a two-item latent variable is generally considered less than ideal in SEM. On the basis of EFA, the concept of IS planning sophistication overlapped with the more dominant concept (at least with this empirical data) of internal partnership quality (IPQ) to some degree: inter-departmental joint planning is an important element of IS planning sophistication as well as internal partnership quality. Second, senior management initiative and involvement is another aspect of IS planning sophistication that was excluded due overlap with top management support (TMS), which certainly diminished the impact of IS planning sophistication on CRM delivery system through the top management support dimension[53]. Third, it may be possible that firms' IS planning efforts focus primarily on picking competent project management, who address operative issues related to other project-level IT resources in CRM system development. In some studies, project management resources are conceptualized separately from other project-level resources (Gemino et al. 2008; Wallace et al. 2004). In conclusion:

H8: IS planning sophistication is positively associated with CRM delivery system quality. PARTIALLY SUPPORTED

IS planning sophistication received partial support as it is positively associated with CRM delivery system through project management resources. However, the support is weak since IS planning sophistication affects CRM delivery system through only one out of five possible dimensions. A different operationalization of IS planning sophistication might have provided more support that IS planning sophistication is an important antecedent of CRM delivery system.

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[53] I performed an additional PLS path model with the excluded manifest variables Isp1 and Isp2. In addition to PMR, the paths from ISP to TR and TMS were significant and stronger but in significant to CR and UI.

IS personnel skill (PS) had a minimal effect on CRM delivery system quality in this study. The paths from IS personnel skill to project management resources (-0.01), consultant resources (-0.07), training resources (-0.04) were negative and insignificant while paths to top management support (0.07) and user involvement (0.05) were positive and insignificant, respectively. In a similar vein, IS personnel skill had virtually no predictive power on the overall CRM delivery system composite (β=0.01).

Similarly with IS planning sophistication, the operational measure of IS personnel skill was undermined by the elimination of two items due to overlaps with the internal partnership quality (IPQ) factor in EFA. Instead of tapping into the technical, managerial and social skills of IS personnel, the two-item operationalization of IS personnel skill after measurement model purification effectively covered only the technical skill element of IS personnel[54]. Technical skills within the firm's IT department seemed to have little importance in relation to CRM delivery system quality. This finding emphasizes the fact that CRM initiatives are largely undertaken by consultant resources with regard to the technological aspects of CRM system development. Based on the empirical results, the following conclusion is drawn:

H9: IS personnel skill is positively associated with CRM delivery system quality. REJECTED

The hypothesized positive relationship PS→CRMDS is rejected. However, an alternative operationalization that encompasses also managerial and social skills, as opposed to mere technical skills, could lead to different results, which could be addressed in future studies.

While it was not surprising that internal partnership quality (IPQ) had a significant positive effect on CRM delivery system quality, its dominant position compared with other proposed antecedents was an unanticipated result. The standardized coefficients from internal partnership quality to project management resources (0.28), consultant resources (0.29), top management support (0.33) and user involvement (0.26) were significant at 1% level and training resources (0.21) at 5% level, indicating solid empirical support for H10 through all five facets of CRM delivery system. Furthermore, the overall effect of internal partnership quality on CRM delivery system at construct level was highly significant (0.40, $p<0.001$).

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[54] I performed an additional PLS path model with the excluded manifest variables Ps3 and Ps4 and without the construct IPQ to avoid collinearity. In this case, the paths PS→PMR and PS→CR were significant. However, the predictive power of IPQ is greater and IPQ items did loaded only into their own construct in EFA whereas the Ps3 and Ps4 loaded equally into both factors PS and IPQ.

Taking into account the previous analyses regarding IS planning and IS personnel skills, it is evident that the conceptualization and corresponding operationalization of internal partnerships between the IT and client departments adopted in this study is a comprehensive one. The concept measured inter-departmental relationships in terms of bilateral information exchange, familiarity, mutual trust, co-operation, and conflict. One could argue that the modest contributions by IS planning sophistication and IS personnel skill suggest that input resources residing within the firm *ex ante*, such as formalized planning methodologies or technical skills of human resources, hold limited rent-creating potential and synergistic effects with respect to CRM system development unless applied in the presence of sufficient co-operation between different internal stakeholders. In conclusion:

H10: Internal partnership quality is positively associated with CRM delivery system quality. SUPPORTED

Internal partnership quality is positively associated with CRM delivery system and H10 received very strong empirical support. Consequently, testing whether CRM delivery system mediates the paths IPQ→SPP and IPQ→SPD is subject to further examination, which is discussed shortly.

Unlike internal partnerships, external partnership quality did not have a significant effect on any formative dimension of CRM delivery system. The beta coefficient of EPQ→CR was 0.13 but not significant. The paths to project management resources (0.00), training resources (0.06) and user involvement (0.02) were very weak and even negative to top management support (-0.06), though not significant. Hence, external partnerships did not have a significant association with CRM delivery system at the construct level ($\beta=0.06$).

Particularly since the effect of internal partnership quality on CRM delivery system was highly significant, it was an unexpected finding that external partnership quality had virtually no impact on CRM system development. This study has explicitly argued that CRM initiatives are complex, inter-organizational projects, and the empirical data was screened accordingly to exclude CRM projects conducted in-house.

The most interesting possible explanations emerged from the empirical data. When the direct paths between the firm-level IT resources and CRM product performance were estimated in the "direct effects model 2", the beta coefficient for the direct path external partnership quality and CRM product performance (SPD) was 0.19 ($p<0.01$). There are a few alternative explanations for this significant direct relationship in the absence of an indirect relationship.

Firstly, relationships with IT service providers and/or CRM vendors may be more important to technological execution, as opposed to being more holistically significant in terms of the organizational change management efforts, which are also included as dimensions of CRM system development in this study. Ethiraj et al. (2005), for example, found that the client's prior experience and previous projects undertaken jointly with the same vendor had a positive impact on project performance. Under these circumstances, the vendor may be able to take advantage of existing technical knowledge related to the client (Ramachandran & Gopal 2010, 193).

Second, the client's perception of external partnership quality is arguably linked to the image and reputation of external partners. Positive perceptions regarding external partners may influence perceptions about CRM product performance. External partnership quality results may also have been distorted by the retrospective design of the questionnaire instrument: when the CRM project had been considered a success in terms project performance, one may have considered external partnership quality to be better as a result of a successful CRM project. In this view, external partnership quality may be a consequence of CRM project performance. For example, further testing revealed that standardized coefficients for CRMDS→EPQ (0.27) and SPD→EPQ (0.37) were both significant at 1% level. In other words, the path between external partnership quality and product performance increased from 0.19 to 0.37 when the direction was reversed. Based on the theoretical rationale presented earlier in this work, however, I will maintain that external partnership quality predicts CRM system development and CRM project performance, not vice versa. Therefore:

H11: External partnership quality is positively associated with CRM delivery system quality. REJECTED

In this study, external partnerships did not have a significant impact on CRM delivery system and H11 is therefore rejected. However, the direct relationship between external partnership quality and product performance without any indirect effects through CRM delivery system should be investigated further in future studies, particularly regarding action mechanism and direction.

Although project management resources (PMR), consultant resources (CR), training resources (TR), top management support (TMS) and user involvement (UI) act as the formative dimensions of CRM delivery system, it is important to report their respective explained variances by antecedents. As mentioned previously, these R^2 values will not be taken into account in any assessment of model fit which only includes measurement models, not dimensions as which project-level IT resources are conceptualized in the present study.

In the main effects model (Table 38), which is not presented in path model form due to the large number of paths, the antecedents explained most variance in project management resources (24%), followed by consultant resources (17%), top management support (16%), user involvement (13%) and training resources (8%), respectively. Collectively, 29%[55] of the variance in CRM delivery system at construct level was explained by firm-level IT resources IT infrastructure (INF), IS planning sophistication (ISP), IS personnel skill (PS), internal partnership quality (IPQ) and external partnership quality (EPQ). While the R^2 value is satisfactory, it was expected to be higher as there were five predictors. Consequently, important antecedents of CRM delivery system exist that are not included in the research model of this study.

Next, I will present an illustration of the significant relationships between CRM delivery system and its antecedents in Figure 11. As all insignificant paths have been eliminated, this path model was derived from the purified model (Table 38), which will be presented in Chapter 7.5.

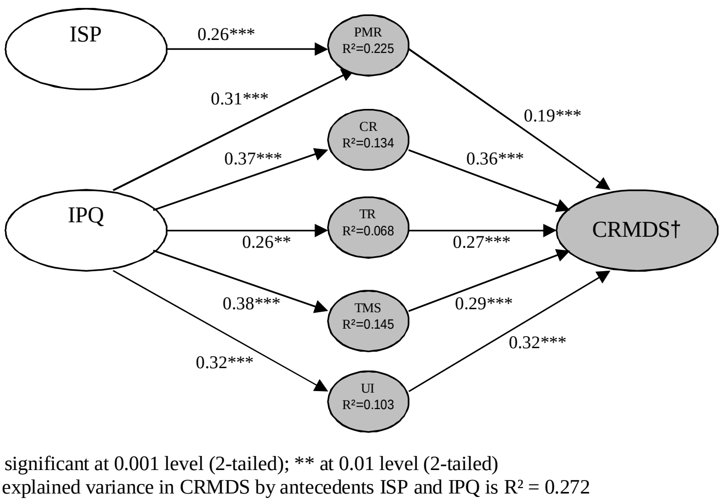

Figure 11 CRM delivery system and significant antecedent paths (derived from purified model)

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55 This total explained variance in CRM delivery system quality was calculated in the PLS path model by conceptualizing CRM delivery system as a 1st order construct with 14 indicators representing project-level IT resources PMR, CR, TR, TMS and UI, a technique that was also used in the hierarchical component model in Appendix 17 (Wold 1982; Lohmöller 1989).

Apart from IPQ→TR (0.26, $p<0.01$), all paths from IS planning sophistication and IPQ to the formative dimensions of CRM delivery system were significant at 0.1% level, providing very solid empirical support for the path model in Figure 11. The significant paths explained almost as much total variance in CRM delivery system (0.272) in the purified model as in the main effects model (0.289). It is evident that internal partnership quality is the dominant predictor of CRM delivery system quality: IS planning has an effect on CRM delivery system only through project management resources. A further examination revealed that dropping IS planning sophistication reduced the explained variance in CRM delivery system by 2% in absolute terms (R^2 = 0.252). According to Cohen's (1988) measure, the effect size of removing IS planning sophistication would be very small (0.027). As internal partnership quality influences CRM delivery system through every dimension and explains a quarter of the variance in CRM delivery system alone, it can be concluded that internal partnership quality is a substantial predictor of CRM delivery system. Notably the impact of internal partnership quality on each dimension of CRM delivery system was relatively similar in magnitude. One could argue that neither internal partnership quality indirectly, nor formative dimensions directly, influence CRM delivery system through a single dominant mechanism - this provides further empirical justification for the adoption of the formative composite variable, and for conceptualizing CRM delivery systems holistically.

7.2 Direct effects models

There are two direct effects models used in this study, which were adopted to test for foundational direct relationships and mediation effects. Firstly, I will use direct effects model 1, which excludes product performance, to test the direct relationships between CRM delivery system, perceived ease of use, and perceived usefulness (H12-H13). In addition, the full model will be used to analyze the mediating effects of product performance.

Second, direct effects model 2 is adopted to test for the direct effects of firm-level IT resources on process and product performance in the absence of CRM delivery system (H14-H15). As with direct effects model 1, the full model will be used to determine the impact of mediator CRM delivery system.

7.2.1 CRM delivery system and CRM acceptance

The main objective of this study is to investigate the link between CRM system development and CRM acceptance. The primary mechanism is expected to indirect through CRM product performance (SPD). However, it is important to establish whether a direct link exists.

In H12, it is hypothesized that CRM delivery system quality (CRMDS) is positively associated with perceived ease of use (PEOU). In H13, respectively, it is hypothesized that CRM delivery system quality (CRMDS) is positively associated with perceived usefulness (PU). In direct effects model 1, H12 was supported. The path CRMDS→PEOU (0.20, $p<0.01$) was significant at 1% level. H13, on the other hand, was not supported. CRM delivery system quality had no effect on perceived usefulness (-0.01).

In an additional test to assess the direct impact of CRM delivery system on CRM acceptance measures, I excluded the process performance (SPP) construct and the direct path connecting perceived ease of use (PEOU) and perceived usefulness (PU) from direct effects model 1. In this model, the path CRMDS→PEOU (0.22; $t=3.7$; $p<0.001$) became more significant while CRMDS→PU (0.13; $t=1.54$) had a clearly positive although insignificant relationship.

Since perceived ease of use is an antecedent of perceived usefulness (Davis 1989), it was expected *a priori* that the relationship between CRM delivery system quality and perceived ease of use will be stronger than the relationship between CRM delivery system quality and perceived usefulness. Most importantly, these results establish a direct significant relationship between CRM system development capability and CRM acceptance through perceived ease of use. Consequently, CRM delivery system quality explained 4.2% of the variance in perceived ease of use. Although this R^2 value is low, one should keep in mind that the direct relationship between CRM delivery system and perceived ease of use represents a secondary mechanism. More importantly, this result shows that a direct link exists. As the data concerning CRM delivery system quality and perceived ease of use was collected from different respondents, this direct link may also be considered to be reliable.

Following the primary indirect mechanism proposed in this study, H12-H13 also stated that the direct relationships CRMDS→PEOU and CRMDS→PU should be mediated by product performance (SPD). Since no direct relationship exists between CRM delivery system and perceived usefulness, H13 was excluded from mediation testing. The mediating effects of product performance on the relationship between CRM delivery system and perceived ease of use were assessed based on the data from direct effects model 1 and the full model (Table 38).

When the mediator product performance was controlled for in the full model, the direct path CRMDS→PEOU decreased from 0.20 ($p<0.01$) to a negative -0.12. As CRMDS→SPD (0.49, $p<0.001$) and SPD→PEOU (0.52, $p<0.001$) were also significant, all four conditions by Baron & Kenny (1986) were satisfied. Therefore, product performance fully mediates the relationship between CRM delivery system and perceived ease of use.

Furthermore, the explained variance in perceived ease of use increased from 0.042 in the direct effects model 1 to 0.208 in the full model, which can be described as a medium-sized effect (0.210) following Cohen’s (1988) classification of effect sizes. Therefore, CRM product performance is a full mediator between CRM delivery system quality and end-user perceptions of CRM technology.

Based on these results, these conclusions can be made:

H12: CRM delivery system quality is positively associated with perceived ease of use, which is mediated by product performance. SUPPORTED

H13: CRM delivery system quality is positively associated with perceived usefulness, which is mediated by product performance. REJECTED

The foundational relationship between CRM system development capability and CRM acceptance is confirmed through the highly significant positive relationship between CRM delivery system quality and perceived ease of use. However, the full mediation of CRM product performance suggests that CRM system development capability needs to be transformed into a high quality CRM system in order to be perceived as easy to use and, consequently, perceived as useful, resulting in CRM acceptance by individuals.

7.2.2 Firm-level IT resources and CRM product performance

Following the operational resource perspective, a core theoretical assumption made in this study was that firm-level IT resources primarily affect CRM project performance through their targeted use (Ravichandran & Lertwongsatien 2005). Therefore, the primary mechanism is expected to be indirect through the CRM delivery system (CRMDS). However, it is important to establish whether a secondary direct link exists, particularly to assess whether the inclusion of CRM delivery system is justified in the research model.

In H14a-e, I hypothesized that firm-level IT resources - IT infrastructure, IS planning sophistication, IS personnel skill, internal partnership quality, and external partnership quality - are positively associated with process performance. Surprisingly, all five paths in H14a-e were rejected. IT infrastructure (0.07), IS planning sophistication (-0.09), IS personnel skill (0.01), internal partnership quality (0.15), and external partnership quality (0.10) had an insignificant impact on CRM process performance. These findings suggest that being in possession of superior firm-level IT resources do not help firms in meeting schedule and budget estimates in CRM projects.

In H15a-e, I hypothesized that the five firm-level IT resources are positively associated with product performance. Internal partnerships (0.23, $p<0.05$) and external partnerships (0.19, $p<0.01$) had significant paths leading to CRM product performance, respectively. However, IT infrastructure (0.10), IS planning sophistication (-0.01), and IS personnel skill (0.03) did not predict product performance. Overall, the impact of firm-level IT resources on product performance ($R^2=0.336$) was lower than expected, although considerably more than their impact on process performance ($R^2=0.054$). Based on these considerations, the targeted use IT resources predicts CRM project performance better.

Following this primary indirect mechanism, H14-H15 also stated that the direct relationships between firm-level IT resources, process performance, and product performance should be mediated by CRM delivery system. Since none of the predictors in the direct effects model 2 had a significant effect on CRM process performance, I proceeded with no mediation testing with regard to H14. In conclusion, firm-level IT resources were not directly associated with the CRM process performance.

H14: (a) IT infrastructure; (b) IS planning sophistication; (c) IS personnel skill; (d) internal partnership quality; (e) external partnership quality is positively associated with process performance, which is mediated by CRM delivery system quality. REJECTED

Two firm-level IT resources, namely, internal (IPQ) and external partnership quality (EPQ), had a positive association with CRM product performance (SPD). As discussed in the previous sub-chapter, external partnerships had no influence on CRM delivery system (CRMDS), which is expected to mediate the path EPQ→SPD. Based on the theoretical resource-based mechanisms offered in this study, external partnership quality should not have a positive relationship with product performance without a significant relationship with CRM delivery system. This unexpected empirical result was analyzed to be a result of other possible reasons, such as the inclusion of organizational factors (user training, top management support, user involvement) into the CRM delivery system construct, or the ambiguity regarding the causal direction of the relationship between external partnership quality and CRM product performance. In conclusion, this contradictory empirical result is not considered sufficient evidence to abandon the theoretical rationale adopted in this study.

Consequently, only the mediating effects of CRM delivery system on the relationship between internal partnership quality and perceived ease of use were assessed based on the data from direct effects model 1 and the full model (Table 38). When the mediator CRM delivery system (CRMDS) was controlled for in the full model, the significant direct path IPQ→SPD (0.23; $p<0.05$) became insignificant (0.05).

Furthermore, internal partnership quality maintained a significant effect on all five formative dimensions of CRM delivery system in the full model, and had a significant total effect (0.40; $p<0.01$) on the CRM delivery system construct (calculated by conceptualizing CRM delivery system as a 1st order construct with 14 indicators). As the path CRMDS→SPD was also statistically significant (0.49; $p<0.01$), CRM delivery system fully mediates the relationship between internal partnership quality and product performance.

Following Cohen (1988), the explained variance in process performance increased from 0.054 in the direct effects model 2 to 0.134 in the full model, which is a small effect (0.092). Product performance increased from 0.336 to 0.489 in the same models, which is medium-sized effect (0.299).

Based on the preceding analysis, it is concluded that:

H15: (a) IT infrastructure; (b) IS planning sophistication; (c) IS personnel skill; (e) external partnership quality is positively associated with product performance, which is mediated by CRM delivery system quality. REJECTED

H15d Internal partnership quality is positively associated with product performance, which is mediated by CRM delivery system quality. SUPPORTED

In conclusion, these results generally suggest that possessing strategic IT resources do not necessarily transform into superior CRM project performance. Instead, the channeled utilization of IT resources in CRM projects predicts project performance significantly better.

Considering the importance of internal partnership quality as an antecedent of CRM delivery system quality as well as the impact of CRM delivery system on CRM product performance and perceived ease of use, it is a crucial finding to discover the mediating mechanisms through which these constructs are inter-linked. Furthermore, these core relationships (IPQ→CRMDS→SPD→PEOU) were all very highly significant ($p<0.001$) with this specific empirical data set.

7.3 Interaction model

Based on literature review, three moderating effects were hypothesized to affect the relationship between CRM delivery system quality and CRM project performance measures – CRM process performance (SPP) and CRM product performance (SPD). These were identified as relative project size (SIZ), application complexity (APP) and requirements uncertainty (REQ). It was hypothesized in H16 that the relationship between CRM delivery system quality and process performance is moderated by (a) relative project size; (b) application complexity; and (c) requirements uncertainty. H17, in turn, stated that the relationship between CRM delivery system quality and product performance is moderated by (a) relative project size; (b) application complexity; and (c) requirements uncertainty.

Following the procedure by Chin et al. (2003), the moderating effects were tested as part of the overall main effects model with interaction terms formed by cross-multiplying all mean-centered indicators of the predictor CRM delivery system and the moderator under investigation. Each moderator was tested separately as simultaneous testing is not available in PLS modeling. Project size (SIZ) was measured with one, application complexity (APP) with two, and requirements uncertainty (REQ) with three reflective indicators, respectively. The results are presented in Table 41 below, which includes the hypotheses H16-17, standardized coefficients (β) and their significances (t-values), the amount of explained variance in the dependent outcome variable (R^2), and the conclusion regarding hypotheses.

Table 41 Results of interaction model (PLS)

Hypothesis	β	t-value	R^2	Conclusion
CRMDS*SIZ→SPP	0,24	0,98	0,21	Rejected
CRMDS*APP→SPP	-0,26	0,86	0,22	Rejected
CRMDS*REQ→SPP	0,30	0,99	0,38	Rejected
CRMDS*SIZ→SPD	-0,15	0,94	0,47	Rejected
CRMDS*APP→SPD	0,18	1,86	0,49	Rejected
CRMDS*REQ→SPD	-0,12	0,72	0,48	Rejected

As Table 41 shows, five out of six interaction terms were non-significant and one interaction term (CRMDS*APP→SPD) was significant at 10% level, indicating weak support for moderation. More specifically, the direction of the moderating effects of relative project size (β=0.24), requirements uncertainty (β=0.30), and application complexity (β=-0.26) had no significant impact on the relationship between CRM delivery system and process performance. Interestingly, though, the explained variance in process performance increased substantially in all three cases from 12% in the main effects model.

The relationship between CRM delivery system and product performance was not significantly influenced by relative project size (β=-0.15) and requirements uncertainty (β=-0.12). Application complexity (β=0.18) had a significant effect at 10% level and provided weak support for interaction effects. The increases in the explained variance in product performance (44% in the main effects model), in turn, were more modest than in process performance.

In conclusion, the interaction model in PLS-SEM results did not provide evidence to support the hypotheses ($p<0.05$ requirement) related to moderating effects. However, the weak support ($p<0.10$) for the interaction effects of application complexity (APP) on the relationship between CRM delivery system (CRMDS) and product performance (SPD) was considered worthy of further investigation. Chin et al. (2003) warned about the reported difficulties in the measurement of moderating effects in PLS-SEM. Therefore, the moderation was further examined with regression analysis, which is a highly established method for testing moderation (Cohen, Cohen, Aiken & West 2003).

Following the guidelines by Cohen et al. (2003) a regression model including interaction terms was tested. The interacting predictors (sum variables of CRM delivery system and application complexity), were mean-centered, and the interaction term (CRMDS*APP) was created by multiplying the centered predictors. The dependent variable is the sum variable of product performance (SPD). As Table 42 shows, a significant interaction effect was detected. The results were highly similar to PLS path analysis but the interaction effect (CRMDS*APP) was significant (0.13) at 5% level. The explained variance in product performance (SPD), in turn, increased from 0.386 to 0.403.

Table 42 Moderating effects of application complexity on the path from CRM delivery system to product performance (SPSS)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4,641	,077		60,249	,000
Mean_Cent_CRMDS	,828	,084	,611	9,798	,000
Mean_Cent_APP	-,112	,049	**-,143**	**-2,300**	**,023**
CRMDS*APP	,107	,051	**,131**	**2,122**	**,035**

To facilitate the interpretation of the moderation, the interaction effect is presented in Figure 12. Consistent with Aiken and West (1991), the values for the moderator were computed using the mean as the medium value, one standard deviation above the mean as the high value, and one standard deviation below the mean as the low value.

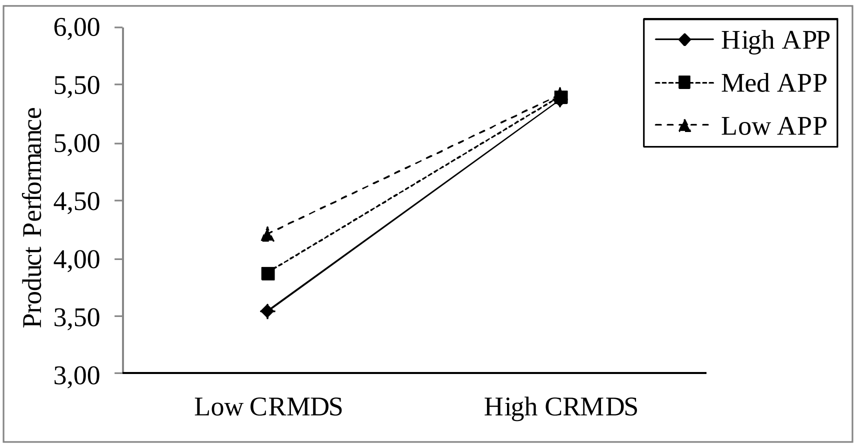

Figure 12 Interaction of CRM delivery system and application complexity

The figure shows that CRM delivery system is more strongly related to product performance when the CRM project is characterized by high levels of application complexity. In summary, only one hypothesized moderation effect received support. Hence:

H16a: The relationship between CRM delivery system quality and process performance is moderated by relative project size. REJECTED

H16b: The relationship between CRM delivery system quality and process performance is moderated by application complexity. REJECTED

H16c: The relationship between CRM delivery system quality and process performance is moderated by requirements uncertainty. REJECTED

H17a: The relationship between CRM delivery system quality and product performance is moderated by relative project size. REJECTED

H17b: The relationship between CRM delivery system quality and product performance is moderated by application complexity. SUPPORTED

H17c: The relationship between CRM delivery system quality and product performance is moderated by requirements uncertainty. REJECTED

7.4 Control variables

The control variables in this study, namely, firm size, industry, CRM contract type, and the duration of CRM use, were assessed in three ways: direct paths to outcome variables, multigroup analyses and Pearson's Chi-Square tests. In relation to outcome variables process performance (SPP), product performance (SPD), perceived ease of use (PEOU) and perceived usefulness (PU), the direct relationships from control variables were assessed in the final sample (N=161). No significant paths were found between control variables and outcome variables. Next, I divided the final sample into two subsamples based on control variable values. CRM contract type was a binary variable. Firm size and duration of CRM use were divided into two distinct groups representing the low and high thirds of the sample. Industry had 13 categories and was not included in the multigroup analysis. The groups were used in separate PLS path analyses to detect differences[56.] Furthermore, Pearson's Chi-Square tests were conducted for the same sub-groups.

[56] Multigroup comparison should only be done if the groups meet the minimum sample size requirements. The minimum sample size should be ten times the maximum number of paths leading to any measurement model (number of formative indicators) or to any construct in the structural model (number of path relationships pointing to a dependent construct), whichever number is greater (Barclay et al. 1995). Because CRM delivery system has 14 indicators pointing towards it, the minimum sample size requirement is N=140. However, for the purposes of detecting observed heterogeneity, I tested the subgroups with the 1st order reflective measurement models (formative

CRM contract type was divided into Time & Materials (N=88) and Fixed (N=73) pricing schemes (Ramachandran & Gopal 2010). A comparison between PLS path model results revealed that the T&M sample had higher R^2 values for CRM delivery system dimensions. In particular, project management resources and training resources had higher R^2 values, suggesting that in a fixed price contract, firm-level IT resources had much less impact on CRM delivery system. Furthermore, process performance had higher explained variance in T&M contracts, which was expected. Pearson's Chi-Square test (p=0,021) confirmed this finding.

The time of the CRM technology in use was divided into the most recent and the oldest CRM projects. In the latter sample, the explained variance in CRM delivery system dimensions was higher apart from training resources. The R^2 value of project management resources (0,54 vs. 0,13) was much higher in the sample of old CRM systems. In addition, the R^2 value in perceived ease of use was substantially higher (0,33 vs. 0,06) with old CRM systems. One probable explanation is that CRM users need time to learn how to use CRM technology, which possibly contributed to this result. However, the finding was not confirmed by the Pearson Chi-Square test (0.556).

Due to the high number of industries (13), multigroup analysis was not undertaken in PLS. However, I created six sub-groups (displaying homogeneity) in order to increase group sizes for Pearson's Chi-Square testing with respect to outcome variables. The groups were: (1) Manufacturing; (2) Construction, Transportation & Warehousing; (3) Wholesale & Retail; (4) Public sector, Education, Health & social services; (5) IT & Media; and (6) Professional services. Process performance (p=0.030), perceived ease of use (p=0.047) and perceived usefulness (p=0.017) all differed significantly across industries while product performance did not (p=0.22). Industries where CRM use is common had better outcomes than other industries. The main reason, however, for significant heterogeneity between industries was group 4. Apparently, CRM projects in the public sector and similar industries are less successful in terms of process performance, product performance, perceived ease of use and perceived usefulness. This finding suggests that additional research is needed to investigate the challenges in CRM system development projects initiated by organizations in the public sector.

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indicators of CRM delivery system) without the 2nd order conceptualization. In this case, the minimum sample requirement is N=50, which effectively enabled multigroup comparison to take place for control variables.

7.5 Summary of results and purified model

I will now summarize the results of the path analysis regarding the hypothesized main effects, direct effects, and moderating effects. After the summary, I will conclude the sub-chapter by presenting a purified path model excluding insignificant paths.

In the main effects model, there were there three hypothesized paths between CRM delivery system quality and direct IT-oriented outcomes, CRM process performance and CRM product performance (H1-H3); three hypothesized paths between IT-oriented outcome product performance and CRM acceptance outcomes, perceived ease of use and perceived usefulness (H4-H6); and five hypothesized paths between five firm-level IT resources (IT infrastructure; IS planning sophistication; IS personnel skill; internal partnership quality; external partnership quality) and CRM delivery system, respectively, which were investigated at formative dimension level resulting in 25 tested paths (H7-H11).

In direct effects model 1, there were two hypothesized paths from CRM delivery system quality to perceived ease of use and perceived usefulness (H12-H13). In direct effects model 2, there were a total of ten hypothesized paths from the five-level IT resources leading to CRM process and product performance, respectively (H14-H15a-e).

In the interaction model, there were six hypothesized moderating effects of IT structural risks (relative project size, application complexity, requirements uncertainty) on the relationship between CRM delivery system and firm outcome variables CRM process performance and CRM product performance (H16-H17a-c).

In total, there were a total of 49 analyzed paths to reach a conclusion on 29 hypothesized paths, encompassing eleven main effects, twelve direct effects, and six moderating effects. Table 39 presented the empirical results with regard to the proposed hypotheses in this study. In the main effects model, seven hypotheses received support, three were rejected and one received partial support. In the direct effects models, two hypotheses were supported and ten were rejected. Five hypothesized moderating relationships were rejected, and one received support.

All rejected hypotheses in main effects were related to antecedent relationships. IT infrastructure (INF), IS personnel skill (PS), and external partnership quality (EPQ) failed to predict CRM delivery system quality – the possible explanations for these unexpected results were analyzed earlier in this chapter. IS planning sophistication (ISP) received partial support by influencing CRM delivery system (CRMDS) through one of its formative dimensions, namely, project management resources (PMR). However, the overall impact of IS planning on CRM delivery system quality was not significant. Internal partnership quality (IPQ) was the only antecedent that met the a priori expectations and may be considered a key antecedent of CRM delivery system, which was underlined by the strength and significance of the empirical relationship ($\beta=0.40$, $p<0.001$).

The proposed relationships between all endogenous constructs – CRM delivery system, process performance (SPP), product performance (SPD), perceived ease of use (PEOU), and perceived usefulness (PU) - were all highly significant at 0.1% level. The only exception was SPD→PU, which was also significant ($p<0.01$) and heavily mediated by perceived ease of use as anticipated. These findings suggest that robust relationships exist between these constructs, at least with this specific empirical data set. Thus, the core relationships IPQ→ CRMDS→ SPD→ PEOU→ PU were all connected highly significantly at 0.1% significance level.

In direct effects model 1, the direct path from CRM delivery system quality to perceived usefulness was rejected. The relationship between CRM delivery system and perceived ease of use (0.20) was supported at 0.1% level. CRM product performance, in turn, fully mediated this relationship with a substantial effect size (0.299). The foundational relationship between CRM system development capability and CRM acceptance was thus confirmed. In addition, the full mediation of CRM product performance implies that CRM system development without a superior CRM system as its output does not lead to CRM acceptance.

In direct effects model 2, all five direct paths from firm-level IT resources to CRM process performance were rejected. Furthermore, IT infrastructure, IS planning sophistication, and IS personnel skill had no impact on CRM product performance. Only the paths from internal and external partnership quality to product performance received support. However, the hypothesis related to external partnerships was rejected due to its non-significant relationship with hypothesized mediating variable CRM delivery system. The effect of internal partnerships on product performance, on the other hand, was fully mediated by CRM delivery system. These findings provided further support that the inclusion of CRM delivery system is crucial in models predicting CRM performance outcomes.

The direct effects models jointly suggest that the core constructs – internal partnership quality, CRM delivery system, product performance, and perceived ease of use – are interlinked by full mediation mechanisms. Therefore, one could argue that it is necessary to include each construct in the above-mentioned continuum in order to accurately predict whether CRM system development capability has an impact on CRM acceptance.

In PLS-SEM, all six moderating effects were statistically insignificant and therefore rejected. These results may be partially caused by the reported difficulties in the measurement of moderating effects in SEM (Chin et al. 2003). Testing moderating effects with a regression model including interaction terms revealed that application complexity had a moderating effect ($p<0.05$) on the relationship between CRM delivery system and product performance. In particular, CRM delivery system had a stronger effect on product performance when the CRM project was characterized by high complexity. In conclusion, this hypothesis was supported.

In general, the results for moderating effects were unsatisfactory. In addition to technical challenges related to PLS-SEM in assessing moderating variables, one possible explanation might be related to the setting of expectations by respondents regarding the CRM system development project. For example, if the structural risks were considered to be high prior to the start of the CRM system development project, the expectations regarding what constitutes an acceptable level of CRM project performance would probably be lower. In this scenario, structural project risks would have subdued moderating effects. Rather, they would co-vary, to some extent, with CRM process performance and CRM product performance.

As an additional test for the main effects, I examined the significance of the hypothesized paths in the full model (Table 38). It is important to assess whether significant relationships remain significant in the presence of all possible relationships between constructs being modeled simultaneously. This is a more rigorous procedure than simply excluding paths from the main effects model. Thus, the purified model is a representation of the full model, excluding all insignificant paths (with the exception of the direct path EPQ→SPD from external partnership quality to product performance, which was rejected based on theoretical rationale). In the present study, all the significant paths in the main effects model remained significant in the full model. Consequently, the final purified model (Figure 13) is based on the supported hypotheses in Table 39 above. The 2nd order CRM delivery system[57] construct is depicted in grey.

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[57] The total explained variance in CRM delivery system was calculated in the PLS path model by conceptualizing CRM delivery system as a 1st order construct with 14 indicators representing project-level IT resources PMR, CR, TR, TMS and UI, a technique that was also used in the hierarchical component model in Appendix 17 (Wold 1982; Lohmöller 1989).

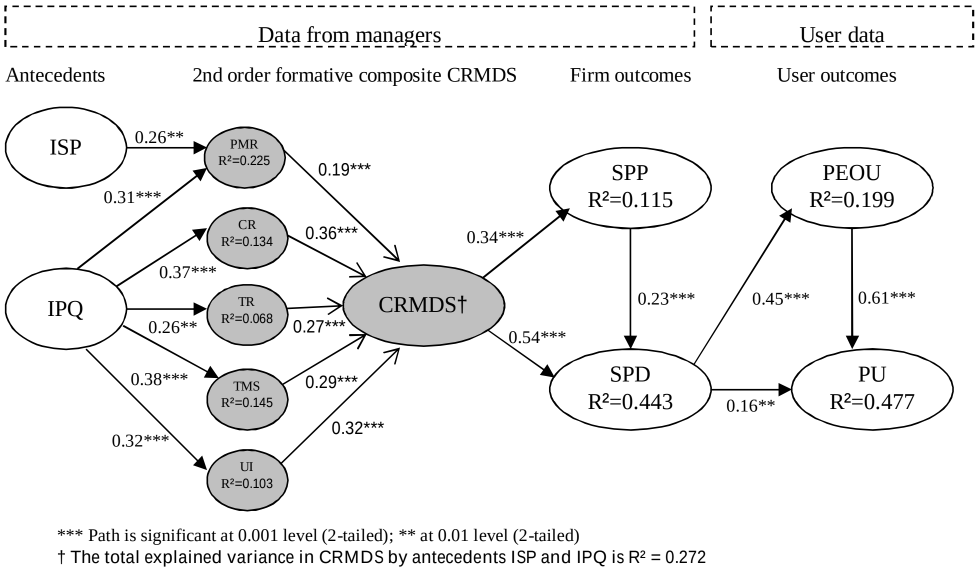


Figure 13 The purified model

Nine out of the total of twelve paths in the purified model were highly significant at 0.1% level while the remaining three were statistically significant at 1% level. These findings suggest that the final model fits the empirical data very well. The differences from the main effects model involve the elimination of IT infrastructure (INF), IS personnel skill (PS) and external partnership quality (EPQ) as antecedents of CRM delivery system. In conclusion, the beta coefficients and R^2 values are satisfactory in the context of IS and marketing research. Next, I will compare different models to determine which model displays the best fit with this particular set of empirical data.

7.6 Competing models comparison

Following the recommendation by Hair et al. (1995, 626), I will employ the strategy of comparing alternative, competing models to ensure rigorous testing of model fit. After model comparisons on the basis of evaluative criteria, I will choose the most suitable model with regard to the empirical data collected for the purposes of this study. Comparing alternative models is a common part of the evaluation process in the search for the “best” model in terms of fit with empirical data. Evaluating the proposed main effects model without justifying its superiority over competing models is not a stringent enough test (Hair et al. 1995, 625). I assessed (1) the main effects model (excluding direct paths); (2)

direct effects model 1 (assessing direct effects of CRM delivery system); (3) direct effects model 2 (assessing direct effects of firm-level IT resources); (4) the full model (including indirect and direct effects); and (5) the purified model (only significant paths). I tested each model in the context of its entire nomological network As mentioned earlier, the results of all models can be found in Table 38, which facilitates any parallel comparisons between competing models, and will be used as the basis for the following analysis..

The primary criterion used for comparing competing models will be the goodness-of-fit (GoF) index. The GoF value is determined by the square root of the weighted (based on the number of indicators of each construct) average of communalities and the average of R^2 values (Tenenhaus et al. 2005, 173). Communality expresses the amount of explained variance in the measurement models and R2 in the structural model, respectively. The R^2 values and communalities of competing models, which were used to calculate GoF values, are presented in Table 43.

Table 43 R^2 values and communalities of latent variables

	Main effects model (excl direct effects)		**Direct effects model 1 (CRMDS)**		**Direct effects model 2 (firm-level IT resources)**		**Full model (incl direct effects)**		**Purified model**	
Construct	**R2**	**Comm**	**R2**	**Comm**	**R2**	**Comm**	**R2**	**Comm**		
INF		0,6394		0,6378		0,6378		0,6378		
ISP		0,8345		0,8345		0,8342		0,8345		0,8345
PS		0,8717		0,8712		0,8695		0,8712		
IPQ		0,6534		0,6535		0,6531		0,6535		0,6535
EPQ		0,6852		0,6860		0,6865		0,6860		
CRMDS	0,289	0,4734	0,297	0,4734			0,287	0,4734	0,272	0,4734
SPP	0,115	0,8567	0,114	0,8568	0,054	0,8571	0,134	0,8568	0,115	0,8568
SPD	0,443	0,7314			0,336	0,7315	0,489	0,7314	0,443	0,7314
PEOU	0,200	0,7744	0,042	0,7744	0,199	0,7744	0,208	0,7744	0,199	0,7744
PU	0,477	0,8715	0,457	0,8715	0,477	0,8715	0,493	0,8715	0,477	0,8715

The weighted communalities were estimated based on the following number of indicators: IT infrastructure (4 indicators), IS planning sophistication (2), IS personnel skill (2), internal partnership quality (5), external partnership quality (5), CRM delivery system (5 dimensions), process performance (2), product performance (5), perceived ease of use (5) and perceived usefulness (4), respectively. As discussed in the previous chapter, the five formative dimensions of CRM delivery system will be treated as indicators here. Although the formative dimensions are 1st order measurement models, this serves the purposes of more accurate measurement and they are not treated as constructs (and thus have no communalities and R^2 values) in the structural (inner) model. Based on these considerations, Table 44 shows the calculations of average R^2 values, weighted average communalities, and the resulting GoF values for each structural model.

Table 44 Goodness-of-Fit (GoF) values for competing models

	Main effects model (excl direct effects)	**Direct effects model 1 (CRMDS)**	**Direct effects model 2 (firm-level IT resources)**	**Full model (incl direct effects)**	**Purified model**
Weighted average communality	0,712	0,709	0,747	0,712	0,715
Average R²	0,305	0,228	0,267	0,322	0,301
Goodness-of-Fit	**0,466**	**0,402**	**0,447**	**0,479**	**0,464**

These GoF values may be considered good and are similar GoF values in other marketing studies (e.g. Guenzi et al. 2009), although GoF values are rarely reported in this discipline when PLS-SEM is used[58]. Furthermore, GoF values are lower due to the lower communality of CRM delivery system (0.47 with five dimensions), which has a substantial impact on weighted average communality.

Overall the GoF values were stable, reflecting relatively small changes in communalities and R^2 values between competing models. The direct effects model 2 had better average communality than other models because the formative CRM delivery system construct was not included. The direct effects model 1, in turn, had lower average R^2 due to a sharp drop in the explained variance in perceived ease of use. The full model naturally had better average R^2 than other models due to the very large number of paths leading to endogenous constructs.

Consequently, the full model had the best GoF score 0.479. However, the purified model had a very similar GoF (0.464) value with dramatically fewer paths. Based on these considerations, the purified model is a better choice as it captures the essence of the model in a far more parsimonious fashion.

The main effects model, in turn, has an almost equal GoF (0.466) score to the purified model. However, the main effects model also has more paths, which do not contribute to the predictive power of the research model: the explained variances in all outcome variables remained unchanged. As the main philosophical orientation of PLS modeling (and of this study) is prediction, it is important choose the model that best predicts key constructs. These evaluation criteria of model fit are of equal quality in the competing models. In this case, the model that accomplishes to predict key constructs with fewer paths should be deemed the most appropriate. Based on these considerations, the purified model prevails over the main effects model in this study.

58 Hair, Ringle et al. (2011) found that only 5% (16 out of 311) of recent marketing research publications, which applied PLS-SEM as the primary analysis method, reported GoF values.

Direct effects model 1 scored the lowest GoF 0.402 as a result of excluding product performance, which proved to be a crucial mediating variable between CRM system development and CRM acceptance. Therefore, the purified model clearly demonstrated better model fit.

Finally, direct effects model 2 had a higher GoF score (0.447) than direct model 1, but fell short in comparison with the purified model. This result is not surprising considering the full mediation effects of CRM delivery system, which was excluded from this model. The effect of CRM delivery system is most evident in the decrease of average variance explained from the purified model ($R^2=0.301$) to the direct effects model ($R^2=0.267$), which is entirely explained by decreases in R^2 values in process performance (0.115→0.054) and product performance (0.443→0.336). Therefore, the purified model clearly fits the empirical data better than the direct effects model.

In conclusion, the final choice after the competing models comparison is the purified model. Despite having far fewer parameters to be estimated than the main effects model and the full model, it achieved a similar GoF score. Nine out of the total of 12 paths in the purified model are highly significant ($p<0.001$) while the remaining three are statistically significant at 1% level. Based on these analyses, I argue that the purified model displayed the best fit with the empirical data collected and analyzed in this study.

8 DISCUSSION AND CONCLUSIONS

In this chapter, I will reflect more profoundly on the theoretical, methodological and managerial contributions of this dissertation, followed by a discussion regarding the limitations of the study. Finally, I will conclude the chapter by making some suggestions for future research.

8.1 Theoretical contribution

The main purpose of this work was to conceptualize CRM system development parsimoniously, to identify all relevant IT resources affecting CRM system development capability, and to test whether the adopted conceptualization of CRM system development predicted CRM acceptance. In marketing studies, the role of CRM system development in CRM success has not been investigated previously. IS research, though, has long examined the success of IS development in general, applying various theoretical lenses. However, IS development studies have seldom specifically focused on CRM system development. Marketing research and particularly sales management literature, on the other hand, have typically focused on social, individual, and organizational factors, which affect CRM technology success measures such as CRM acceptance *after* users have gained experience using the CRM application.

Therefore, this study aimed to make its primary theoretical contribution by assessing what factors have an impact on CRM acceptance *before* the CRM application is launched within the organization. These factors influence the firm's CRM system development capability, which produces the CRM application as its direct output. Based on experiences of using CRM technology to perform organizational processes, the CRM system is either accepted or rejected by CRM users. These IT-oriented concepts affecting CRM acceptance, namely, CRM system development capability and CRM system quality, are novel predictors in marketing research and thus form the foundation of the theoretical contribution made by this study. Next, the main theoretical contributions of this study are discussed in further detail.

1. CRM system development is an important predictor of CRM acceptance. Firstly, this study makes a key theoretical contribution by suggesting that the firm's CRM system development capability as a determinant of CRM acceptance by the firm's employees. Marketing research has arguably treated technical factors such as CRM system quality as fixed conditions, opting to focus on social norms, individual characteristics, and organizational factors as predictors of CRM acceptance.

The empirical results provide strong support for technical factors as predictors of CRM acceptance. CRM system development capability explained 44% of the variance in CRM system quality, and also had a significant direct effect on CRM acceptance through perceived ease of use. When mediated by CRM system quality, CRM system development capability explained 20% of the variance in perceived ease of use. In turn, CRM system quality and perceived ease of use together explained 48% of the variance in perceived usefulness.

Although empirical evidence in a number of sales management studies have clearly shown that social (Schillewaert et al. 2005), individual (Speier & Venkatesh 2002) and organizational factors (Avlonitis & Panagopoulos 2005) explain the majority of CRM acceptance or use by individuals, the impact of a high quality CRM application - with the appropriate functionalities, sufficient reliability and response times – also accounted for 20% of perceived ease of use. In comparison, Venkatesh (2000) found in the general IS context that individual characteristics explained 60% of the variance in perceived ease of use. However, the impact of CRM system quality on perceived ease of use is also substantial, albeit smaller as expected *a priori*.

Based on the preceding discussion, this study provides evidence that incorporating technical factors into research models predicting CRM acceptance represents a complementary extension to the existing body of CRM/ SFA adoption literature. In contrast, previous studies (Avlonitis & Panagopoulos 2005; Speier & Venkatesh 2002) have consciously attempted to nullify the effect of technical factors in testing other external factors predicting CRM acceptance. The opposite approach taken here has potential to produce new knowledge in CRM research. For example, a superior CRM application may arguably positively influence social norms among firm personnel, individuals' attitudes towards information technology, and organizational efforts to support user adoption during the post-implementation phase. This issue could be a worthy research topic in future studies.

The reliability and validity of the results linking CRM system development to CRM acceptance is supported further by the following arguments. Firstly, the CRM acceptance measures were based on users' actual experiences of using the CRM application, as opposed to future expectations. Therefore, the relationships between CRM system development capability, CRM system quality, and CRM acceptance are likely to be relatively robust as CRM acceptance is a consequence of CRM use, not an antecedent (Seddon 1997). In this view, this study challenges whether CRM technology use is the most appropriate measure to assess the impact of CRM technology on individual performance or firm performance, which has received empirical support from Avlonitis & Panagopoulos (2005) with respect to salesperson performance, for example.

Second, the data regarding CRM system development and CRM system quality were collected from IT management, whereas the data regarding CRM acceptance was collected from multiple CRM users. The dual research design with two separate data sets - one containing data regarding technical factors as predictors, the other data regarding multi-respondent perceptions as outcomes – clearly adds to the credibility of these results.

2. A parsimonious conceptualization of CRM system development. Second, this study makes a distinct contribution to marketing and IS research by introducing a new conceptualization of CRM system development, which captures the most important elements of this multidimensional concept. Based on an extensive theoretical review of marketing and IS research, a resource-based conceptualization of CRM system development was proposed. This novel conceptualization received empirical support with the operational measure CRM delivery system, which is a new 1^{st} order reflective, 2^{nd} order formative composite variable. Each dimension of the operational measure represented a distinctive facet of and made a substantial contribution to the overall formative construct, which parsimoniously explained the cumulative effects on CRM system development outcomes.

Consequently, this study accumulates the knowledge base within CRM research by identifying the core dimensions of, or project-level IT resources as resource inputs of, CRM system development capability, which is required to install high quality CRM systems into unique organizational settings. Experienced and capable project management, knowledgeable and competent consultants, sufficient investments into user training, visible support demonstrated by the firm's top executives, and continuous involvement of end-users during the CRM system development project, are distinct and complementary IT resources, which collectively form the firm's CRM system development capability. Although the core dimensions have all received wide empirical support separately (Table 9) as predictors of IS development success and/ or CRM acceptance, they have not been previously tested as a configuration of IT resources.

The operational measure CRM delivery system was adopted from Karimi et al.'s (2007a) empirical study, which introduced the operational measure ERP delivery system in the enterprise resource planning (ERP) system development context. More importantly, this study makes a theoretical contribution to CRM research through the addition of user involvement, based on careful theoretical analysis, into the original ERP delivery system construct. The inclusion of user involvement was strongly supported by empirical data, which will be discussed in further detail below.

In addition to identifying the core dimensions of CRM system development, this study expands on extant CRM research by expressing, in quantitative terms as formative dimension weights, the relative importance of each dimension to overall CRM system development capability. According to empirical results, consultant resources and user involvement are particularly important factors in achieving CRM system development success. This finding arguably highlights the importance of co-operation and information sharing between different stakeholders, especially those outside the firm's IT department. Consultants should not only be technologically experienced; they should also be familiar with the client firm's organizational processes. The participation of the end-user community, in turn, ensures that their requirements are sufficiently communicated to and jointly planned with external consultants to develop appropriate technical solutions to meet those requirements.

In CRM research in marketing, user involvement has been cited as an important organizational factor affecting CRM acceptance and use (e.g. Morgan & Inks 2001). This study suggests that it is crucial to involve end-users starting from the early stages of CRM initiatives. Since the execution of CRM system development projects are often driven by the IT department, lack of adequate and continuous participation by users in marketing, sales and customer service is an evident risk. Furthermore, it is particularly important that user involvement in CRM system development is directed at facilitating the work of external consultants, who are responsible for customizing the CRM application to satisfy organizational requirements. Although IS research has predominantly examined consultant resources, this study indicates that CRM consultants play a significant role in CRM technology success, which is not sufficiently taken into account in most CRM projects. This assertion is highlighted by the fact that this empirical study reported the lowest mean values for consultant resources, and the highest variances in consultant resources between CRM projects regarded as successes or failures.

Previous CRM/ SFA adoption studies have stressed the role of top management commitment (e.g. Cascio et al. 2010) and user training (e.g. Buehrer et al. 2005) as determinants of CRM acceptance. This study confirms that top management support and user training are also significant organizational resources in the CRM system development phase. In particular, top management support provides CRM initiatives with credibility, resources and priority status, which may significantly enhance stakeholder commitment. User training, in turn, is a vital facilitator of learning how to use and benefit from the CRM application. This study suggests that this individual learning process, which is key to establishing CRM acceptance, should start prior to

CRM system rollout. Based on these considerations, this study not only confirms prior findings in marketing research but also emphasizes the need for top management support and training resources in the CRM system development phase to achieve higher levels of CRM acceptance among employees.

In addition to consultant resources, project management represents an IT-oriented resource, which has not been addressed in CRM research. This study finds that project management is also a necessary dimension of CRM system development efforts, which is consistent with empirical studies in risk and project management (Wallace et al. 2004) and IT capability literature (Karimi et al. 2007b). The planning, coordination and control over tasks, activities, and people in CRM system development underlines the importance of project management. Furthermore, competent project management can be invaluable in encouraging information exchange between IT staff, consultants, and end-users.

The conclusions drawn regarding the relative importance of the dimensions of CRM system development capability should be taken with a certain degree of caution. Whereas covariance-based SEM analysis techniques such as LISREL primarily emphasize confirmatory testing and parameter estimation, PLS modeling aims to maximize the explained variance of the outcome variables (Hair, Ringle et al. 2011, 139-140). In other words, indicator weights of formative constructs vary across different samples. Therefore, the generalizability regarding the dimensions and their relative contribution to CRM system development capability should be tested in additional studies with new sets of empirical data in different research settings.

Consequently, this study provides CRM researchers with a new operational instrument to test the impact of CRM system development on CRM success outcomes. In this study, the higher-order operationalization CRM delivery system proved to be a robust construct in terms of reliability and validity criteria. This construct responds to recent calls to develop new holistic operationalizations, representing combinations of factors affecting IS development, by academics in risk and project management literature (Gemino et al. 2008), IT innovation research (Fichman 2004a), and IT capability literature (Karimi et al. 2007b). This study supports the notion that different IT resources in CRM system development projects do not work in isolation but rather in combinations. Based on resource complementarity arguments, a higher-order conceptualization would better reflect reality than stand-alone IT resources (Karimi et al. 2007a). Such an operational measure has been lacking in the CRM context.

3. Internal partnership quality is crucial to CRM system development capability. The third notable theoretical contribution to CRM research made by this study concerns the fundamental impact of internal partnership quality on the firm's CRM system development capability, explaining 25% of the variance in the overall construct. Importantly this study also suggests that the relationships between the IT department and business units affect CRM system development capability through all of its five dimensions. Therefore, relationships between IT and its client departments characterized by reciprocal information sharing, familiarity with each other's working practices, mutual trust, joint planning and goal formulation, and lack of conflicts, are paramount in allocating the appropriate IT resources to the CRM project, and in maximizing their contribution to CRM system development capability through synergistic effects.

In a case study setting in the ERP context, Akkermans & van Helden (2002) argued inter-departmental collaboration and communication are the core processes driving successful ERP projects forward. They posited that in the absence of internal partnerships, stakeholders including top management, the project team, project management, and external partners, are also likely to be inferior in terms their presence and/or attitudes (p. 44). Similarly it appears that the lack of internal partnership quality has the potential to seriously undermine the firm's capability to develop high quality CRM systems. Although this conclusion is not surprising, one could argue that the all-embracing nature of the effect of internal partnerships on the CRM system development concept is unexpected. The strength of the empirical results certainly warrants further research into uncovering the action mechanisms of internal partnerships in the CRM context.

The dominating position of inter-departmental relationships is further highlighted by the apparent insignificance of other firm-level IT resources with respect to the firm's CRM system development efforts. The empirical results indicate that a modern and flexible IT infrastructure, highly skilled IT department personnel, and good external partnerships with IT vendors and IT service providers, do not have a positive influence on CRM projects. In a similar vein, formalized and sophisticated IS planning only contributes to the quality of project management acquired to lead the CRM system development project. Some conclusions can be drawn from these unexpected findings.

IT infrastructure is a valuable IT resource whose contribution to strategic level outcomes such as firm performance and competitive advantage remains controversial with empirical support for (e.g. Armstrong & Sambamurthy 1999; Ravichandran & Lertwongsatien 2005) and against (Bhatt 2005; Powell & Dent-Micallef 1997). This study suggests that IT infrastructure is a necessary but insufficient condition for operative level outcomes such as CRM system development capability, but does not lead to incremental performance improvements.

The impacts of IS planning and IS personnel skill, in turn, are arguably diminished by overlapping domains with and suppressing effects by internal partnership quality, contrary to Ravichandran & Lertwongsatien's (2005) empirical study. Well-executed IS planning involves a great deal co-operation between internal and external stakeholders, which became evident in the empirical analysis. Similarly, "people skills" possessed by IT staff, such as managerial and interpersonal skills, are particularly important in the CRM system development context, while technology-related skills are less important to consultant-driven projects such as CRM system development. Therefore, the crucial role of co-operation emerges again as the underlying theme.

Consequently, this study does not entirely reject IS planning and IS personnel skill as contributors to CRM system development capability. Based on theoretical review, both have received theoretical (Mata et al. 1995; Ross et al. 1996) and empirical support (Dehning & Stratopoulos 2003; Powell & Dent-Micallef 1997) as antecedents of firm performance. Thus, I would rather argue that IS planning *without* collaboration between stakeholders, and *technical* skills of IS personnel, do not predict CRM system development capability. Similar to IT infrastructure, they are valuable and necessary IT resources but unlikely to lead to differential performance in the absence of sufficient co-operation. Hence, IS planning and IS personnel skill should be examined further in future studies addressing CRM system development with alternative operational measures.

This study also asserts that external partnership quality does not enhance the firm's CRM system development capability. Firstly, this unanticipated finding suggests that external partners cannot compensate for the shortcomings in the client firm's IT resources. External partners are often consulted in resource allocation decisions for CRM projects, and their consultants are heavily involved in CRM project execution. However, the client firm, its organizational environment, and its change management efforts, ultimately determine whether CRM system development success is achieved. Second, organizations in the empirical data set may have used a new vendor in the CRM project, which is common in the context of specialized technology. In this case, external partnership quality is less relevant. Third, empirical analysis suggests that external partnership quality is directly related to CRM system quality, not CRM system development capability. As a predictor, using the same vendor has been found to improve CRM project performance due to relational and technical familiarity (Ethiraj et al. 2005; Ramachandran & Gopal 2010). As an outcome, past joint successes in IS projects are likely to positively influence the client firm's perceptions of the completed CRM project. Evidence on the role of external partnership quality in CRM system development is inconclusive in this study, which should be examined in additional studies.

4. CRM acceptance is achieved through several conditions. This study makes a fourth interesting contribution to CRM research by unveiling the mediating mechanisms through which the firm's IT resources affect CRM acceptance. According to Baron & Kenny (1986), mediating mechanisms can be described as "various transformation processes internal to the organism (p. 1176)", or "entities or processes that intervene between input and output (p. 1176)". From the CRM research perspective of this study, these entities and processes during CRM projects, from initiation to CRM application launch to diffusion of use, could be described as necessary conditions that must be met in order to achieve CRM acceptance among the firm's employees. The empirical results provided strong support that internal partnership quality, CRM system development capability, CRM system quality, perceived ease of use, and perceived usefulness, are separate conditions inter-connected through subsequent mediating relationships. Although the research design was cross-sectional, one could argue that these relationships are causal in nature as internal relationships exist prior to the CRM project, which results in a completed CRM system, leading to experience-based user perceptions regarding the CRM system. In this view, each condition in the CRM system development process is a necessary component to achieve CRM acceptance from a CRM technology perspective.

5. *Empirical application of the operational resource perspective*. Traditional resource-based (RBV) research, referred to as the strategic resource perspective, has focused on examining the complementary links between different types of resources at the strategic level, and their impact on firm performance and/or sustainable competitive advantage. IT capability studies in IS research have similarly investigated the complementarities between strategic IT resources and non-IT resources. These studies have focused relied on the interaction perspective of resource complementarity (Ravichandran & Lertwongsatien 2005), which assumes that the presence or possession of one resource enhances the value of another resource.

Contrary to the tradition resource-based approach, this study makes a theoretical contribution to the resource-based discourse and the IT capability paradigm by employing the operational resource perspective (Ray et al. 2005; Karimi et al. 2007b) to empirically test the relatively new idea of investigating the relationships between resource hierarchies (Kraaijenbrink et al. 2010), and the channeled use of firm-level IT resources (Ravichandran & Lertwongsatien 2005) in the CRM system development context. These approaches stress that resources must be utilized (as opposed to mere possession) to yield economic rents.

Following resource-picking and resource complementarity mechanisms, the relationships between firm-level IT resources (resource capacity) and project-level IT resources (resources in action) were investigated. The results regarding this study's exploratory examination of the relationships between resource hierarchies following resource-picking and resource complementarity arguments were mixed. Following the resource-picking mechanism, firm-level IT resources were expected to improve the firm's ability to make informed decisions regarding resource allocations to the CRM project. Following resource complementarity arguments, firm-level IT resources (when used) were also expected to enhance the value-creating potential of project-level IT resources. With the exception of internal partnership quality, the firm's IT resource endowments had weak explanatory power on the quality of allocated project-level IT resources and overall CRM system development capability.

Consequently, this study did not confirm Ravichandran & Lertwongsatien's (2005) findings of positive influences by IT resources on functional IT capabilities, which include IS planning, IS development, and IS maintenance and support. However, data regarding CRM system development capability in this study was related to experiences from specific CRM projects, not general evaluations of the firm's IT capability. In this view, it seems that the firm's IT resources do contribute to the firm's functional IT capabilities in general, but do not necessarily improve the success rates of single IS development projects to the degree, or at least CRM system development projects.

In contrast to the mixed evidence with respect to the relationships between resource hierarchies, this study suggests that IT resources influence CRM project outcomes through their targeted use (Ravichandran & Lertwongsatien 2005) when combined into CRM system development capability. Therefore, this study provided support for the operational resource perspective by demonstrating how CRM system development capability, i.e. dedicated use of IT resources at the operative level, clearly predicted CRM project outcomes better that firm-level IT resources directly.

Based on resource complementarity arguments, CRM system development capability, defined as a bundle of resource inputs, explained almost half of the variance in product performance, i.e. CRM system quality. This study did not examine the capability-building mechanism, which refers the firm's capability to deploy resource inputs more effectively. It would be an interesting avenue for future studies to investigate how IT resources are deployed most effectively in the CRM system development context, and what is the contribution of this rent-generating mechanism to the firm's CRM system development capability and related outcomes.

In summary, this study suggests that the operational resource perspective is a promising approach in IT capability research, which could be extended to other empirical areas and resource-based research in general. Investigating resource hierarchies, in any context, also has the potential to make a new contribution to resource-based theories. The operational resource approach could also develop new concepts and operational measures at more tactical levels. After all, RBV has been criticized in the past for high levels of abstraction, an emphasis on conceptual theorizing, and lack of anecdotal evidence.

6. Confirmation of CRM project performance and CRM acceptance measures. Finally, this research provides further confirmation of the well-established outcome measures, namely, CRM project performance and CRM acceptance. The dimensions of IS project performance - process performance and product performance – have been seldom tested in the CRM project context. Generally speaking, the empirical results confirmed previous findings by risk and project management scholars. Similarly to IT project risks, project-level IT resources predicted a relatively high portion CRM project performance. In addition, it has been suggested that there is a moderate relationship between process performance and product performance (Wallace et al. 2004). This study provides further validation for this link: CRM projects meeting budget and schedule estimates are more likely to produce high quality CRM systems.

With respect to CRM acceptance, this study confirms the well-documented role of perceived ease of use as an antecedent of perceived usefulness. Empirical results clearly show that CRM system quality primarily affects perceived ease of use, which consequently acts as a core facilitator of perceived usefulness. Therefore, the CRM acceptance measure adopted in this study is consistent with *a priori* expectations.

8.2 Methodological contribution

In addition to confirmatory testing of adopted operational measures from existing literature, there are also some novel methodological contributions made by this study. Firstly, the main methodological contribution of this study is the empirical testing of a higher-order formative composite construct in an endogenous position. Second, an uncommon approach was used to aggregate CRM acceptance data from a large number of organizations. I will discuss these two issues next.

In recent methodological articles related to structural equation modeling (SEM), the question of how to measure endogenous formative variables has been raised as a priority (Diamantopoulos et al. 2008). This study provides nascent empirical support for the functionality of the solution suggested by Cadogan & Lee (2010), following which the antecedent relationships of formative variables are measured at the formative indicator level, not the formative construct level. The core construct CRM delivery system is a 1st order reflective, 2nd order formative (Type II; Jarvis et al. 2003) composite variable, which importantly allowed for parameter estimation at the formative dimension level. The parameters for the 1st order reflective measurement models, which represented the formative dimensions of the 2nd order formative construct, remained stable in various empirical tests. Cadogan & Lee's (2010) conceptualization proved to be useful in measuring the antecedent relationships of each formative dimension, and their contribution to the formative construct as dimension weights. These measurements also remained stable across different structural model scenarios.

However, Cadogan & Lee's (2010) model is subject to the general limitations associated with formative measurement. Formative indicator weights vary across different empirical data sets and research contexts, leading to limitations regarding the generalizability of empirical findings (Bagozzi 2011). Reflective measures are thus considered more useful from a theory development perspective (Howell et al. 2007). Based on theoretical rationale, however, CRM system development is clearly a formative, multidimensional construct. Under these circumstances and based on this empirical study, Cadogan & Lee's (2010) recommended technique is currently the most fruitful approach to investigate formative variables, Type II in particular, occupying endogenous positions in structural equation models.

This study also presents an unorthodox approach to measure CRM acceptance. Typically, CRM/ SFA adoption studies have collected empirical data from one or two organizations, and the number of CRM user responses representing each organization is sufficient for quantitative analysis. In this study, it would have been desirable to assess CRM acceptance based on a large sample from each organization. However, data was collected from 161 organizations regarding CRM projects, effectively ruling out the possibility to gather the optimal amount of CRM user data due to research resource constraints.

Following the guidelines by Van Bruggen et al. (2003), this study aimed to collect CRM acceptance data from three users per organization, after which their responses were aggregated into weighted averages, improving the reliability of responses by taking into account group consensus. This study suggests that the weighted average approach is useful in research settings, which do not allow for the collection of a large number of CRM user responses per case. Although compromise with respect to the accuracy of CRM acceptance data is inevitable, this research design enables the inclusion of a large number of organizations to test for differences in CRM system development capability, CRM system quality, and their *approximate* impacts on CRM acceptance.

8.3 Managerial implications

This study has several important implications for managers and practitioners involved in different roles dealing with various aspects of CRM initiatives. These stakeholders include, for example, top executives and procurement managers responsible for CRM investment decisions; middle management responsible for CRM system development and CRM implementation efforts in the IT department and business units; and the management of CRM vendors and IT service providers.

Generally speaking, the initial CRM investment decision should be preceded by a comprehensive analysis regarding the readiness of the organization to develop a CRM system that truly fits the people and the processes that the CRM system is intended to serve. Firstly, top executives should take actions to ensure that CRM implementation is regarded as a top priority by organizational stakeholders. Starting from CRM system development, CRM implementation is a complex undertaking, which requires the full commitment of the IT department and involved business units, with the example being set by top management. Furthermore, managers should also assess whether the prospect CRM users are receptive towards the idea of adopting new CRM technology. Positive attitudes should be reinforced by communicating the benefits of CRM technology, preferably by top management.

More specifically, this study makes an important managerial contribution by providing a checklist of different IT resources, which improve the probability of successfully executing CRM system development projects and gaining CRM acceptance by employees. Managers can utilize this checklist, for example, as an intuitive toolbox to evaluate their IT resources with respect to CRM system development capability. For example, practitioners can determine whether sufficient resources have been allocated to each dimension of CRM projects. Consequently, managers can identify the strengths and weaknesses associated with each dimension, and design specific efforts to improve any dimension considered to be inadequate. Experiences from previous IS initiatives undertaken by the firm could also be utilized to reach valid conclusions. Karimi et al. (2007b) made similar managerial recommendations in the ERP context, contending that such analyses should precede any large-scale IS development project. Ill-advised CRM investments and CRM project failures could arguably be avoided following these guidelines.

In particular, managers should carefully assess and if necessary, seek ways to improve the relationship between the IT department and the client department(s) adopting the new CRM application. Inter-departmental co-operation plays a central role in the acquisition and allocation of the "right" resources needed to carry out the CRM project, which is a challenging task in practice.

From the IT management respective, responsible for CRM initiatives at the operational level, (1) appointing competent and experienced project management; (2) assembling a capable team of external consultants who are able to work with the firm's internal stakeholders; (3) providing effective training to the target user community; (4) gaining visible top management participation and commitment, and (5) involving end-users to articulate their needs and requirements; should all be top priorities as the primary determinants of CRM project success.

During CRM system development, co-operation and communication between the external and internal groups are crucial to achieve high levels of commitment, effective technological solutions, and required organizational changes. These groups may have very different working practices, motivations and goals, suggesting that managers should put a special emphasis on relationship building efforts. In particular, IT managers should pay increasing attention to the selection process of external consultants. The people skills of consultants are necessary to provide them with sufficient knowledge regarding user requirements and organizational processes. This issue may also have implications with respect to contractual agreements. Client firm managers negotiating a fixed price contract are likely to have less power over choosing consultants than in time & materials –based CRM projects. In a similar vein, the recruitment of external project management should not, if possible, be compromised by contractual agreements.

From the business unit management perspective, every effort should be made to ensure that the target CRM user community is continuously involved and trained during CRM system development to achieve satisfactory levels of CRM acceptance. In the absence of user participation and training, managers in sales, marketing, and customer service face a daunting task to convince their personnel to accept the new CRM technology. CRM project managers should especially focus on developing open communications and knowledge sharing between CRM users and consultants, which largely determines whether the technological solutions developed meet user expectations. User training, on the other hand, is needed to support the necessary learning process associated with new technologies. Technical training on learning how to use the CRM application is only one element of training; educating CRM users about the benefits of use is arguably even more important.

In conclusion, organizations can follow these guidelines to increase the likelihood of CRM technology success. Fortunately, managers have a degree of influence on an individuals' decision to adopt CRM technology by providing a CRM tool, which is both easy to use as well as useful for job performance. However, managers should keep in mind a superior CRM system does not guarantee that users will accept and use it in their daily job routines. Resources should be secured towards the provision of technical support on an ongoing basis. Managers should also make an attempt to create a good "reputation" for using CRM within the organization, for instance, by gaining sponsorship from opinion leaders, high-performing individuals and supervisors. Although admittedly difficult, managers should also formulate action plans to promote employees' positive attitudes towards information technology utilization, and to decrease resistance and fears related to technology and change in work routines. Managers should revise corporate reward systems accordingly to acknowledge and provide incentives for desirable behaviors with regard to CRM use. Persuading employees to leave behind the comfort of the "status quo" is perhaps is the greatest managerial challenge of all.

8.4 Study limitations and generalizability of results

There are several limitations in this study that should be taken into account. Firstly, the population under investigation consisted of client organizations (at SBU level) in the private and public sectors based in Finland using CRM technology, excluding small enterprises. The sample was assessed to represent the population well, although organizations in the public sector appeared to have less successful CRM projects. Therefore, the sample is more applicable to the private sector; CRM system development capability in public organizations should be studied separately.

Since the study focused exclusively on Finland-based organizations, the findings are not necessarily applicable to other geographical contexts. In addition, the CRM projects included in the sample were relatively small by international standards, with user environments below 50 forming almost half of the sample. On the other hand, no significant differences were found between small and large CRM projects with respect to outcome variables.

Second, the sample size (N=161) in this study is considered small in SEM. The reliability of empirical results would have benefited from a larger sample. However, the sample size exceeded the minimum thresholds for PLS-SEM (Barclay et al. 1995). Taking into consideration that the final set of empirical data contained responses from both IT managers as well as from multiple CRM users per each case, the sample size may be considered satisfactory.

Third, this study examined CRM system development from the client firm perspective. A dyadic approach with the external partner perspective included would have provided a more complete picture of CRM system development, which is an inter-organizational phenomenon.

Fourth, single key informants were used in the first questionnaire, which assessed the firm's IT resource endowments as predictors, and the dimensions of CRM system development and CRM project performance as dependent variables. However, common method bias was tested for and was not detected. Using multiple informants would have been very difficult due to the specialized knowledge required from informants. The respondents were thus carefully chosen and assessed with respondent competency measures. Furthermore, the second questionnaire further validated the results of the first questionnaire, which significantly decreased the risk of common method bias.

Fifth, the responses were based on subjective evaluations. Unfortunately, "soft" quality measures are difficult to measure objectively. The only exception in this study was CRM process performance, which was measured subjectively and objectively in terms of time and cost. Furthermore, the data collected was based on retrospective reports, which in some cases required recollection of events that had occurred several years earlier. It is evident that the reliability of such accounts is compromised to some extent.

Sixth, this study adopted a cross-sectional design, which implies that causal relationships between constructs cannot be determined; the empirical data merely represents a snapshot in time. One could argue, though, that the hypothesized relationships in this study are causal in a less strict definition. For example, CRM system development must occur before the CRM system is completed, after which users gain experiences interacting with it. In any case, the cross-sectional design does not provide any information regarding the dynamic properties and processes of the constructs under investigation.

Finally, the generalizability of the results is affected by a number of limitations. As mentioned earlier, the restricted geographical scope of the study warrants a certain degree of caution. In addition, CRM system development was operationalized with a new measure CRM delivery system, which has not been empirically tested beyond the present study. The new measure is a formative construct, suggesting that the generalizability of results is compromised as the empirical results would vary across different samples. On the other hand, the generalizability of the CRM delivery construct is arguably improved by measuring its formative dimensions as reflective measurement models, allowing for the assessment of measurement error. Lastly, PLS path modeling was used as the primary analysis method, which emphasizes prediction over theory testing. Since PLS-SEM calculates parameter estimates to maximize exogenous constructs' predictive power on endogenous constructs, the generalizability of PLS-SEM results is generally considered to be lower than those produced by covariance-based SEM.

8.5 Suggestions for future research

As is the case in most academic research, this study was forced to employ a narrow theoretical, methodological, and empirical scope to examine a single aspect of the phenomenon of interest. This study raised a number of interesting issues related to CRM system development, which would be worthy of further investigation in future studies.

The novel contribution of this study is the resource-based conceptualization of the CRM system development concept, and its empirical validation through the CRM delivery system (CRMDS) measure. This operational measure is new, and future studies should further test and validate CRM delivery system in different research settings. In order to improve the generalizability of the formative composite variable CRM delivery system, future studies could also test CRM delivery system with predetermined dimension weights. These weights could be predetermined as equal weightings (Cadogan & Lee 2010) or predetermined based on theoretical considerations (Howell et al. 2007), for instance.

Another promising avenue for future research would be to study CRM system development in longitudinal studies, particularly qualitative case study research. This dissertation represents static, variance-based factor research, which simplifies the realities of CRM system development. Case studies would increase our understanding of how IT resources interact and evolve in CRM initiatives. Further research into the capability-building mechanism of rent creation, and the role of internal relationships in CRM system development would especially benefit from a process research approach.

In a broader context, RBV researchers in marketing, IS and strategic management should explore the conceptual and empirical feasibility of the operational resource perspective, and examining the relationships between resource hierarchies, such as component resources and higher-order resource bundles (Kraaijenbrink et al. 2010). In the CRM context, more research is needed to identify the antecedents of the firm's capability to develop CRM systems. In addition to relationship capital between stakeholders, how can organizations improve their ability to acquire the right mix of IT resources for CRM projects?

In a similar vein, CRM research should identify moderating variables affecting the success of CRM system development efforts. For example, examining the potential moderating effects of social norms and individual characteristics on the relationship between CRM system development and CRM acceptance could provide useful insights. Alternatively, investigating whether CRM system development influences social and individual factors may reveal connections between these known predictors of CRM acceptance.

Future studies should also assess the role of technical factors (Davis 1989; Davis et al. 1989; Lucas 1975), such as the quality of the CRM system, in holistic models predicting CRM acceptance. For example, technical factors could be added to Speier & Venkatesh’s (2002) SFA adoption model or Venkatesh et al.’s (2003) unified user acceptance model to determine whether technical factors impact CRM acceptance in the presence of well-established predictors, such as external social norms, individual characteristics and organizational facilitators. The inclusion of technical factors could accommodate Speier & Venkatesh’s (2002) and Venkatesh et al.’s (2003) calls for the including factors affecting the earlier stages of large-scale CRM implementations.

Experience-based CRM acceptance, in turn, could be tested as a predictor of individual performance and firm performance measures. CRM use has not received conclusive empirical support as the appropriate measure for CRM technology utilization (e.g. Avlonitis & Panagopoulos 2005; Reinartz et al. 2004). Experience-based CRM acceptance may arguably produce more consistent results in studies investigating CRM technology success in terms individual and firm performance consequences, which ultimately dictate whether committing to CRM technology investment is beneficial for firms in the first place.

9 SUMMARY

Advances in CRM technology have presented practitioners with unprecedented opportunities to acquire, manage and retain customer relationships. Consequently, firms have made significant financial investments into CRM system development aimed at developing high quality CRM applications, which are customized to meet firm-specific user requirements and organizational processes. Unfortunately, most CRM initiatives have failed to meet firms' expectations. It has been suggested that CRM technology success is primarily determined by the functionality of the CRM application and CRM acceptance by end-users, which are necessary prerequisites for building customer knowledge, and for managing customer-facing interactions efficiently and effectively. Since some firms are more successful than others in benefiting from CRM technology investments and achieving CRM acceptance among their employees, gaining a better understanding of the reasons behind such differences is an important research area from both an academic as well as from a managerial perspective.

The purpose of this study was to investigate the impact of CRM system development on CRM acceptance. The study purpose was divided into the following research objectives: (1) to propose and empirically test a parsimonious conceptualization of CRM system development; (2) to determine whether the proposed conceptualization of CRM system development predicts CRM user acceptance; and (3) to identify which specific resources, and by what mechanisms, affect CRM system development and, ultimately, CRM acceptance.

The research model - including CRM system development, its antecedents, consequences, and moderating effects - and the related hypotheses H1-H17 were developed based on an extensive review of all relevant academic literature related to CRM system development and CRM technology success. Due to the interdisciplinary nature of the phenomena under investigation, the theoretical review covered relevant theories within marketing and information systems (IS) research. More specifically, two research streams in marketing, namely, CRM/ SFA adoption studies in sales management and CRM-performance literature in marketing, were reviewed to identify factors related to CRM technology success. Distinct areas of IS research - risk and project management theory, IT innovation research, and IT capability literature – were reviewed to develop a conceptualization of CRM system development. The resource-based view of the firm (RBV) was chosen as the most appropriate theoretical lens. RBV also provided resource-based action mechanisms to make sense of the hypothesized relationships between different resources, which were adopted as the basic units of analysis.

The methodological approach adopted in this study was the quantitative online survey method. Prior to data collection, the survey instrument was validated through questionnaire pre-testing with nine industry experts. All operational measures were adopted from prior literature. The core concept CRM system development was operationalized as "CRM delivery system (CRMDS)", a 1st order reflective, 2nd order formative composite variable. The population under investigation was client firms (at SBU level) in Finland using CRM technology, excluding small businesses. Data was collected from both aspects of CRM technology success: (1) regarding the CRM system development project from IT management; and (2) regarding post-implementation perceptions of CRM technology from end-users. Therefore, two samples were used, the first including CRM project champions within organizations, and the second including CRM users within the same organization. For the first questionnaire, the population sample consisting of 526 organizations produced 168 usable responses. Sent to multiple respondents within these 168 organizations, the second questionnaire produced 487 usable responses (N=931) from 161 organizations, i.e. an average of three CRM user responses per organization. The final sample thus consisted of 161 organizations, resulting in a respectable 31% response rate.

The primary analysis method for testing the research model and related hypotheses was Partial Least Squares (PLS) path modeling, a structural equation modeling (SEM) technique. PLS modeling was chosen because it was the most appropriate approach to analyze the research model in question, which was a complex structural model including formative constructs, with a relatively small sample size, and the primary objective was prediction and new theory development. Measurement models were subject to rigorous reliability and validity testing, which showed satisfactory results. The empirical results of the structural model produced several important findings.

Firstly, the parsimonious, higher-order conceptualization of CRM system development (operationalized as CRM delivery system) predicted CRM acceptance by individuals in marketing, sales, and customer service. More specifically, 48% of the variance in perceived usefulness, the ultimate outcome variable, was explained by the research model. Second, all five dimensions – project management resources, consultant resources, training resources, top management support, and user involvement - proved to be important and distinct facets of the CRM system development concept. Third, the antecedents, firm-level IT resources, did not predict CRM system development capability with the notable exception of internal partnership quality, which had a significant effect on CRM system development through all five dimensions. Internal partnership quality alone explained 25% of the total variance in CRM system development capability. IS planning sophistication also had a modest effect on CRM system development through project management resources. Fourth, the moderating effects of IT structural risks appeared to have a weak impact on the relationships between CRM system development capability and outcome variables. Fifth, the full mediating effects of CRM system development capability and CRM system quality were highly significant, suggesting that IT resources have an impact on CRM acceptance through their targeted use in the CRM project, which combines project-level IT resources into CRM system development capability, resulting in a high quality CRM system with functionalities customized to meet firm-specific needs in terms of fit with target users and organizational processes. In conclusion, the final purified research model proved to be a reliable and valid representation of CRM system development, its antecedents and consequences, which can be used to predict CRM acceptance by individuals.

The main theoretical contribution of this work was the parsimonious conceptualization of CRM system development, the identification of internal partnership quality as a vital antecedent of CRM system development capability, and the empirical confirmation that CRM system development, as conceptualized in this dissertation, did predict CRM acceptance to a significant degree. In doing so, this study posited that incorporating technical factors into research models predicting CRM acceptance represents a complementary extension to the existing body of CRM/ SFA adoption literature. Furthermore, this study underlined that several conditions must be met to transform resources allocated to CRM projects into CRM systems accepted by the target user community. Finally, conceptualizing CRM system development as a combination of complementary project-level IT resources provides a new theoretical construct for CRM research, which can be tested empirically with its operational surrogate measure CRM delivery system. This work showed that the operational resource perspective in IT capability research is a useful approach for CRM research.

The most important methodological contribution of this study was the empirical confirmation of Cadogan & Lee's (2010) proposed solution on how to test a higher-order formative composite construct in an endogenous position in a structural equation model. Testing the antecedent relationships of CRM delivery system at the formative dimension level instead of the formative construct level produced robust results, which overcame the shortcomings typically associated with endogenous formative variable measurement. Second, this study successfully implemented a weighted average approach to aggregate CRM acceptance data from a large number of organizations. This solution provides CRM researchers with an alternative to collect CRM acceptance data from a large number of organizations when the research objectives require such an approach, without compromising the accuracy of collected CRM acceptance data too drastically for carrying out reliable analyses.

From a business practice perspective, this dissertation suggested that managers considering investing in CRM initiatives should analyze whether organizational stakeholders are positive towards CRM technology, and are willing to accept the disruptive changes in their work routines that would inevitably follow. In order to overcome these potential pitfalls, this study provided managers with a checklist of complementary IT resources required to develop successful CRM systems, which are more likely to be perceived as easy to use and useful by their employees. In particular, managers should make every effort to nurture relationships between people from IT department, business units, and external partners involved in the CRM project. Co-operation ensures that the different aspects of the CRM system development capability - project management, consultants, user training, top management support, and user involvement - can flourish as mutually reinforcing elements brought together to produce a CRM system that meets the organization’s expectations.

REFERENCES

Ahearne, Michael – Jelinek, Ronald – Rapp, Adam (2005) Moving beyond the direct effect of SFA adoption on salesperson performance: Training and support as key moderating factors. *Industrial Marketing Management*, Vol. 34, No: 4, 379−388.

Ahearne, Michael – Jones, Eli – Rapp, Adam – Mathieu, John (2008) High touch through high tech: The impact of salesperson technology usage on sales performance via mediating mechanisms. *Management Science*, Vol. 54, No: 4, 671–685.

Ahearne, Michael – Rapp, Adam (2010) The role of technology at the interface between salespeople and consumers. Journal of Personal Selling and Sales Management, Vol 30, No: 2, 111–120.

Ahearne, Michael – Rapp, Adam – Mariadoss, Babu John – Ganesan, Shankar (2012) Challenges of CRM implementation in business-to-business markets: A contingency perspective. Journal of Personal Selling and Sales Management, Vol. 32, No: 1, 117–129.

Aiken, Leona S. – West, Stephen G. (1991) *Multiple Regression: Testing and interpreting interactions.* Sage: London.

Akkermans, H. – van Helden, K. (2002) Vicious and virtuous cycles in ERP implementation: A case study of interrelations between critical success factors. *European Journal of Information Systems*, Vol. 11, 35–46.

Amit, Raphael – Schoemaker, Paul J.H. (1993) Strategic assets and organizational rent. *Strategic Management Journal*, Vol. 14, 33–46.

Anderson, James C. – Gerbing, David W. (1988) Structural equation modeling in practice: A review and recommended two-Step approach. *Psychological Bulletin*, Vol. 103, No: 3, 411–423.

Andrews, Kenneth R. (1971) *The concept of corporate strategy*. Irwin: Homewood, IL.

Argyris, Chris (1993) *On Organizational Learning*. Blackwell: Cambridge.

Armstrong, Curtis P. – Sambamurthy, V. (1999) Information technology assimilation in firms: The influence of senior leadership and IT infrastructures. *Information Systems Research*, Vol. 10, No: 4, 304–327.

Armstrong, Scott J. – Overton, Terry S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research*, Vol. 14, August 1977, 396−402.

Avlonitis, George J. – Panagopoulos, Nikolaos G. (2005) Antecedents and consequences of CRM technology acceptance in the sales force. *Industrial Marketing Management*, Vol. 34, No: 4, 355–368.

Bagozzi, Richard P. (1994) Structural equation models in marketing research: Basic principles. In: *Principles of marketing research*, ed. by R. P. Bagozzi, 317–385. Blackwell: Oxford.

Bagozzi, Richard P. (2011) Measurement and meaning in information systems and organizational research: Methodological and philosophical foundations. *MIS Quarterly*, Vol. 35, No: 2, 261–292.

Bailey, James E. – Pearson, Sammy W. (1983) Development of a tool for measuring and analyzing computer user satisfaction. *Management Science*, Vol. 29, No: 5, 530–545.

Barclay, D. W. – Higgins, C. A. – Thompson, R. (1995) The partial least squares approach to causal modeling: Personal computer adoption and use as illustration. *Technology Studies*, Vol. 2, No: 2, 285–309.

Barker, Robert M. – Gohmann, Stephan F. – Guan, Jian – Faulds, David J. (2009) Why is my sales force automation system failing? *Business Horizons*, Vol. 52, 233–241.

Barki, Henri – Hartwick, Jon (1989) Rethinking the concept of user involvement. *MIS Quarterly*, Vol. 13, March 1989, 53–63.

Barki, Henri – Hartwick, Jon (1994) Measuring user participation, user involvement, and user attitude. *MIS Quarterly*, Vol. 18, No: 1, 59–82.

Barki, Henri – Rivard, Suzanne – Talbot, Jean (1993) Toward an assessment of software development risk. *Journal of Management Information Systems*, Vol. 10, No: 2, 203–225.

Barki, Henri – Rivard, Suzanne – Talbot, Jean (2001) An integrative contingency model of software project risk management. *Journal of Management Information Systems*, 17:4, 37–69.

Barney, Jay B. (1986) Types of competition and the theory of strategy: Toward an integrative framework. *Academy of Management Review*, Vol. 11, No: 4, 791–800.

Barney, Jay B. (1991) Firm resources and sustained competitive advantage. *Journal of Management*, Vol. 17, No: 1, 99–120.

Baron, Reuben M. – Kenny, David. A. (1986) The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, Vol. 51, No: 6, 1173–1182.

Baronas, A.M.K. – Louis, M.R. (1988) Restoring a sense of control during implementation: How user involvement leads to system acceptance. MIS Quarterly, Vol. 12, No: 1, 111–124.

Baroudi, Jack J. – Olson, Margarethe H. – Ives, Blake (1986) An empirical study of the impact of user involvement on system usage and information satisfaction. *Communications of the ACM*, Vol. 29, No: 3, 232–238.

Baumgartner, Hans – Homburg, Christian (1996) Applications of structural equation modeling in marketing and consumer research: A review. *International Journal of Research in Marketing*, Vol. 13, No: 2, 139–161.

Becker, Jan U. – Greve, Goetz – Albers, Sönke (2009) The impact of technological and organizational implementation of CRM on customer acquisition, maintenance, and retention. *International Journal of Research in Marketing*, Vol. 26, 207–215.

Benjamin, Robert I. – Levinson, Eliot (1993) A framework for managing IT-enabled change. *Sloan Management Review*, Vol. 34, No: 4, 23–33.

Berry, Leonard L. (1983) Relationship marketing. In: *Emerging perspectives on services marketing*, ed. by L. Berry, G.L. Shostack & G.D. Upah, 25–28. American Marketing Association: Chicago.

Bharadwaj, Anandhi S. (2000) A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly*, Vol. 24, No: 1, 169–196.

Bhatt, Ganesh D. – Grover, Varun (2005) Types of information technology capabilities and their role in competitive advantage: An empirical study. *Journal of Management Information Systems*, Vol. 22, No: 2, 253–277.

Black, Janice A. – Boal, Kimberly B. (1994) Strategic resources: Traits, configurations and paths to sustainable competitive advantage. *Strategic Management Journal*, Vol. 15, Summer 1994, 131–148.

Blalock, Hubert M. (1964) *Causal inferences in nonexperimental research*. University of North Carolina Press: Chapel Hill.

Bogaert, Ilse – Martens, Rudy – van Cauwenbergh, Andre (1994) Strategy as a situational puzzle: The fit of components. In: *Competence-Based Competition*, ed. by G. Hamel & A. Heene, 57–76. John Wiley: Chichester.

Bollen, Kenneth A. (2007) Interpretational confounding is due to misspecification, not to type of indicator: Comment on Howell, Breivik, and Wilcox (2007). *Psychological Methods*, Vol. 12, No: 2, 219–228.

Bollen, Kenneth A. (2011) Evaluating effect, composite, and causal indicators in structural equation models. *MIS Quarterly*, Vol. 35, No: 2, 359–372.

Bollen, Kenneth – Lennox, Richard (1991) Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin*, Vol. 110, No: 2, 305–314.

Borsboom, Denny – Mellenbergh, Gideon J. – van Heerden, Jaap (2003) The theoretical status of latent variables. *Psychological Review*, Vol. 110, No: 2, 203–219.

Boulding, William – Staelin, Richard – Ehret, Michael, - Johnston, Wesley J. (2005) A customer relationship management roadmap: What is known, potential pitfalls, and where to go. *Journal of Marketing*, Vol. 69, October 2005, 155–166.

Boynton, Andrew C. – Zmud, Robert W. – Jacobs, Gerry C. (1994) The influence of it management practice on it use in large organizations. *MIS Quarterly*, Vol. 18, September 1994, 299–318.

Broadbent, Marianne – Weill, Peter – Neo, Boon Siong (1999) Strategic context and patterns of it infrastructure capability. *Journal of Strategic Information Systems*, Vol. 8, 157–187.

Bruhn, Manfred – Georgi, Dominik – Hadwich, Karsten (2008) Customer equity management as formative second-order construct. *Journal of Business Research*, Vol. 61, 1292–1301.

Buehrer, Richard. E – Senecal, Sylvain – Pullins, Ellen Bolman (2005) Sales force technology usage – reasons, barriers, and support: An exploratory investigation. *Industrial Marketing Management*, Vol. 34, No: 4, 389−398.

Bush, Alan J. – Moore, Jarvis B. – Rocco, Rich (2005) Understanding sales force automation outcomes: A managerial perspective. *Industrial Marketing Management*, Vol. 34, No: 4, 369−377.

Cadogan, John W. – Lee, Nick (2010) Improper use of endogenous formative variables. Accepted at: *Journal of Business Research*, 18 October 2010, 1–34.

Cadogan, John W. – Souchon, Anne L. – Procter, David B. (2008) The quality of market-oriented behaviors: Formative index construction. *Journal of Business Research*, Vol. 61, 1263–1277.

Carte, Traci A. – Russell, Craig J. (2003) In pursuit of moderation: Nine common errors and their solutions. *MIS Quarterly*, Vol. 27, No: 3, 479–501.

Cascio, Robert – Mariadoss, Babu John – Mouri, Nacef (2010) The impact of management commitment alignment on salespersons' adoption of sales force automation technologies: An empirical investigation. *Industrial Marketing Management*, Vol. 39, 1088–1096.

Cenfetelli, Ronald T. – Bassellier, Geneviève (2009) Interpretation of formative measurement in information systems research. *MIS Quarterly*, Vol. 33, No: 4, 689–708.

Chang, Jerry Cha-Jan – King, William R. (2005) Measuring the performance of information systems: A functional scorecard. *Journal of Management Information Systems*, Vol. 22, No: 1, 85–115.

Chang, Woojung – Park, Jeong Eun – Chaiy, Seoil (2010) How does CRM technology transform into organizational performance? A mediating role of marketing capability. *Journal of Business Research*, Vol. 63, 849–855.

Chen, Injazz J. – Popovich, Karen (2003) Understanding customer relationship management (CRM). People, process and technology. *Business Process Management Journal*, Vol. 9, No: 5, 672–688.

Chin, Wynne W. (1998) Issues and opinion on structural equation modeling. *MIS Quarterly*, Vol. 22, March 1998, 7−16.

Chin, Wynne W. – Marcolin, Barbara L. – Newsted, Peter R. (2003) A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/ adoption study. *Information Systems Research*, Vol. 14, No: 2, 189–217.

Churchill, Gilbert A., Jr. (1979) A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, Vol. 16, February 1979, 64–73.

Clemons, Eric K. – Row, Michael C. (1991) Sustaining IT advantage: The role of structural differences. *MIS Quarterly*, Vol. 15, September 1991, 275–292.

Cohen, Jacob (1988) *Statistical power analysis for the behavioral sciences*. 2nd edition, Erlbaum: Hillsdale, NJ.

Cohen, Jacob – Cohen, Patricia – West, Stephen G. – Aike, Leona S. (2003) *Applied multiple regression/correlation analysis for the behavioural sciences.* 3rd edition, Erlbaum: London.

Coltman, Tim (2007) Why build a customer relationship management capability? *Journal of Strategic Information Systems*, Vol. 16, 301–320.

Coltman, Tim – Devinney, Timothy M. – Midgley, David F. – Venaik, Sunil (2008) Formative versus reflective measurement models: Two applications of formative measurement. *Journal of Business Research*, Vol. 61, No: 12, 1250–1262.

Conner, Kathleen R. (1991) A historical comparison of resource-based theory and five schools of thought within industrial organization economics: Do we have a new theory of the firm? *Journal of Management*, Vol. 17, No: 1, 121–154.

Cooper, Randolph B. – Zmud, Robert W. (1990) Information technology implementation research: A technological diffusion approach. *Management Science,* Vol. 36, No: 2, 123–139.

Costello, Anna B. – Osborne, Jason W. (2005) Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Research Assessment and Evaluation*, Vol. 10, No: 7, 1–9.

Curtis, Richard F. – Jackson Elton F. (1962) Multiple indicators in survey research. *American Journal of Sociology*, Vol. 68, 195–204.

Davis, Fred (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, Vol. 13, No: 3, 319–339.

Davis, Fred D. – Bagozzi, Richard P. – Warshaw, Paul R. (1989) User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, Vol. 35, No: 8, 982–1003.

Day, George S. (1994) The capabilities of market-driven organizations. *Journal of Marketing*, Vol. 58, No: 4, 37–52.

Day, George S. (2003) Creating a superior customer-relating capability. *Sloan Management Review*, Vol. 44, No: 3, 77–82.

Deephouse, Christopher – Mukhopadhyay, Tridas – Goldenson, Dennis R. – Kellner, Marc I. (1996) Software processes and project performance. *Journal of Management Information Systems*, Vol. 12, No: 3, 187–205.

Dehning, Bruce – Stratopoulos, Theophanis (2003) Determinants of a sustainable competitive advantage due to an IT-enabled strategy. *Journal of Strategic Information Systems*, Vol. 12, 7–28.

DeLone, William H. – McLean, Ephraim R. (1992) Information systems success: The quest for the dependent variable. *Information Systems Research*, Vol. 3, No: 1, 60–95.

DeLone, William H. – McLean, Ephraim R. (2003) The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, Vol. 19, No: 4, 9–30.

Dewar, R.D. – Dutton, J.E. (1986) The adoption of radical and incremental innovations: An empirical analysis. *Management Science*, Vol. 32, No: 11, 1422–1433.

Diamantopoulos, Adamantios (2006) The error term in formative measurement models: Interpretation and modeling implications. *Journal of Modelling in Management*, Vol. 1, No: 1, 7–17.

Diamantopoulos, Adamantios – Riefler, Petra – Roth, Katharina P. (2008) Advancing formative measurement models. *Journal of Business Research*, Vol. 61, No: 12, 1203–1218.

Diamantopoulos, Adamantios – Siguaw, Judy A. (2006) Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management*, Vol. 17, No: 4, 263–282.

Diamantopoulos, Adamantios – Winklhofer, Heidi M. (2001) Index construction with formative indicators: An alternative to scale development. *Journal of Marketing Research*, Vol. 38, No: 2, 269–277.

Dierickx, Ingemar – Cool, Karen (1989) Asset stock accumulation and the sustainability of competitive advantage. *Management Science*, Vol. 35, No: 12, 1504–1511.

Doll, William J. – Torkzadeh, Gholamreza (1988) The measurement of end-user computing satisfaction. *MIS Quarterly*, Vol. 12, June 1988, 259–274.

Doll, William J. – Torkzadeh, Gholamreza (1989) Disrepancy model of end-user computing involvement. *Management Science*, Vol. 35, No: 10, 1151–1171.

Edwards, Jeffrey R. (2001) Multidimensional constructs in organizational behavior research: An integrative analytical framework. *Organizational Research Methods*, Vol. 4, No: 2, 144–192.

Edwards, Jeffrey R. – Bagozzi, Richard P. (2000) On the nature and direction of relationships between constructs and measures. *Psychological Methods*, Vol. 5, No: 2, 155–174.

Eisenhardt, Kathleen M. – Martin, Jeffrey A. (2000) Dynamic capabilities: What are they? *Strategic Management Journal*, Vol. 21, 1105–1121.

Erffmeyer, Robert C. – Johnson, Dale A. (2001) An exploratory study of sales force automation practices: Expectations and realities. *Journal of Personal Selling and Sales Management*, Vol. 21, No: 2, 167–175.

Ethiraj, Sendil E. – Kale, Prashant – Krishnan, M.S. – Singh, Jitendra V. (2005) Where do capabilities come from and how do they matter?

A study in the software services industry. *Strategic Management Journal*, Vol. 26, No: 1, 25–46.

Fahy, John – Smithee, Alan (1999) Strategic marketing and the resource based view of the firm. *Academy of Marketing Science Review*, Vol. 10, 1–20.

Faraj, Samer – Sproull, Lee (2000) Coordinating expertise in software development teams. *Management Science*, Vol. 46, No: 12, 1554–1568.

Feeny, David F – Willcocks, Leslie P. (1998) Core IS capabilities for exploiting information technology. *Sloan Management Review*, Vol. 39, No: 1, 9–21.

Fichman, Robert G. (2001) The role of aggregation in the measurement of IT-related organizational innovation. *MIS Quarterly*, Vol. 25, No: 4, 427–455.

Fichman, Robert G. (2004a) Going beyond the dominant paradigm for information technology innovation research: Emerging concepts and methods. *Journal of the AIS,* Vol. 5, No: 8, 314–355.

Fichman, Robert G. (2004b) Real options and IT platform adoption: Implications for theory and practice. *Information Systems Research*, Vol. 15, No: 2, 132–154.

Field, Andy P. (2005) *Discovering statistics using SPSS*. 2nd edition, Sage: London.

Fishbein, Martin – Ajzen, Icek (1975) *Belief, attitude. intention and behavior: An introduction to theory and research.* Addison-Wesley: Reading, MA.

Fjermestad, Jerry – Romano, Nicholas C. (2003) Electronic customer relationship management. Revisiting the general principles of usability and resistance – an integrative implementation framework. *Business Process Management Journal*, Vol. 9, No: 5, 572–591.

Fornell, Claes G. – Bookstein, Fred L. (1982) Two structural equation models: Lisrel and PLS applied to consumer exit-voice theory. *Journal of Marketing Research*, Vol. 19, No: 4, 440–452.

Fornell, Claes G. – Larcker, David F. (1981) Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, Vol. 18, No: 1, 39–50.

Foss, Nicolai J. (1997) Resources and strategy: A brief overview of themes and contributions. In: *Resources, Firms and Strategies*, ed. by N.J. Foss. University Press: Oxford.

Franz, Charles R. – Robey, Daniel (1986) Organizational context, user involvement, and the usefulness of information systems. *Decision Sciences*, Vol. 17, No: 2, 329–356.

Fuerst, William L. – Cheney, Paul H. (1982) Factors affecting the perceived utilization of computer-based decision support systems in the oil industry. *Decision Sciences*, Vol. 13, No: 4, 554–569.

Gable, Guy G. (1991) Consultant engagement for computer system selection: A pro-active client role in small businesses. *Information and Management*, Vol. 20, No: 2, 83–93.

Gefen, David – Straub, Detmar (2005) A practical guide to factorial validity using PLS-Graph: Tutorial and annotated example. *Communications of the Association for Information Systems*, Vol. 16, 91–109.

Gemino, Andrew – Reich, Blaize Horner – Sauer, Chris (2008) A temporal model of information technology project performance. *Journal of Management Information Systems*, Vol. 24, No: 3, 9–44.

Goodhue, Dale L. – Thompson, Ronald L. (1995) Task-technology fit and individual performance. *MIS Quarterly*, Vol. 19, June 1995, 213–236.

Gopal, Anandasivam – Sivaramakrishnan, Konduru – Krishnan, M.S. – Mukhopadhyay, Tridas (2003) Contracts in off-shore software development: an empirical analysis. *Management Science*, Vol. 49, No: 12, 1671–1683.

Granovetter, Mark (1985) Economic action and social structure: A theory of embeddedness. *American Journal of Sociology*, Vol. 91, No: 3, 481–510.

Grant, Robert M. (1991) The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, Vol. 33, No: 3, 114–135.

Grant, Robert M. (1996a) Prospering in dynamically-competitive environments: organizational capability as knowledge integration. *Organization Science*, Vol. 7, 375–387.

Grant, Robert M. (1996b) Toward a knowledge-based theory of the firm. *Strategic Management Journal*, Vol. 17, Winter 1996, 109–122.

Grover, Varun – Fiedler, Kirk – Teng, James (1997) Empirical evidence on Swanson's tri-core model of information systems innovation. *Information Systems Research*, Vol. 8, No: 3, 273–286.

Grönroos, Christian (1990) Relationship approach to marketing in service contexts: The marketing and organizational behavior interface. *Journal of Business Research*, Vol. 20, No: 1, 3–11.

Guenzi, Paolo – Georges, Laurent – Pardo, Catherine (2009) The impact of strategic account managers' behaviors on relational outcomes: An empirical study. *Industrial Marketing Management*, Vol. 38, 300–311.

Guimaraes, Tor – Igbaria, Magid – Lu, Ming-te (1992) The determinants of DSS success: An integrated model. *Decision Sciences*, Vol. 23, 409–430.

Gummesson, Evert (1987) The new marketing – developing long-term interactive relationships. *Long Range Planning*, Vol. 20, No: 4, 10–20.

Hair, Joseph F. – Black, William C. – Babin, Barry J. – Anderson, Rolph E. (1995) *Multivariate data analysis*. 4th edition, Prentice Hall: Englewood Cliffs, NJ.

Hair, Joe F. – Ringle, Christian M. – Sarstedt, Marko (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, Vol. 19, No: 2, 139–151.

Hair Joe F. – Sarstedt, Marko – Ringle, Christian M. – Mena, Jeanette A. (2011) An assessment of the use of partial least squares structural equation modeling in marketing research. Accepted in: *Journal of the Academy of Marketing Science*, 17 May 2011.

Hall, Richard (1992) The strategic analysis of intangible resources. *Strategic Management Journal*, Vol. 13, 135–144.

Hall, Richard (1993) A framework linking intangible resources and capabilities to sustainable competitive advantage. *Strategic Management Journal*, Vol. 14, 607–618.

Hamel, Gary – Heene, Aimé (1994) *Competence-based competition*. John Wiley: Chichester.

Hauser, Robert M. – Goldberger, Arthur S. (1971) The treatment of unobservable variables in path analysis. *Sociological Methodology*, Vol. 3, 81–117.

Henseler, Jörg – Ringle, Christian M. – Sinkovics, Rudolf R. (2009) The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, Vol. 20, 277–320.

Hitt, Lorin M. – Brynjolfsson, Erik (1996) Productivity, business profitability, and consumer surplus: Three different measures of information technology value. *MIS Quarterly*, Vol. 20, June 1996, 121–142.

Honeycutt, Earl D., Jr. – Thelen, Tanya – Thelen, Shawn T. – Hodge, Sharon K. (2005) Impediments to sales force automation. *Industrial Marketing Management*, Vol. 34, 313–322.

Howell, Roy D. – Breivik, Einar – Wilcox, James B. (2007) Reconsidering formative measurement. *Psychological Methods*, Vol. 12, No: 2, 205–218.

Huber, George P. – Power, Daniel J. (1985) Restrospective reports of strategic-level managers: Guidelines for increasing their accuracy. *Strategic Management Journal*, Vol. 6, 171–180.

Hulland, John (1999) Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic Management Journal*, Vol. 20, No: 2, 195–204.

Hunter, Gary K. – Perreault, William D., Jr. (2007) Making sales technology effective. *Journal of Marketing*, Vol. 71, January 2007, 16–34.

Igbaria, Magid – Parasuraman, Saroj – Pavri, Francis (1990) A path analytic study of the determinants of micro-computer usage. *Journal of Management Systems*, Vol. 2, No: 2, 1–14.

Igbaria, Magid – Pavri, Francis – Huff, Stanley (1989) Microcomputer applications: An empirical look at usage. *Information and Management*, Vol. 16, No: 4, 187–196.

Igbaria, Magid – Zinatelli, Nancy – Cragg, Paul – Cavaye, Angele L.M. (1997) Personal computing acceptance factors in small firms: A structural equation model. *MIS Quarterly*, Vol. 21, September 1997, 279–302.

Ives, Blake – Olson, Margarethe H. (1984) User involvement and MIS success: A review of research. *Management Science*, Vol. 30, No: 5, 586–603.

Ives, Blake – Olson, Margarethe H. – Baroudi, Jack J. (1983) The measurement of user information satisfaction. *Communications of the ACM*, Vol. 26, No: 10, 785–793.

James, Lawrence R. – Demaree, Robert G. – Wolf, Gerrit (1984) Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, Vol 69, No: 1, 85–98.

Jarvis, Cheryl Burke – MacKenzie, Scott B. – Podsakoff, Philip M. (2003) A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research*, Vol. 30, September 2003, 199–218.

Jaworski, Bernard J. – Kohli, Ajay K. (1993) Market orientation: Antecedents and consequences. *Journal of Marketing*, Vol. 57, No: 3, 53–70.

Jayachandran, Satish – Sharma, Subhash – Kaufman, Peter – Raman, Pushkala (2005) The role of relational information processes and technology use in customer relationship management. *Journal of Marketing*, Vol. 69, October 2005, 177–192.

Jones, Eli – Sundaram, Suresh – Chin, Wynne (2002) Factors leading to sales force automation use: A longitudinal analysis. *Journal of Personal Selling and Sales Management*, Vol. 22, No: 3, 145−156.

Järvenpää, Sirkka L. – Ives, Blake (1991) Executive involvement and participation in the management of information technology. *MIS Quarterly*, Vol. 15, No: 2, 205–227.

Jöreskog, Karl G. (1973) A general method for estimating a linear structural equation system. In: *Structural Equation Models in the Social Sciences*, ed. by A.S. Goldberger & O.D. Duncan, 255–284. Seminar Press: New York.

Jöreskog, Karl G. – Goldberger, Arthur S. (1975) Estimation of a model with multiple indicators and multiple causes of a single latent variable. *Journal of the American Statistical Association*, Vol. 70, September 1975, 631–639.

Jöreskog, Karl G. – Wold, Herman (1982) The ML and PLS techniques for modeling with latent variables: Historical and comparative aspects. In: *Systems under indirect observation, part I*, ed. by H.Wold & K.G. Jöreskog, 263–270. North- Holland: Amsterdam.

Jüttner, Uta – Wehrli, Hans-Peter (1994) Competitive advantage. Merging marketing and the competence-based perspective. *Journal of Business & Industrial Marketing*, Vol. 9, No: 4, 42–53.

Karimi, Jahangir – Somers, Toni M. – Bhattacherjee, Anol (2007a) The impact of ERP implementation on business process outcomes: A factor-based study. *Journal of Management Information Systems*, Vol. 24, No: 1, 101–134.

Karimi, Jahangir – Somers, Toni M. – Bhattacherjee, Anol (2007b) The role of information systems resources in ERP capability building and business process outcomes. *Journal of Management Information Systems*, Vol 24, No: 2, 221–260.

Keillor, Bruce D. – Bashaw, R. Edward – Pettijohn, Charles E. (1997). Salesforce automation issues prior to implementation: The relationship between attitudes toward technology, experience and productivity. *Journal of Business and Industrial Marketing*, Vol. 12, No: 3/4, 209−219.

Kim, Hyung-Su – Kim, Young-Gul (2009) A CRM performance measurement framework: Its development process and application. *Industrial Marketing Management*, Vol. 38, 477–489.

King, William R. (1988) How effective is your information systems planning? *Long Range Planning*, Vol. 21, No: 5, 103–112.

Klein, Katherine J. – Buhl Conn, Amy –Sorra, Joann Speer (2001) Implementing computerized technology: An organizational analysis. *Journal of Applied Psychology*, Vol. 86, No: 5, 811–824.

Klein, Katherine J. –Sorra, Joann Speer (1996) The challenge of innovation implementation. *Academy of Management Review*, Vol. 21, No: 4, 1055–1080.

Kogut, Bruce – Zander, Udo (1992) Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, Vol. 3, No: 3, 383–387.

Kohli, Ajay K. – Jaworski, Bernard J. (1990) Market orientation: The construct, research propositions, and managerial implications. *Journal of Marketing*, Vol. 54, No: 2, 1–18.

Kraaijenbrink, Jeroen – Spender, J-C. – Groen, Aard J. (2010) The resource-based view: A review and assessment of its critiques. *Journal of Management*, Vol. 36, No: 1, 349–372.

Kumar, Nirmalya – Stern, Louis W. – Anderson, James C. (1993) Conducting interorganizational research using key informants. *Academy of Management Journal*, Vol. 36, No: 6, 1633–1651.

Law, Kenneth S. – Wong, Chi-Sum (1999) Multidimensional constructs in structural equation analysis: An illustration using the job perception and job satisfaction constructs. *Journal of Management*, Vol. 25, No: 2, 143–160.

Law, Kenneth S. – Wong, Chi-Sum – Mobley, William H. (1998) Toward a taxonomy of multidimensional constructs. *Academy of Management Review*, Vol. 23, No: 4, 741–755.

Lee, Denis M.S. – Trauth, Eileen M. – Farwell, Douglas (1995) Critical skills and knowledge requirements of is professionals: A joint academic/ industry investigation. *MIS Quarterly*, Vol. 18, September 1995, 313–340.

Leonard-Barton, Dorothy (1988) Implementation as mutual adaptation of technology and organization. *Research Policy*, Vol. 17, No: 5, 251–267.

Leonard-Barton, Dorothy (1992) Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal*, Vol. 13, 111–125.

Leonard-Barton, Dorothy – Deschamps, Isabelle (1988) Managerial influence in the implementation of new technology. *Management Science*, Vol. 34, No: 10, 1252–1265.

Lin, Chien-Hsin – Sher, Peter J. – Shih, Hsin-Yu (2005) Past progress and future directions in conceptualizing customer perceived value. *International Journal of Service Industry Management*, Vol. 16, No: 4, 318–336.

Lohmöller, Jan-Bernd (1989) *Latent variable path modeling with partial least squares*. Physica: Heidelberg.

Lucas, Henry C. (1975) Performance and the use of an information system. *Management Science*, Vol. 21, No: 8, 908–919.

MacKenzie, Scott B. – Podsakoff, Philip M. – Jarvis, Cheryl Burke (2005) The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. *Journal of Applied Psychology*, Vol. 90, No: 4, 710–730.

MacKenzie, Scott B. – Podsakoff, Philip M. – Podsakoff, Nathan P. (2011) Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, Vol. 35, No: 2, 293–334.

Madakok, Richard (2001) Toward a synthesis of the resource-based and dynamic-capability views of rent creation. *Strategic Management Journal*, Vol. 22, 387–401.

Mahoney, Joseph T. – Pandian, Rajedran (1992) The resource-based view within the conversation of strategic management. *Strategic Management Journal*, Vol. 13, June 1992, 363–380.

Mann, Robert I. – Watson, Hugh J. (1984) A contingency model for user involvement in DSS development. *MIS Quarterly*, Vol. 8, No: 1, 27–38.

Markus, M. Lynne – Robey, Daniel (1988) Information technology and organizational change: Causal structure in theory and research. *Management Science,* Vol. 34, No: 5, 583–598.

Mata, Francisco J. – Fuerst, William L. – Barney, Jay B. (1995) Information technology and sustained competitive advantage: A resource-based analysis. *MIS Quarterly*, Vol. 19, No: 4, 487–505.

McFarlan, Warren F. (1981) Portfolio approach to information systems. *Harvard Business Review,* Vol. 59, No: 5, 142–150.

Melville, Nigel – Kraemer, Kenneth – Gurbaxani, Vijay (2004) Information technology and organizational performance: An integrative model of it business value. *MIS Quarterly*, Vol. 28, No: 2, 283–322.

Meyer, Alan D. – Goes, James B. (1988) Organizational assimilation of innovations: A multilevel contextual analysis. *Academy of Management Journal*, Vol. 31, No: 4, 897–923.

Mithas, Sunil – Krishnan M.S. – Fornell, Claes (2005) Why do customer relationship management applications affect customer satisfaction? *Journal of Marketing*, Vol. 69, October 2005, 201–209.

Moore, Gary C. – Benbasat, Izak (1991) Development of an instrument to measure perceptions of adopting an information technology innovation. *Information Systems Research*, Vol. 2, No: 3, 192–222.

Morgan, Amy J. – Inks, Scott A. (2001) Technology and the sales force. *Industrial Marketing Management*, Vol. 30, 463–472.

Narver, John C. – Slater, Stanley F. (1990) The effect of a market orientation on business profitability. *Journal of Marketing*, Vol. 54, No: 4, 20–35.

Nelson, Richard R. – Winter, Sidney G. (1982) *An evolutionary theory of economic change*. Harvard University Press: Cambridge.

Nelson, Ryan – Cheney, Paul (1987) Training end-users: An exploratory study. *MIS Quarterly*, Vol. 11, No: 4, 547–559.

Nidumolu, Sarma (1995) The effect of coordination and uncertainty on software project performance: Residual performance risk as an intervening variable. *Information Systems Research*, Vol. 6, No: 3, 191–219.

Nonaka, Ikujiro (1991) The knowledge-creating company. *Harvard Business Review*, Vol. 69, No: 6, 96–104.

Nonaka, Ikujiro – Takeuchi, Hirotaka (1995) *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press: New York.

Nunnally, Jum C. (1978) *Psychometric theory*. McGraw-Hill: New York.

Oliver, Christine (1997) Sustainable competitive advantage: Combining institutional and resource-based views. *Strategic Management Journal*, Vol. 18, No: 9, 697–714.

Olson, Margarethe H. – Ives, Blake (1981) User involvement in system design: An empirical test of alternative approaches. *Information and Management*, Vol. 4, No: 4, 183–196.

Parasuraman, A. – Zeithaml, Valarie A. – Berry, Leonard L. (1985) A conceptual model of service quality and its implications for future research. *Journal of Marketing*, Vol. 49, Fall 1985, 41–50.

Parasuraman, A. – Zeithaml, Valarie A. – Berry, Leonard L. (1988) A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, Vol. 64, No: 1, 12–40.

Park, Jeong Eun – Kim, Juyoung – Dubinsky, Alan J. – Lee, Hyunju (2010) How does sales force automation influence relationship quality and performance? The mediating roles of learning and selling behaviors. *Industrial Marketing Management*, Vol. 39, 1128–1138.

Parthasarathy, Madhavan – Sohi, Ravipreet S. (1997) Salesforce automation and the adoption of technological innovations by salespeople: Theory and implications. *Journal of Business and Industrial Marketing*, Vol. 12, No: 3/4, 196−208.

Pavlou, Paul A. – El Sawy, Omar A. (2006) From IT leveraging competence to competitive advantage in turbulent environments: The case of new product development. *Information Systems Research*, Vol. 17, No: 3, 198–227.

Payne, Adrian – Frow, Pennie (2005) A strategic framework for customer relationship management. *Journal of Marketing*, Vol. 69, October 2005, 167–176.

Penrose, Edith T. (1959) *The theory of the growth of the firm.* Basil Blackwell: New York.

Peteraf, Margaret A. (1993) The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal*, Vol. 14, No: 3, 179–191.

Petter, Stacie – Straub, Detmar – Rai, Arun (2007) Specifying formative constructs in information systems research. *MIS Quarterly*, Vol. 31, No: 4, 623–656.

Pfeffer, Jeffrey – Salancik, Gerald R. (1978) *The external control of organizations: A resource dependence perspective*. Harper and Row: New York.

Pitt, Leyland F. – Watson, Richard T. – Kavan. C. Bruce (1995) Service quality: A Measure of infomation systems effectiveness. *MIS Quarterly*, Vol. 19, No: 2. 173–188.

Podsakoff, Philip M. – MacKenzie, Scott B. – Lee, Jeong-Yeon – Podsakoff, Nathan P. (2003) Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, Vol. 88, No: 5, 879‒903.

Porter, Michael A. (1980) *Competitive strategy*. Free Press: New York.

Powell, Thomas C. – Dent-Micallef, Anne (1997) Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic Management Journal*, Vol. 18, No: 5, 375–405.

Prahalad, C. K. – Hamel, Gary (1990) The core competence of the corporation. *Harvard Business Review*, Vol. 68, No: 3, 79–91.

Prahalad, C.K. – Hamel, Gary (1994) Strategy as a field of study: Why search for a new paradigm? *Strategic Management Journal*, Vol 15, No: 1, 5–16.

Pullig, Chris – Maxham, James G. III – Hair, Joseph F., Jr. (2002) Salesforce automation systems. An exploratory examination of organizational factors associated with effective implementation and salesforce productivity. *Journal of Business Research*, Vol. 55, 401–415.

Rai, Arun – Lang, Sandra S. – Welker, Robert B. (2002) Assessing the validity of IS success models: An empirical test and theoretical analysis. *Information Systems Research*, Vol. 13, No: 1, 50–69.

Ramachandran, Vandana – Gopal, Anandasivam (2010) Managers' judgments of performance in it services outsourcing. *Journal of Management Information Systems*, Vol. 26, No: 4, 181–218.

Rangarajan, Deva – Jones, Eli – Chin, Wynne (2005) Impact of sales force automation on technology-related stress, effort, and technology usage among salespeople. *Industrial Marketing Management*, Vol. 34, No: 4, 345–354.

Rapp, Adam – Trainor, Kevin J. – Agnihotri, Raj (2010) Performance implications of customer-linking capabilities: Examining the complementary role of customer orientation and CRM technology. *Journal of Business Research*, Vol. 63, 1229–1236.

Ravichandran, T. – Lertwongsatien, Chalermsak (2005) Effect of information systems resources and capabilities on firm peformance: A resource-based perspective. *Journal of Management Information Systems*, Vol. 21, No: 4, 237–276.

Ray, Gautam – Muhanna, Waleed A. – Barney, Jay B. (2005) Information technology and the performance of the customer service process: A resource-based analysis. *MIS Quarterly*, Vol. 29, No: 4, 625–652.

Reed, R. – DeFilippi, R. (1990) Causal ambiguity, barriers to imitation, and sustainable competitive advantage. *Academy of Management Review*, Vol. 15, No: 1, 88–102.

Reinartz, Werner – Haenlein, Michael – Henseler, Jörg (2009). An empirical comparison of the efficacy of covariance-based and variance-based SEM. *International Journal of Market Research*, Vol. 26, No: 4, 332–344.

Reinartz, Werner – Krafft, Manfred – Hoyer, Wayne D. (2004) The customer relationship management process: Its measurement and impact on performance. *Journal of Marketing Research*, Vol. 41, August 2004, 293–305.

Ringle, Christian M. – Wende, Sven – Will, Alexander (2005) SmartPLS 2.0 (Beta) software. SmartPLS: Hamburg (available at www.smartpls.de).

Rivers, L. Mark – Dart, Jack (1999) Sales technology applications: the acquisitions and use of sales force automation by mid-sized manufactures. *Journal of Personal Selling and Sales Management*, Vol. 19, No: 2, 59–73.

Robinson, Leroy, Jr. – Marshall, Greg W. – Stamps, Miriam B. (2005) An empirical investigation of technology acceptance in a field sales force setting. *Industrial Marketing Management*, Vol. 34, No: 4, 407–415.

Rockart, John F. – Earl, Michael J. – Ross, Jeanne W. (1996) Eight imperatives for the new IT organization. *Sloan Management Review*, Vol. 37, Fall 1996, 43–55.

Rogers, Everett M. (1995) *Diffusion of innovations*. 4th edition. Free Press: New York.

Ross, Jeanne W. – Beath, Cynthia Mathis – Goodhue, Dale L. (1996) Develop long-term competitiveness through IT assets. *Sloan Management Review*, Vol. 37, Fall 1996, 31–42.

Rossiter, John R. (2002) The C-OAR-SE procedure for scale development in marketing. *International Journal of Research in Marketing*, Vol. 19, No: 4, 305–335.

Ruiz, David Martín – Gremler, Dwayne D. – Washburn, Judith H. – Carrión, Gabriel Cepeda (2008) Service value revisited: Specifying a higher-order, formative measure. *Journal of Business Research*, Vol. 61, 1278–1291.

Rumelt, Richard P. (1984) Toward a strategic theory of the firm. In: *Competitive Strategic Management*, ed. by R. Lamb, 556–570. Prentice Hall: Englewood Cliffs, NJ.

Ryals, Lynette – Knox, Simon (2001) Cross-functional issues in the implementation of relationship marketing through customer relationship management. *European Management Journal*, Vol. 19, No: 5, 534–542.

Ryan, H.W. (1999) Managing development in the era of large complex systems. *Information Systems Management*, Vol. 16, No: 2, 89–91.

Sabherwal, Rajiv – Robey, Daniel (1993) An empirical taxonomy of implementation processes based on sequences of events in information system development. *Organization Science*, Vol. 4, No: 4, 548–576.

Sambamurthy, V. – Bharadwaj, Anandhi S. – Grover, Varun (2003) Shaping agility through digital options: Reconceptualizing the role of IT in contemporary firms. *MIS Quarterly*, Vol. 27, No: 2, 237–263.

Sanchez, Ron – Heene, Aimé (1997) Reinventing strategic management: new theory and practice for competence-based competition. *European Management Journal*, Vol. 15, No: 3, 303–317.

Sanders, L.G. – Courtney, James F. (1985) A field study of organizational factors influencing DSS success. *MIS Quarterly*, Vol. 9, No: 1, 77–93.

Santhanam, Radhika – Hartono, Edward (2003) Issues in linking information technology capability to firm performance. *MIS Quarterly*, Vol. 27, No: 1, 125–153.

Schillewaert, Niels – Ahearne, Michael J. – Frambach, Ruud T. – Moenaert, Rudy K. (2005) The adoption of information technology in the sales force. *Industrial Marketing Management*, Vol. 34, No: 4, 323–336.

Seddon, Peter B. (1997) A respecification and extension of the DeLone and McLean model of IS success. *Information Systems Research*, Vol. 8, No: 3, 240–253.

Segars, Albert H. – Grover, Varun (1993) Re-examining perceived ease of use and usefulness: A confirmatory factor analysis. *MIS Quarterly*, Vol. 17, 517–525.

Segars, Albert H. – Grover, Varun (1998) Strategic information systems planning success: An investigation of the construct and its measurement. *MIS Quarterly*, Vol. 22, June 1998, 139–163.

Segars, Albert H. – Grover, Varun – Teng, James T.C. (1998) Strategic information systems planning: Planning system dimensions, internal coalignment, and implications for planning effectiveness. *Decision Sciences*, Vol. 29, No:2, 303–345.

Senge, Peter (1990) *The fifth discipline: The age and practice of the learning organization*. Century Business: London.

Siemsen, E. – Roth, A. – Oliveira, P. (2010) Common method bias in regression models with linear, quadratic, and interaction effects. *Organizational Research Methods*, Vol. 13, No: 3, 456–476.

Silver, Mark S. – Markus, M. Lynne – Beath, Cynthia Mathis (1995) The information technology interaction model: a foundation for the MBA core course. *MIS Quarterly*, Vol. 19, September 1995, 361–390.

Simon, Herbert (1991) Bounded rationality and organizational learning. *Organization* Science, Vol. 2, No: 1, 125–134.

Speier, Cheri – Venkatesh, Viswanath (2002) The hidden minefields in the adoption of sales force automation technologies. *Journal of Marketing*, Vol. 66, No: 3, 98−111.

Srinisavan, Raji – Moorman, Christine (2005) Strategic firm commitments and rewards for customer relationship management in online retailing. *Journal of Marketing*, Vol. 69, October 2005, 193–200.

Stalk, George – Evans, Philip – Schulman, Lawrence E. (1992) Competing on capabilities: The new rules of corporate strategy. *Harvard Business Review*, Vol. 70, No: 2, 57–69.

Statistics Finland (2008) TOL 2008 standard industrial classification by Tilastokeskus. <http://www.stat.fi/til/tol2008_en.html>, retrieved 20 November 2011).

Statistics Finland (2010) Use of information technology in enterprises 2010 by Tilastokeskus. <http://www.stat.fi/til/icte/2010/index.html>, retrieved 20 November 2011.

Swanson, Burton E. (1994) Information systems innovation among organizations. *Management Science*, Vol. 40, No: 9, 1069–1092.

Teece, David – Pisano, Gary – Shuen, Amy (1997) Dynamic capabilities and strategic management. *Strategic Management Journal*, Vol. 18, No: 7, 509–533.

Tenenhaus, Michel – Esposito Vinzi, Vincenzo – Chatelin, Yves Marie – Lauro, Carlo (2005) PLS path modeling. *Computational Statistics and Data Analysis*, Vol. 48, 159−205.

Tippins, Michael J. – Sohi, Ravipreet S. (2003) IT competency and firm performance: Is organizational learning a missing link? *Strategic Management Journal*, Vol. 24, No: 6, 745–761.

Ulaga, Wolfgang – Eggert, Andreas (2006) Value-based differentiation in business relationships: Gaining and sustaining key supplier status. *Journal of Marketing*, Vol. 70, January 2006, 119–136.

Van Bruggen, Gerrit H. – Lilien, Gary L. – Kacker, Manish (2002) Informants in organizational marketing research: why use multiple informants and how to aggregate responses. *Journal of Marketing Research*, Vol. 39, 469–478.

Venkatesh, Viswanath (2000) Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, Vol. 11, No: 4, 342–365.

Venkatesh, Viswanath – Davis, Fred D (2000) A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, Vol. 46, No: 2, 186–204.

Venkatesh, Viswanath – Morris, Michael G. – Davis, Gordon B. – Davis, Fred D. (2003) User acceptance of information technology: Toward a unified view. *MIS Quarterly*, Vol. 27, No: 3, 425–478.

Venkatraman, N. (1985) Research on MIS planning: Some guidelines from strategic planning research. *Journal of Management Information Systems*, Vol. 2, No: 3, 65–77.

Venkatraman, N. – Ramanujam, Vasudevan (1987) Planning system success: A conceptualization and an operational model. *Management Science*, Vol. 33, No: 6, 687–705.

Wade, Michael – Hulland, John (2004) The resource-based view and information systems research: Review, extension, and suggestions for future research. *MIS Quarterly*, Vol. 28, No: 1, 107–142.

Wallace, Linda – Keil, Mark – Rai, Arun (2004) How software project risk affects project performance: An investigation of the dimensions of risk and an exploratory model. *Decision Sciences*, Vol. 35, No: 2, 289–321.

Webster, Frederick E., Jr. (1988) Rediscovering the marketing concept. *Business Horizons*, Vol. 31, No: 3, 29–39.

Weitz, Barton A. – Sujan, Harish – Sujan, Mita (1986) Knowledge, motivation, and adaptive behavior: A framework for improving selling effectiveness. *Journal of Marketing*, Vol. 50, No: 4, 174–191.

Wernerfelt, Birger (1984) A resource-based view of the firm. *Strategic Management Journal*, Vol. 5, No: 2, 171–180.

Wetzels, Martin – Odekerken-Schroder, Gaby – van Oppen, Claudia (2009) Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Quarterly*, Vol. 33, No: 1, 177–195.

Wilcox, James B. – Howell, Roy D. – Breivik, Einar (2008) Questions about formative measurement. *Journal of Business Research*, Vol. 61, 1219–1228.

Wold, Herman (1982) Soft modeling: the basic design and some extensions. In: *Systems under indirect observations: Part I*, ed. by K.G. Jöreskog & H. Wold, 1–54. North-Holland: Amsterdam.

Yim, Frederick Hong-kit H. – Anderson, Rolph E. – Swaminathan, Srinisavan (2005) Customer relationship management: Its dimensions and effect on customer outcomes. Journal of Personal Selling and Sales Management, Vol. 24, No: 4, 263–278.

Zablah, Alex R. – Bellenger, Danny N. – Johnston, Wesley J. (2004a) An evaluation of divergent perspectives on customer relationship management: Towards a common understanding of an emerging phenomenon. *Industrial Marketing Management*, Vol. 33, 475–489.

Zablah, Alex R. – Bellenger, Danny N. – Johnston, Wesley J. (2004b) Customer relationship management implementation gaps. *Journal of Personal Selling and Sales Management*, Vol. 24, No: 4, 279–295.

Zablah, Alex R. – Bellenger, Danny N. – Straub, Detmar W. – Johnston, Wesley J. (2012) Performance implications of CRM technology use: A multi-level field study of business customers and their providers in the telecommunications industry. *Information Systems Research*, Vol. 23, No: 2, 418–435.

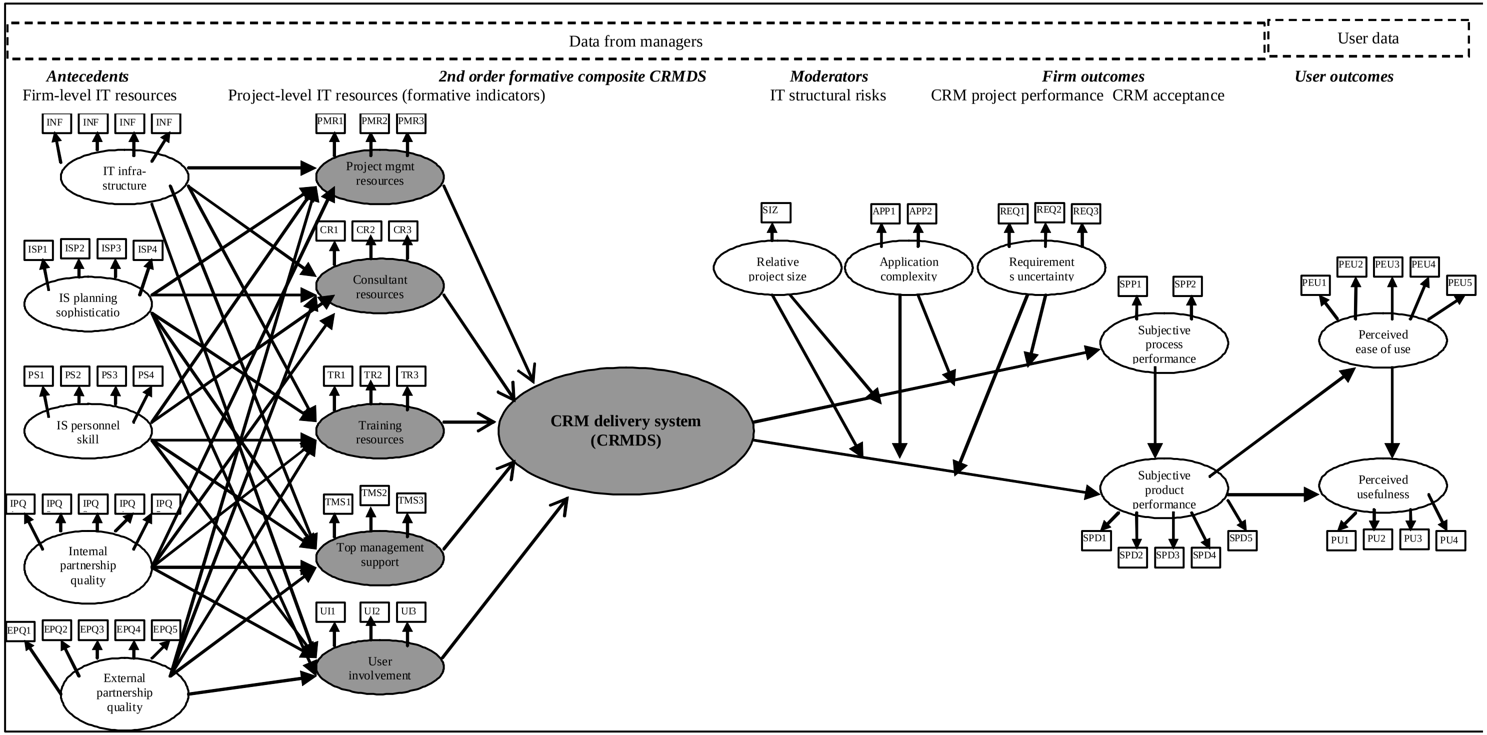
Zmud, Robert W. (1980) Management of large software development efforts. *MIS Quarterly*, Vol. 4, June 1980, 45–55.

APPENDICES

Appendix 1 Construct acronyms

Acronym	Construct
INF	IT infrastructure
ISP	IS planning sophistication
PS	IS personnel skill
IPQ	Internal partnership quality
EPQ	External partnership quality
CRMDS	CRM delivery system
PMR	Project management resources
CR	Consultant resources
TR	Training resources
TMS	Top management support
UI	User involvement
SPP	Subjective process performance
SPD	Subjective product performance
PEOU	Perceived ease of use
PU	Perceived usefulness
SIZ	Relative project size
APP	Application complexity
REQ	Requirements uncertainty

Appendix 2 Measurement models and structural model



Appendix 3 Preliminary email regarding consent for participation

HYVÄ VASTAANOTTAJA

Teen väitöskirjaa **CRM-toimitusprojekteista Suomessa asiakkaan näkökulmasta.** Tutkimuksen tarkoituksena on selvittää liiketoimintayksikköjen IT-resurssien, CRM-projektien resurssien ja projektien lopputulosten välisiä suhteita. Tutkimus toteutetaan yhteistyössä Tietotekniikan Liiton kanssa.

Tämä on **osallistumispyyntö** sähköpostikyselyyn, joka on lähetetty yli 1000 liiketoimintayksikölle Suomessa. **Vastaaminen pyyntöön vie vain muutaman sekunnin ajastanne.**

Pyydän teitä vastaamaan pyyntöön sähköpostin lopussa olevasta Webropol-linkistä:
”**Kyllä**” jos haluatte osallistua tutkimukseen.
”**Ei**” jos teillä ei ole CRM-järjestelmää tai ette muusta syystä halua osallistua.

Lähetän web-pohjaisen kyselylomakkeen ”Kyllä” -vastauksen antaneille maaliskuussa. Kyselyn täyttää 10 minuutissa. Mikäli liiketoimintayksikössänne on toinen henkilö, joka osaa paremmin vastata CRM-projektia koskeviin kysymyksiin, pyydän teitä antamaan **vastaajan sähköpostiosoitteen** saman Webropol-linkin kautta.

Tutkimus on ehdottoman luottamuksellinen. Vastaajien henkilöllisyys on ainoastaan allekirjoittaneen tiedossa. Tulokset tullaan esittämään vain tilastollisina yhteenvetoina, jolloin vastaajien yksityisyys on täysin suojattu.

Jokainen kyselyyn osallistunut saa sähköpostitse loppuraportin tutkimuksen valmistuttua. Uskon, että loppuraportti sisältää myös teitä kiinnostavaa tietoa sovellusten toimitusprojekteista.

Kiitos jo etukäteen vastauksestanne!

Samppa Suoniemi
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Appendix 4 Cover letter for first questionnaire

HYVÄ KYSELYYN VASTAAJA

Haluan aluksi kiittää Teitä siitä, että liiketoimintayksikkönne suostui osallistumaan väitöskirjaani liittyvään kyselytutkimukseen, joka käsittelee CRM-projekteja Suomessa asiakkaan näkökulmasta. Tutkimuksen tarkoituksena on selvittää liiketoimintayksiköjen IT-resurssien, CRM-projektien resurssien ja CRM-projektien lopputulosten välisiä suhteita.

Mikäli ette itse saaneet osallistumispyyntöä viime viikkojen aikana, toinen henkilö organisaatiossanne on nimennyt Teidät vastaamaan kyselyyn siihen parhaiten soveltuvana henkilönä. Vastaajalla tulee olla vähintään kohtuullinen tuntemus liiketoimintayksikkönne IT-resursseista ja nykyisen CRM-järjestelmänne toimitusprojektista. Mikäli ette sittenkään ole oikea henkilö, pyydän Teitä välittämään tämän viestin eteenpäin oikealle henkilölle.

Lähetän tässä teille sähköisen web-pohjaisen kyselylomakkeen. **Pyydän teitä vastaamaan kyselyyn sähköpostin lopussa olevasta Webropol-linkistä.** Kyselylomakkeen huolellinen täyttäminen onnistuu 10 minuutissa.

Vastatkaa kysymyksiin omaan arviointiinne perustuen. On tärkeää, että vastaatte jokaiseen kysymykseen. Voitte lähettää valmiit vastauksenne painamalla ”Lähetä” –linkkiä, joka löytyy kyselylomakkeen lopusta.

Tutkimus on ehdottoman luottamuksellinen. Vastaajien henkilöllisyys on ainoastaan allekirjoittaneen tiedossa. Tulokset tullaan esittämään vain tilastollisina yhteenvetoina, jolloin vastaajien yksityisyys on täysin suojattu.

Jokainen kyselyyn osallistunut saa sähköpostitse loppuraportin tutkimuksen valmistuttua. CRM-projektit eivät usein toteudu suunnitellussa budjetissa, aikataulussa ja/tai CRM-järjestelmän toteutuneiden hyötyjen ja käyttäjäkokemuksen osalta. Uskon, että loppuraportti sisältää myös teitä kiinnostavaa tietoa sovellusten toimitusprojekteista.

Kiitos jo etukäteen vastauksestanne!

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Appendix 5 First questionnaire

TUTKIMUS CRM-JÄRJESTELMIEN IMPLEMENTOINTIPROJEKTEISTA

TURUN KAUPPAKORKEAKOULU
Turku School of Economics

Tämän kyselytutkimus keskittyy CRM-järjestelmien implementointiprojekteihin Suomessa liiketoimintayksikkö-tasolla. Mikäli yrityksessänne ei ole liiketoimintayksikköjä, vastatkaa kysymyksiin yritys-tasolla.

Kyselyssä on yhteensä 4 sivua kattaen seuraavat osa-alueet: taustatietoja (sivu 1), yleiset IT-resurssit (sivu 2), CRM-projektin käytössä olleet resurssit (sivu 3), CRM-projektin riskit (sivu 4), CRM-projektin tulokset (sivu 4)

Taustatietoja

Seuraavat kysymykset ovat yleisiä kysymyksiä liittyen itseenne, liiketoimintayksikköönne ja CRM-järjestelmäänne. (sivu 1)

Tehtävänimikkeenne on

valitse (tehtävänimike)

Kuinka monta vuotta olette olleet tämänhetkisen työnantajanne palveluksessa?

valitse (vuotta)

Liiketoimintayksikkönne vuotuinen liikevaihto (miljoonaa euroa) on:

valitse (miljoonaa euroa)

Liiketoimintayksikkönne toimiala on:

valitse (toimiala)

Liiketoimintayksikkönne nykyinen CRM-järjestelmä on ollut tuotantokäytössä:

valitse (tuotantokäyttö)

Liiketoimintayksikkönne nykyisen CRM-järjestelmän loppukäyttäjien lukumäärä on:

valitse (käyttäjämäärä)

Mitkä ovat CRM-järjestelmänne käyttötarkoitukset?

Valitse yksi tai useampi vaihtoehto

Myynnin tuki · Markkinoinnin tuki · Asiakaspalvelun tuki · Analysointityökalu

Liiketoimintayksikkönne nykyinen CRM-järjestelmä on tyypiltään:

Client / server (CRM-on-Premise) · Pilvipalveluna ostettu CRM (CRM-on-Demand)

CRM-järjestelmän implementoinnista vastaavassa tiimissä oli omasta henkilökunnastanne mukana:

valitse (oma henkilökunta)

CRM-järjestelmän implementoinnista vastaavassa tiimissä oli ulkopuolisia konsultteja mukana:

valitse (konsultit)

IT-resurssien ja CRM-projektin tuntemus

1=en kovin hyvin? 2=melko hyvin? 3=erittäin hyvin

	1	2	3
Kuinka hyvin yleisesti ottaen tunnette liiketoimintayksikkönne IT-resurssit?			
Kuinka hyvin yleisesti ottaen tunnette CRM-järjestelmänne implementointiprojektin?			

Yleiset IT-resurssit

Seuraavat kysymykset ja väittämät liittyvät liiketoimintayksikkönne yleisiin IT-resursseihin, joiden jaottelu on seuraava: IT-infrastruktuuri, IT-järjestelmien suunnittelu, IT-henkilökunnan tietotaito, sisäisten kumppanuuksien laatu, ulkoisten kumppanuuksien laatu. Valitse numero, joka parhaiten vastaa näkemystäsi välillä 1 ja 7. (sivu 2)

IT-infrastruktuuri

1 = erittäin vähän ..... 7 = erittäin paljon

	1	2	3	4	5	6	7
Missä määrin järjestelmät ovat modulaarisia?							
Missä määrin järjestelmät ovat skaalattavia?							
Missä määrin järjestelmät ovat läpinäkyviä?							
Missä määrin järjestelmät kykenevät käsittelemään useita sovelluksia?							

IT-järjestelmien suunnittelu

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Liiketoimintaosastojen osallistuminen IT-järjestelmien suunnitteluprosessiin on hyvin korkea.							
IT-järjestelmän suunnittelu alkaa ylimmän johdon aloitteesta? ylimmän johdon osallistuminen IT-järjestelmän suunnitteluun on hyvin korkea.							
Meillä on muodolliset menetelmät IT-järjestelmien suunnittelussa.							
Suunnittelumenetelmämme sisältävät monia ohjeita varmistaakseen, että kriittiset liiketoiminta-, organisationaaliset and teknologiset asiat otetaan huomioon IT-järjestelmäsuunnitelman kehittämisessä.							

IT-henkilökunnan tietotaito

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
IT-henkilökunnallamme on erittäin hyvä tekninen tietämys? he edustavat yhtä parhaista teknisistä ryhmistä, joka IT-osastolla voisi olla.							
IT-henkilökunnallamme on kyky nopeasti oppia ja soveltaa úusia teknologioita niiden tullessa saataville.							
IT-henkilökunnallamme on taidot ja tiedot IT-projektien johtamiseen nykyisessä liiketoimintaympäristössä.							
IT-henkilökunnallamme on kyky työskennellä tiiviisti asiakkaiden kanssa ja ylläpitää tuottavia loppukäyttäjä- ja asiakassuhteita.							

Sisäisten kumppanuuksien laatu

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Kriittistä informaatiota ja tietoa, jotka vaikuttavat IT-projekteihin, jaetaan vapaasti liiketoimintaosastojemme ja IT-osastomme välillä.							
IT-osastomme ja liiketoimintaosastomme ymmärtävät toistensa työympäristöt erittäin hyvin.							
Korkea luottamus vallitsee IT-osastomme ja liiketoimintaosastojemme välillä.							
Tavoitteet ja suunnitelmat IT-projekteille kehitetään yhdessä sekä IT-osaston että liiketoimintaosastojen toimesta.							
Ristiriidat IT-osaston ja liiketoimintaosastojen välillä ovat harvinaisia organisaatiossamme.							

Ulkoisten kumppanuuksien laatu

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Meillä on harvoin ristiriitoja IT-toimittajiemme ja IT-palveluntarjoajiemme kanssa.							
Saamme ajankohtaista informaatiota toimittajiltamme odottamattomista ongelmista, jotka voisivat vaikuttaa heidän kykyynsä tyydyttää teknologiatarpeemme.							
Voimme luottaa siihen, että IT-toimittajamme ja -palveluntarjoajamme vastaavat IT-tarpeisiimme nopeasti ja tehokkaasti.							
Hyvin luottavainen suhde vallitsee IT-osaston ja tärkeimpien IT-toimittajiemme sekä -palveluntarjoajiemme välillä.							
Meillä on pitkäaikaiset kumppanuudet tärkeimpien IT-toimittajiemme ja -palveluntarjoajiemme kanssa.							

CRM-projektin käytössä olleet resurssit

Seuraavat väittämät liittyvät CRM-projektinne käytössä olleisiin resursseihin, jotka on jaettu seuraaviin osa-alueisiin: projektijohtamisresurssit, konsulttiresurssit, koulutusresurssit, ylimmän johdon tuki, loppukäyttäjien osallistuminen. (sivu 3)

Projektijohtamisresurssit

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Muodollisia projektijohtamisen työkaluja ja tekniikoita käytettiin tässä projektissa.							
Projektimanagerit projektin johdossa olivat hyvin kyvykkäitä ja kokeneita.							
Implementoinnin aikataulu oli realistinen.							

Konsulttiresurssit

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Kokeneet konsultit ohjasivat meitä koko projektin ajan.							
Ulkoiset konsultit olivat harjaantuneita liiketoimintaprosesseihimme.							
Ulkoiset konsultit toivat huomattavasti asiantuntemusta ja kokemusta projektiimme.							

Koulutusresurssit

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Merkittävästi aikaa ja resursseja sijoitettiin työntekijöiden kouluttamiseen uuden järjestelmän käyttämisessä.							
Riittävästi koulutusta työpaikalla tarjottiin sisäisille loppukäyttäjäryhmille käyttää uutta järjestelmää.							
Sekä teknologia- että prosessikoulutusta tarjottiin järjestelmää käyttäville työntekijöille.							

Ylimmän johdon tuki

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Ylimmän johdon edustajat osoittivat paljon innostusta ja kiinnostusta koko projektin ajan.							
Ylemmän tason managerit olivat henkilökohtaisesti mukana projektissa.							
Kokonaisuudessaan johdon tuki tässä projektissa oli varsin korkea.							

Loppukäyttäjien osallistuminen

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Loppukäyttäjäyhteisö osallistui koko (CRM) implementointiprojektin ajan.							
Loppukäyttäjät osallistuivat järjestelmän tarpeiden ja suorituskyvyn määrittelemiseen.							
Loppukäyttäjät osallistuivat syöte/tuotos ("input/output") -tarpeiden tunnistamiseen.							

CRM-projektin riskit

Seuraavat kysymykset ja väittämät liittyvät CRM-projektinne riskeihin. (sivu 4)

Mikä oli CRM-projektinne laskutusmalli?

- Laskutus ajankäytön ja materiaalien perusteella.
- Laskutus urakkaperusteisesti.

Missä määrin olette samaa mieltä tai eri mieltä seuraavien väittämien kohdalla? Valitse numero, joka parhaiten vastaa näkemystäsi välillä 1 ja 7.

Projektin suhteellinen koko, sovelluksen kompleksisuus ja vaatimusten epävarmuus

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Projektin koko oli suuri verrattuna muihin toteuttamiimme (asiakkaana) viimeisen kolmen vuoden aikana.							
Sovelluksen piti integroitua muiden sovellusten kanssa.							
Teknologia piti liittää muuntyyppisiin teknologioihin.							
Paljon vaivaa piti nähdä eri käyttäjien vaatimusten sovittelemiseen.							
Käyttäjät erosivat paljon keskenään tyydytettävien vaatimusten suhteen.							
Tunnistetut vaatimukset projektin alussa poikkesivat varsin paljon projektin lopussa olleista.							

CRM-projektin tulokset

Seuraavat kysymykset ja väittämät liittyvät CRM-projektinne tuloksiin, jotka on jaettu tulosten subjektiiviseen ja objektiiviseen arviointiin. (sivu 4)

Tulosten subjektiivinen arviointi: prosessin ja tuotteen laatu

1 = täysin eri mieltä ..... 7 = täysin samaa mieltä

	1	2	3	4	5	6	7
Järjestelmä saatiin valmiiksi suunnitellussa budjetissa.							
Järjestelmä saatiin valmiiksi suunnitellussa aikataulussa.							
Kehitetty sovellus on luotettava.							
Kehitetty sovellus on helppo ylläpitää.							
Käyttäjät kokevat, että järjestelmä täyttää sille tarkoitetut toiminnalliset vaatimukset.							
Järjestelmä täyttää käyttäjien odotukset toimintanopeuden osalta.							
Kokonaisuudessaan kehitetyn sovelluksen laatu on korkea.							

Tulosten objektiivinen arviointi

Arvioikaa kuinka monta % CRM-projektin budjetti alitettiin/ylitettiin?

Kirjoita %-luku tyhjään kenttään

Pysyi budjetissa (0%) Budjetti alitettiin (%) [ ] Budjetti ylitettiin (%) [ ]

Arvioikaa kuinka monta % CRM-projektin suunniteltu aikataulu alitettiin/ylitettiin?

Kirjoita %-luku tyhjään kenttään

Pysyi aikataulussa (0%) Aikataulu alitettiin (%) [ ] Aikataulu ylitettiin (%) [ ]

Lähetä

 Suuret kiitokset osallistumisestanne kyselytutkimukseen!

Appendix 6 Cover letter for second questionnaire

Hei,

Teen väitöskirjaa CRM-projektien onnistumisesta ja CRM-käyttökokemuksista Suomessa. Tutkimukseen osallistuu 168 liiketoimintayksikköä, joilla on käytössään CRM-järjestelmä.

Yrityksenne CRM-projektin tunteva henkilö on jo vastannut sitä koskeviin kysymyksiin. Pyytäisin nyt teiltä osallistumista käyttökokemus-osioon, jossa on 9 monivalintakysymystä. Vastaaminen kestää vain minuutin.

Voitte vastata helposti allaolevan Webropol-linkin kautta, joka avaa web-pohjaisen lomakkeen. Klikkaa lopuksi ”Lähetä” –painiketta lomakkeen lopussa.

Tutkimus on ehdottoman luottamuksellinen. Jokainen kyselyyn osallistunut saa sähköpostitse loppuraportin tutkimuksen valmistuttua.

Vastaan mielelläni lisäkysymyksiin tutkimuksesta, alla yhteystietoni.

Terveisin,

Samppa Suoniemi

KTM, tutkija
Turun kauppakorkeakoulu
Rehtorinpellonkatu 3
20500 Turku
Puh. 044 549 1055
samppa.suoniemi@tse.fi

Appendix 7 Second questionnaire

TURUN KAUPPAKORKEAKOULU
Turku School of Economics

CRM-järjestelmän käyttökokemus

Missä määrin olette samaa mieltä tai eri mieltä seuraavien väittämien kohdalla? Valitse numero, joka parhaiten vastaa näkemystäsi välillä 1 (Täysin eri mieltä) ja 7 (Täysin samaa mieltä).

Helppokäyttöisyys

1=täysin eri mieltä ..... 7=täysin samaa mieltä

	1	2	3	4	5	6	7
Järjestelmän käyttäminen on selkeää ja ymmärrettävää.							
Järjestelmän käyttö ei vaadi minulta paljon henkistä ponnistelua.							
Mielestäni järjestelmää on helppo käyttää.							
Mielestäni on helppoa saada järjestelmä tekemään sitä mitä haluan sen tekevän.							
Mielestäni järjestelmä on käyttäjäystävällinen.							

Hyödyllisyys

1=täysin eri mieltä ..... 7=täysin samaa mieltä

	1	2	3	4	5	6	7
Järjestelmän käyttö parantaa suoritustani työssäni.							
Järjestelmän käyttö työssäni lisää tuottavuuttani.							
Järjestelmän käyttö parantaa tehokkuuttani työssäni.							
Mielestäni järjestelmä on hyödyllinen työssäni.							

(Sivu 1 / 1)

Lähetä

Appendix 8 Harman's one factor test for common method bias (first questionnaire)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10,337	26,506	26,506	10,337	26,506	26,506	3,860	9,897	9,897
2	3,375	8,654	35,159	3,375	8,654	35,159	3,645	9,346	19,243
3	2,903	7,444	42,604	2,903	7,444	42,604	3,427	8,788	28,031
4	2,255	5,783	48,386	2,255	5,783	48,386	2,744	7,035	35,066
5	1,970	5,050	53,437	1,970	5,050	53,437	2,654	6,805	41,872
6	1,860	4,768	58,205	1,860	4,768	58,205	2,649	6,791	48,663
7	1,667	4,275	62,480	1,667	4,275	62,480	2,550	6,537	55,201
8	1,569	4,022	66,502	1,569	4,022	66,502	2,167	5,555	60,756
9	1,343	3,443	69,946	1,343	3,443	69,946	1,927	4,941	65,697
10	1,265	3,244	73,190	1,265	3,244	73,190	1,857	4,763	70,460
11	1,172	3,006	76,196	1,172	3,006	76,196	1,849	4,742	75,202
12	,902	2,312	78,508	,902	2,312	78,508	1,289	3,305	78,508
13	,766	1,964	80,472						
14	,636	1,631	82,102						
15	,573	1,470	83,572						
16	,562	1,442	85,014						
17	,529	1,357	86,371						
18	,465	1,193	87,564						
19	,419	1,074	88,638						
20	,366	,940	89,577						
21	,352	,904	90,481						
22	,346	,887	91,368						
23	,328	,842	92,210						
24	,306	,784	92,993						
25	,283	,725	93,718						
26	,259	,664	94,382						
27	,250	,642	95,025						
28	,237	,608	95,633						
29	,227	,582	96,215						
30	,220	,564	96,779						
31	,195	,501	97,280						
32	,183	,469	97,748						
33	,164	,421	98,169						
34	,147	,378	98,547						
35	,141	,361	98,908						
36	,137	,351	99,259						
37	,107	,275	99,534						
38	,105	,268	99,802						
39	,077	,198	100,000						

Extraction Method: Principal Component Analysis.

Appendix 9 Non-response analysis: Group statistics for early and late respondents (first questionnaire)

Group Statistics

Variable	Respondents	N	Mean	Std. Deviation	Std. Error Mean
JOB	Early	70	3,57	1,724	,206
	Late	91	3,82	1,596	,167
EXPERIENCE	Early	70	3,71	1,416	,169
	Late	91	3,68	1,290	,135
TURNOVER	Early	70	5,14	2,286	,273
	Late	91	4,98	2,181	,229
INDUSTRY	Early	70	6,09	3,825	,457
	Late	91	6,30	3,710	,389
CRM_AGE	Early	70	3,00	1,494	,179
	Late	91	3,07	1,632	,171
ENDUSERS#	Early	70	3,46	2,224	,266
	Late	91	3,40	2,385	,250
CRM_TYPE	Early	70	1,10	,302	,036
	Late	91	1,16	,373	,039
OWN_STAFF#	Early	70	1,37	,618	,074
	Late	91	1,42	,668	,070
CONSULT#	Early	70	1,26	,557	,067
	Late	91	1,26	,647	,068
ITR	Early	70	2,66	,562	,067
	Late	91	2,73	,449	,047
CRM	Early	70	2,57	,579	,069
	Late	91	2,53	,502	,053
INF_SUM	Early	70	4,6750	1,06946	,12783
	Late	91	4,5824	1,06852	,11201
ISP_SUM	Early	70	4,2214	1,37955	,16489
	Late	91	3,9231	1,50356	,15762
PS_SUM	Early	70	4,6929	1,15248	,13775
	Late	91	4,9011	1,25215	,13126
IPQ_SUM	Early	70	4,6143	1,07154	,12807
	Late	91	4,5582	1,08628	,11387
EPQ_SUM	Early	70	4,4857	1,07761	,12880
	Late	91	4,1956	1,13293	,11876
PMR_SUM	Early	70	4,7857	1,19350	,14265
	Late	91	4,6044	1,33857	,14032
CR_SUM	Early	70	4,3238	1,20516	,14404
	Late	91	4,2271	1,45711	,15275
TR_SUM	Early	70	4,5810	1,23383	,14747
	Late	91	4,2454	1,13185	,11865
TMS_SUM	Early	70	4,5714	1,40065	,16741
	Late	91	4,7582	1,43076	,14998
UI_SUM	Early	70	4,5429	1,38914	,16603
	Late	91	4,8132	1,41352	,14818
SPP_SUM	Early	70	4,7429	1,56442	,18698
	Late	91	4,4615	1,75789	,18428
SPD_SUM	Early	70	4,5943	1,33968	,16012
	Late	91	4,7121	1,17083	,12274
PEOU_SUM	Early	70	4,3146	1,02257	,12222
	Late	91	4,5733	,84576	,08866
PU_SUM	Early	70	4,7639	1,13157	,13525
	Late	91	5,0416	,92381	,09684
BUDG	Early	70	1,64	,615	,073
	Late	91	1,60	,555	,058
SCHE	Early	70	1,49	,531	,064
	Late	91	1,45	,522	,055
SIZ	Early	70	4,44	1,766	,211
	Late	91	4,11	1,841	,193
APP_SUM	Early	70	5,2714	1,45633	,17407
	Late	91	4,8077	1,66961	,17502
REQ_SUM	Early	70	4,4143	1,20578	,14412
	Late	91	4,2674	1,38173	,14484

Appendix 10 Non-response analysis: Independent samples T-test for early and late respondents (first questionnaire)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Conf. Lower	95% Conf. Upper
JOB	Equal variances assumed	1,964	,163	-,962	159	,338	-,253	,263	-,772	,266
	Equal variances not assumed			-,952	142,463	,343	-,253	,265	-,777	,272
EXPERIENCE	Equal variances assumed	1,924	,167	,154	159	,878	,033	,214	-,390	,456
	Equal variances not assumed			,152	141,143	,879	,033	,217	-,395	,461
TURNOVER	Equal variances assumed	,246	,620	,466	159	,642	,165	,354	-,534	,864
	Equal variances not assumed			,463	144,953	,644	,165	,356	-,539	,869
INDUSTRY	Equal variances assumed	,057	,811	-,353	159	,725	-,211	,598	-1,392	,970
	Equal variances not assumed			-,352	146,281	,726	-,211	,600	-1,397	,975
CRM_AGE	Equal variances assumed	,497	,482	-,264	159	,792	-,066	,250	-,560	,428
	Equal variances not assumed			-,267	154,191	,790	-,066	,247	-,554	,423
ENDUSERS#	Equal variances assumed	,052	,820	,167	159	,867	,062	,368	-,666	,789
	Equal variances not assumed			,169	153,158	,866	,062	,365	-,659	,782
CRM_TYPE	Equal variances assumed	5,917	,016	-1,185	159	,238	-,065	,055	-,173	,043
	Equal variances not assumed			-1,218	158,554	,225	-,065	,053	-,170	,040
OWN_STAFF#	Equal variances assumed	,836	,362	-,449	159	,654	-,046	,103	-,249	,157
	Equal variances not assumed			-,454	153,616	,651	-,046	,102	-,247	,155
CONSULT#	Equal variances assumed	,264	,608	-,068	159	,946	-,007	,097	-,198	,185
	Equal variances not assumed			-,069	156,971	,945	-,007	,095	-,194	,181
ITR	Equal variances assumed	3,242	,074	-,855	159	,394	-,068	,080	-,225	,089
	Equal variances not assumed			-,831	129,478	,407	-,068	,082	-,230	,094
CRM	Equal variances assumed	,334	,564	,515	159	,607	,044	,085	-,125	,213
	Equal variances not assumed			,506	136,780	,614	,044	,087	-,128	,216
INF_SUM	Equal variances assumed	,023	,879	,545	159	,587	,09258	,16994	-,24305	,42821
	Equal variances not assumed			,545	148,515	,587	,09258	,16996	-,24327	,42843
ISP_SUM	Equal variances assumed	,001	,981	1,293	159	,198	,29835	,23069	-,15726	,75396
	Equal variances not assumed			1,308	154,079	,193	,29835	,22810	-,15226	,74896
PS_SUM	Equal variances assumed	,006	,939	-1,083	159	,281	-,20824	,19235	-,58814	,17165
	Equal variances not assumed			-1,094	153,909	,275	-,20824	,19027	-,58413	,16764
IPQ_SUM	Equal variances assumed	,165	,685	,326	159	,745	,05604	,17168	-,28303	,39512
	Equal variances not assumed			,327	149,559	,744	,05604	,17138	-,28259	,39468
EPQ_SUM	Equal variances assumed	,450	,503	1,645	159	,102	,29011	,17635	-,05818	,63840
	Equal variances not assumed			1,656	151,981	,100	,29011	,17520	-,05603	,63625

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Conf. Lower	95% Conf. Upper
PMR_SUM	Equal variances assumed	,932	,336	,893	159	,373	,18132	,20312	-,21984	,58248
	Equal variances not assumed			,906	155,508	,366	,18132	,20010	-,21394	,57658
CR_SUM	Equal variances assumed	2,808	,096	,449	159	,654	,09670	,21519	-,32829	,52170
	Equal variances not assumed			,461	158,131	,646	,09670	,20995	-,31797	,51138
TR_SUM	Equal variances assumed	,838	,361	1,793	159	,075	,33553	,18715	-,03409	,70515
	Equal variances not assumed			1,773	141,716	,078	,33553	,18928	-,03864	,70970
TMS_SUM	Equal variances assumed	,045	,833	-,829	159	,408	-,18681	,22540	-,63197	,25835
	Equal variances not assumed			-,831	150,088	,407	-,18681	,22477	-,63093	,25731
UI_SUM	Equal variances assumed	,060	,807	-1,212	159	,227	-,27033	,22305	-,71085	,17019
	Equal variances not assumed			-1,215	149,820	,226	-,27033	,22254	-,71005	,16939
SPP_SUM	Equal variances assumed	2,804	,096	1,055	159	,293	,28132	,26656	-,24513	,80777
	Equal variances not assumed			1,072	155,594	,286	,28132	,26253	-,23726	,79990
SPD_SUM	Equal variances assumed	1,411	,237	-,594	159	,553	-,11780	,19824	-,50932	,27371
	Equal variances not assumed			-,584	137,508	,560	-,11780	,20175	-,51674	,28113
PEOU_SUM	Equal variances assumed	3,138	,078	-1,756	159	,081	-,25869	,14732	-,54964	,03226
	Equal variances not assumed			-1,713	132,579	,089	-,25869	,15099	-,55735	,03997
PU_SUM	Equal variances assumed	2,563	,111	-1,714	159	,089	-,27767	,16203	-,59767	,04234
	Equal variances not assumed			-1,669	131,407	,097	-,27767	,16634	-,60673	,05139
BUDG	Equal variances assumed	,839	,361	,416	159	,678	,038	,093	-,144	,221
	Equal variances not assumed			,410	140,412	,682	,038	,094	-,147	,224
SCHE	Equal variances assumed	,192	,662	,420	159	,675	,035	,084	-,130	,200
	Equal variances not assumed			,419	147,254	,676	,035	,084	-,131	,201
SIZ	Equal variances assumed	,567	,453	1,158	159	,249	,333	,288	-,235	,901
	Equal variances not assumed			1,164	151,417	,246	,333	,286	-,232	,898
APP_SUM	Equal variances assumed	5,109	,025	1,845	159	,067	,46374	,25128	-,03255	,96002
	Equal variances not assumed			1,879	156,448	,062	,46374	,24684	-,02384	,95131
REQ_SUM	Equal variances assumed	1,920	,168	,706	159	,481	,14689	,20799	-,26390	,55767
	Equal variances not assumed			,719	156,430	,473	,14689	,20433	-,25671	,55048

Appendix 11 Non-response analysis: Group statistics and Independent samples T-test for early and late respondents (second questionnaire)

Group Statistics

	Respondent	N	Mean	Std. Deviation	Std. Error Mean
PEOU1	Early	268	4,6231	1,31391	,08026
	Late	219	4,6895	1,43815	,09718
PEOU2	Early	268	4,8657	1,50052	,09166
	Late	219	4,8174	1,52757	,10322
PEOU3	Early	268	4,5746	1,49344	,09123
	Late	219	4,6667	1,56021	,10543
PEOU4	Early	268	3,8097	1,42647	,08714
	Late	219	3,9452	1,49209	,10083
PEOU5	Early	268	3,8806	1,43287	,08753
	Late	219	4,0502	1,56868	,10600
PU1	Early	268	4,9366	1,52375	,09308
	Late	219	4,7397	1,49949	,10133
PU2	Early	268	4,6455	1,62301	,09914
	Late	219	4,5799	1,59033	,10746
PU3	Early	268	4,7127	1,63170	,09967
	Late	219	4,6301	1,57247	,10626
PU4	Early	268	5,3358	1,49127	,09109
	Late	219	5,2146	1,52790	,10325

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Conf.	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PEOU1	Equal variances assumed	3,538	,061	-,531	485	,595	-,06636	,12490	-,31177	,17905
	Equal variances not assumed			-,527	447,008	,599	-,06636	,12604	-,31407	,18134
PEOU2	Equal variances assumed	,532	,466	,351	485	,726	,04832	,13780	-,22243	,31907
	Equal variances not assumed			,350	462,527	,726	,04832	,13804	-,22295	,31959
PEOU3	Equal variances assumed	1,055	,305	-,663	485	,508	-,09204	,13881	-,36477	,18069
	Equal variances not assumed			-,660	457,328	,509	-,09204	,13942	-,36602	,18194
PEOU4	Equal variances assumed	,990	,320	-1,021	485	,308	-,13550	,13266	-,39616	,12515
	Equal variances not assumed			-1,017	457,069	,310	-,13550	,13326	-,39738	,12638
PEOU5	Equal variances assumed	3,153	,076	-1,245	485	,214	-,16963	,13622	-,43729	,09803
	Equal variances not assumed			-1,234	446,960	,218	-,16963	,13747	-,43979	,10053
PU1	Equal variances assumed	,039	,843	1,428	485	,154	,19684	,13781	-,07394	,46762
	Equal variances not assumed			1,431	468,665	,153	,19684	,13759	-,07352	,46721
PU2	Equal variances assumed	,094	,759	,448	485	,654	,06561	,14651	-,22226	,35349
	Equal variances not assumed			,449	469,383	,654	,06561	,14621	-,22169	,35292
PU3	Equal variances assumed	1,025	,312	,565	485	,573	,08255	,14623	-,20478	,36988
	Equal variances not assumed			,567	472,028	,571	,08255	,14569	-,20373	,36883
PU4	Equal variances assumed	,347	,556	,882	485	,378	,12121	,13735	-,14867	,39108
	Equal variances not assumed			,880	461,280	,379	,12121	,13769	-,14936	,39178

Appendix 12 Communalities of purified measures in EFA

Communalities		
	Initial	Extraction
Inf1	1,000	,698
Inf2	1,000	,750
Inf3	1,000	,686
Inf4	1,000	,681
Isp3	1,000	,840
Isp4	1,000	,808
Ps1	1,000	,887
Ps2	1,000	,866
Ipq1	1,000	,779
Ipq2	1,000	,790
Ipq3	1,000	,814
Ipq4	1,000	,693
Ipq5	1,000	,704
Epq1	1,000	,754
Epq2	1,000	,755
Epq3	1,000	,842
Epq4	1,000	,826
Epq5	1,000	,635
Pmr1	1,000	,699
Pmr2	1,000	,737
Cr1	1,000	,842
Cr2	1,000	,858
Cr3	1,000	,846
Tr1	1,000	,857
Tr2	1,000	,829
Tr3	1,000	,736
Tms1	1,000	,858
Tms2	1,000	,801
Tms3	1,000	,917
Ui1	1,000	,811
Ui2	1,000	,855
Ui3	1,000	,815
Spp1	1,000	,851
Spp2	1,000	,859
Spd1	1,000	,774
Spd2	1,000	,761
Spd3	1,000	,799
Spd4	1,000	,733
Spd5	1,000	,871
Peou1_Wall	1,000	,844
Peou2_Wall	1,000	,733
Peou3_Wall	1,000	,870
Peou4_Wall	1,000	,691
Peou5_Wall	1,000	,817
Pu1_Wall	1,000	,895
Pu2_Wall	1,000	,891
Pu3_Wall	1,000	,917
Pu4_Wall	1,000	,786
Extraction Method: Principal Component Analysis.		

Appendix 13 Descriptive statistics and reliability of reflective measurement models (PLS)

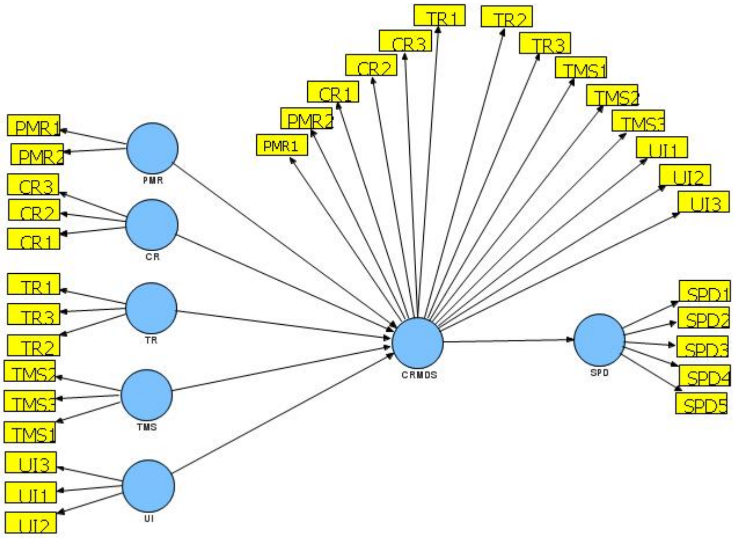
	Indicator loadings in the main effects model								Indicator loadings in isolation							
	Mean	SD	Loadings	T value	SE	Cr a	CR	AVE	Mean	SD	Loadings	T value	SE	Cr a	CR	AVE
INF						0,81	0,88	0,64						0,81	0,88	0,64
INF1	4,68	1,25	0,76	9,93	0,08				4,68	1,25	0,78	15,39	0,05			
INF2	4,93	1,28	0,83	18,05	0,05				4,93	1,28	0,84	31,18	0,03			
INF3	4,34	1,33	0,79	15,16	0,05				4,34	1,33	0,79	20,74	0,04			
INF4	4,54	1,48	0,80	17,01	0,05				4,54	1,48	0,79	24,96	0,03			
ISP						0,80	0,91	0,83						0,80	0,91	0,83
ISP3	4,20	1,60	0,92	37,09	0,02				4,20	1,60	0,91	60,82	0,02			
ISP4	3,90	1,58	0,91	40,10	0,02				3,90	1,58	0,91	60,82	0,02			
PS						0,85	0,93	0,87						0,85	0,93	0,87
PS1	4,75	1,35	0,92	30,25	0,03				4,75	1,35	0,93	83,19	0,01			
PS2	4,87	1,24	0,94	39,44	0,02				4,87	1,24	0,93	83,19	0,01			
IPQ						0,87	0,90	0,65						0,87	0,90	0,65
IPQ1	4,73	1,30	0,75	13,61	0,06				4,73	1,30	0,76	17,15	0,04			
IPQ2	4,36	1,25	0,86	40,28	0,02				4,36	1,25	0,86	38,50	0,02			
IPQ3	4,74	1,24	0,87	35,10	0,02				4,74	1,24	0,88	43,20	0,02			
IPQ4	4,75	1,42	0,79	19,68	0,04				4,75	1,42	0,77	14,81	0,05			
IPQ5	4,34	1,48	0,76	19,76	0,04				4,34	1,48	0,77	19,79	0,04			
EPQ						0,88	0,92	0,69						0,88	0,92	0,69
EPQ1	4,03	1,42	0,79	12,10	0,07				4,03	1,42	0,83	21,09	0,04			
EPQ2	3,76	1,31	0,83	20,99	0,04				3,76	1,31	0,84	28,11	0,03			
EPQ3	4,07	1,37	0,90	41,15	0,02				4,07	1,37	0,90	76,70	0,01			
EPQ4	4,4	1,37	0,90	51,83	0,02				4,4	1,37	0,89	44,83	0,02			
EPQ5	5,35	1,26	0,70	10,30	0,07				5,35	1,26	0,66	10,29	0,06			
PMR						0,63	0,83	0,71						**0,63**	0,83	0,71
PMR1	4,55	1,64	0,74	8,73	0,08				4,55	1,64	0,86	44,40	0,02			
PMR2	4,82	1,34	0,94	47,41	0,02				4,82	1,34	0,86	44,40	0,02			
CR						0,89	0,93	0,82						0,89	0,93	0,82
CR1	4,47	1,43	0,90	47,54	0,02				4,47	1,43	0,90	52,68	0,02			
CR2	3,85	1,49	0,90	36,12	0,02				3,85	1,49	0,90	36,42	0,02			
CR3	4,48	1,55	0,92	65,81	0,01				4,48	1,55	0,92	65,17	0,01			
TR						0,79	0,87	0,70						0,79	0,87	0,70
TR1	4,41	1,43	0,85	21,55	0,04				4,41	1,43	0,85	32,33	0,03			
TR2	4,49	1,38	0,90	43,94	0,02				4,49	1,38	0,89	37,24	0,02			
TR3	4,27	1,44	0,76	10,75	0,07				4,27	1,44	0,77	19,54	0,04			
TMS						0,90	0,94	0,83						0,90	0,94	0,83
TMS1	4,6	1,51	0,92	63,31	0,01				4,6	1,51	0,92	62,82	0,01			
TMS2	4,71	1,56	0,86	20,22	0,04				4,71	1,56	0,87	31,62	0,03			
TMS3	4,72	1,59	0,96	102,34	0,01				4,72	1,59	0,95	105,22	0,01			
UI						0,88	0,93	0,81						0,88	0,93	0,81
UI1	4,6	1,54	0,87	31,25	0,03				4,6	1,54	0,87	38,41	0,02			
UI2	4,83	1,55	0,93	50,81	0,02				4,83	1,55	0,93	50,66	0,02			
UI3	4,65	1,59	0,90	43,23	0,02				4,65	1,59	0,90	52,18	0,02			
SPP						0,83	0,92	0,86						0,83	0,92	0,86
SPP1	4,77	1,75	0,91	38,83	0,02				4,77	1,75	0,93	63,12	0,01			
SPP2	4,4	1,87	0,94	62,61	0,02				4,4	1,87	0,93	63,12	0,01			
SPD						0,91	0,93	0,73						0,91	0,93	0,73
SPD1	5,04	1,44	0,82	23,66	0,03				5,04	1,44	0,83	24,88	0,03			
SPD2	4,53	1,42	0,82	26,62	0,03				4,53	1,42	0,83	26,02	0,03			
SPD3	4,5	1,51	0,87	30,40	0,03				4,5	1,51	0,86	27,74	0,03			
SPD4	4,64	1,55	0,83	23,07	0,04				4,64	1,55	0,82	19,95	0,04			
SPD5	4,59	1,38	0,93	81,24	0,01				4,59	1,38	0,93	77,31	0,01			
PEOU						0,93	0,94	0,77						0,93	0,94	0,77
PEOU1_WALL	4,73	1,03	0,91	65,61	0,01				4,73	1,03	0,90	68,80	0,01			
PEOU2_WALL	4,94	1,02	0,81	23,36	0,03				4,94	1,02	0,82	27,29	0,03			
PEOU3_WALL	4,72	1,10	0,92	56,36	0,02				4,72	1,10	0,92	71,22	0,01			
PEOU4_WALL	3,89	1,10	0,85	25,67	0,03				3,89	1,10	0,84	23,57	0,04			
PEOU5_WALL	4,03	1,06	0,91	69,57	0,01				4,03	1,06	0,91	60,60	0,02			
PU						0,95	0,96	0,87						0,95	0,96	0,87
PU1_WALL	4,88	1,07	0,94	81,62	0,01				4,88	1,07	0,94	79,94	0,01			
PU2_WALL	4,70	1,10	0,95	78,69	0,01				4,70	1,10	0,95	82,66	0,01			
PU3_WALL	4,75	1,15	0,95	125,05	0,01				4,75	1,15	0,95	129,93	0,01			
PU4_WALL	5,36	1,07	0,89	46,03	0,02				5,36	1,07	0,89	40,09	0,02			

Appendix 14 Cross loadings (reflective measurement model analysis; PLS)

	CR1	CR2	CR3	EPQ1	EPQ2	EPQ3	EPQ4	EPQ5	INF1	INF2	INF3	INF4	IPQ1	IPQ2	IPQ3	IPQ4	IPQ5	PEOU1	PEOU2	PEOU3	PEOU4	PEOU5	PMR1	PMR2
EPQ	0,264	0,248	0,218	**0,792**	**0,828**	**0,898**	**0,904**	**0,699**	0,165	0,251	0,257	0,237	0,321	0,433	0,299	0,181	0,286	0,156	0,167	0,112	0,114	0,217	-0,021	0,316
INF	0,225	0,167	0,209	0,257	0,212	0,266	0,323	0,118	**0,764**	**0,834**	**0,794**	**0,804**	0,151	0,264	0,267	0,266	0,197	0,154	0,128	0,132	0,089	0,110	0,204	0,245
IPQ	0,286	0,419	0,291	0,201	0,252	0,301	0,399	0,357	0,166	0,248	0,210	0,286	**0,753**	**0,861**	**0,870**	**0,790**	**0,760**	0,227	0,172	0,174	0,186	0,221	0,265	0,411
PEOU	0,117	0,112	0,093	0,144	0,105	0,214	0,199	0,051	0,113	0,117	0,167	0,050	0,077	0,166	0,243	0,242	0,165	**0,906**	**0,808**	**0,915**	**0,852**	**0,914**	0,024	0,239
PS	0,257	0,339	0,261	0,138	0,203	0,250	0,382	0,393	0,171	0,264	0,157	0,341	0,423	0,520	0,458	0,500	0,459	0,108	0,117	0,060	0,117	0,099	0,146	0,466
PU	0,036	0,043	0,049	0,038	0,004	0,029	0,077	0,033	0,073	0,068	0,053	0,020	0,090	0,023	0,132	0,172	0,019	0,642	0,501	0,588	0,599	0,629	-0,034	0,139
TR	0,436	0,312	0,335	0,095	0,135	0,125	0,169	0,128	0,040	0,050	0,057	0,091	0,203	0,225	0,138	0,277	0,213	0,106	0,186	0,096	0,143	0,147	0,256	0,381
UI	0,345	0,167	0,275	0,093	0,116	0,121	0,164	0,166	0,160	0,191	0,184	0,196	0,274	0,334	0,217	0,232	0,239	0,150	0,196	0,185	0,194	0,239	0,326	0,440
CR	**0,898**	**0,899**	**0,920**	0,151	0,227	0,293	0,211	0,207	0,159	0,112	0,197	0,231	0,226	0,310	0,311	0,336	0,283	0,094	0,137	0,037	0,110	0,143	0,287	0,493
PMR	0,455	0,492	0,385	0,104	0,200	0,174	0,272	0,219	0,243	0,209	0,173	0,224	0,226	0,402	0,334	0,334	0,373	0,104	0,239	0,150	0,181	0,211	**0,710**	**0,953**
SPD	0,472	0,385	0,486	0,256	0,275	0,337	0,347	0,284	0,040	0,246	0,206	0,234	0,349	0,303	0,309	0,333	0,287	0,382	0,327	0,359	0,409	0,474	0,171	0,551
SPP	0,265	0,276	0,260	0,151	0,137	0,092	0,104	0,199	-0,016	0,125	0,132	0,076	0,122	0,104	0,136	0,159	0,204	0,121	0,112	0,152	0,150	0,186	0,127	0,355
TMS	0,251	0,185	0,270	0,089	0,107	0,086	0,130	0,035	0,055	0,190	0,178	0,090	0,336	0,309	0,315	0,375	0,195	0,036	0,055	-0,010	0,114	0,052	0,236	0,272

	PS1	PS2	PS3	PS4	PU1	PU2	PU3	PU4	SPD1	SPD2	SPD3	SPD4	SPD5	SPP1	SPP2	TMS1	TMS2	TMS3	TR1	TR2	TR3	UI1	UI2	UI3
EPQ	0,196	0,226	0,319	0,314	0,039	0,045	0,003	0,083	0,299	0,196	0,344	0,304	0,412	0,147	0,150	0,043	0,137	0,126	0,216	0,157	0,015	0,122	0,129	0,191
INF	0,149	0,313	0,248	0,225	0,067	0,070	0,039	0,069	0,218	0,122	0,214	0,190	0,242	0,093	0,095	0,134	0,159	0,152	0,010	0,029	0,175	0,256	0,197	0,170
IPQ	0,299	0,385	0,551	0,546	0,061	0,149	0,099	0,096	0,300	0,257	0,411	0,323	0,365	0,185	0,147	0,373	0,322	0,347	0,220	0,298	0,120	0,266	0,324	0,279
PEOU	0,001	0,077	0,102	0,144	0,644	0,636	0,635	0,609	0,269	0,409	0,398	0,379	0,441	0,147	0,159	0,051	0,104	0,012	0,211	0,125	0,036	0,159	0,206	0,226
PS	**0,732**	**0,760**	**0,853**	**0,832**	-0,033	0,039	0,007	0,051	0,186	0,175	0,365	0,267	0,300	0,087	0,130	0,234	0,158	0,257	0,194	0,243	0,069	0,152	0,172	0,190
PU	0,031	0,029	-0,023	0,041	**0,943**	**0,946**	**0,954**	**0,891**	0,284	0,383	0,424	0,331	0,400	0,094	0,120	0,106	0,056	0,094	0,133	0,092	0,019	0,061	0,152	0,115
TR	0,068	0,106	0,286	0,121	0,122	0,064	0,056	0,135	0,251	0,272	0,462	0,346	0,424	0,148	0,254	0,350	0,253	0,369	**0,846**	**0,902**	**0,758**	0,324	0,252	0,257
UI	0,146	0,193	0,149	0,136	0,134	0,084	0,096	0,145	0,380	0,288	0,389	0,476	0,393	0,225	0,158	0,289	0,349	0,312	0,197	0,330	0,233	**0,869**	**0,927**	**0,904**
CR	0,025	0,173	0,345	0,332	0,023	0,045	0,002	0,108	0,419	0,435	0,399	0,364	0,495	0,235	0,306	0,223	0,227	0,262	0,282	0,381	0,337	0,239	0,221	0,325
PMR	0,231	0,203	0,473	0,325	0,075	0,089	0,101	0,104	0,356	0,308	0,488	0,480	0,471	0,283	0,317	0,305	0,202	0,296	0,211	0,369	0,409	0,445	0,383	0,421
SPD	0,158	0,220	0,298	0,255	0,412	0,388	0,398	0,404	**0,825**	**0,822**	**0,866**	**0,828**	**0,931**	0,369	0,418	0,300	0,256	0,365	0,306	0,419	0,312	0,356	0,441	0,417
SPP	0,061	0,087	0,135	0,071	0,111	0,091	0,120	0,112	0,475	0,339	0,346	0,324	0,358	**0,914**	**0,937**	0,221	0,052	0,161	0,176	0,207	0,171	0,228	0,137	0,190
TMS	0,211	0,204	0,239	0,114	0,063	0,116	0,110	0,067	0,286	0,195	0,372	0,299	0,293	0,134	0,169	**0,924**	**0,856**	**0,956**	0,221	0,345	0,341	0,284	0,334	0,309

Appendix 15 Hierarchical component model for CRM delivery system (PLS)



Appendix 16 Indicator loadings in a 1st order conceptualization of CRM delivery system (formative measurement model analysis; PLS)

	Loading	t-value	SE
PMR1 → CRMDS	0,50	6,48	0,077
PMR2 → CRMDS	0,68	16,94	0,040
CR1 → CRMDS	0,71	15,29	0,046
CR2 → CRMDS	0,59	8,05	0,074
CR3 → CRMDS	0,65	11,90	0,055
TR1 → CRMDS	0,49	6,40	0,077
TR2 → CRMDS	0,66	11,71	0,056
TR3 → CRMDS	0,59	9,07	0,065
TMS1 → CRMDS	0,60	8,71	0,069
TMS2 → CRMDS	0,56	8,45	0,066
TMS3 → CRMDS	0,64	9,87	0,065
UI1 → CRMDS	0,63	10,24	0,061
UI2 → CRMDS	0,62	11,06	0,056
UI3 → CRMDS	0,65	9,68	0,067

Appendix 17 Inter-item correlations of formative dimensions of CRM delivery system (formative measurement model analysis; PLS)

	CR	PMR	TMS	TR	UI
EPQ1	0,151	0,070	0,090	0,091	0,093
EPQ2	0,228	0,160	0,110	0,131	0,117
EPQ3	0,293	0,131	0,088	0,120	0,121
EPQ4	0,211	0,221	0,130	0,163	0,164
EPQ5	0,207	0,192	0,034	0,117	0,166
INF1	0,160	0,248	0,056	0,046	0,161
INF2	0,112	0,204	0,190	0,055	0,191
INF3	0,197	0,178	0,178	0,064	0,185
INF4	0,232	0,221	0,092	0,097	0,196
IPQ1	0,226	0,215	0,337	0,194	0,274
IPQ2	0,309	0,383	0,309	0,221	0,334
IPQ3	0,311	0,330	0,314	0,134	0,217
IPQ4	0,336	0,323	0,374	0,275	0,230
IPQ5	0,282	0,370	0,195	0,212	0,239
ISP3	0,180	0,357	0,217	0,170	0,133
ISP4	0,173	0,321	0,196	0,181	0,115
PEOU1_WALL	0,095	0,076	0,039	0,098	0,150
PEOU2_WALL	0,137	0,227	0,057	0,184	0,196
PEOU3_WALL	0,037	0,126	-0,007	0,092	0,185
PEOU4_WALL	0,110	0,155	0,114	0,136	0,193
PEOU5_WALL	0,143	0,174	0,054	0,140	0,239
PS1	0,026	0,205	0,209	0,063	0,147
PS2	0,173	0,187	0,203	0,101	0,193
PU1_WALL	0,023	0,056	0,062	0,117	0,133
PU2_WALL	0,045	0,062	0,116	0,059	0,083
PU3_WALL	0,001	0,081	0,108	0,054	0,095
PU4_WALL	0,107	0,076	0,067	0,131	0,144
SPD1	0,419	0,328	0,284	0,250	0,380
SPD2	0,436	0,270	0,194	0,273	0,287
SPD3	0,398	0,436	0,371	0,462	0,388
SPD4	0,365	0,439	0,298	0,348	0,475
SPD5	0,495	0,427	0,291	0,424	0,392
SPP1	0,235	0,260	0,132	0,148	0,226
SPP2	0,306	0,289	0,165	0,255	0,160

Appendix 18 Indicator loadings, significances and standard errors in the main effects model (structural model analysis)

Indicator <- Latent variable	Loading	t-value	SE
CR1 <- CR	0,90	55,60	0,016
CR1 <- CRMDS	0,71	14,79	0,048
CR2 <- CR	0,90	31,75	0,028
CR2 <- CRMDS	0,60	8,47	0,071
CR3 <- CR	0,92	64,39	0,014
CR3 <- CRMDS	0,66	12,31	0,053
EPQ1 <- EPQ	0,79	11,79	0,067
EPQ2 <- EPQ	0,83	21,59	0,038
EPQ3 <- EPQ	0,90	39,09	0,023
EPQ4 <- EPQ	0,90	48,39	0,019
EPQ5 <- EPQ	0,70	9,41	0,074
INF1 <- INF	0,77	9,51	0,081
INF2 <- INF	0,83	16,94	0,049
INF3 <- INF	0,80	16,19	0,049
INF4 <- INF	0,80	16,40	0,049
IPQ1 <- IPQ	0,75	14,13	0,053
IPQ2 <- IPQ	0,86	42,04	0,021
IPQ3 <- IPQ	0,87	38,82	0,022
IPQ4 <- IPQ	0,79	18,25	0,043
IPQ5 <- IPQ	0,76	19,26	0,040
ISP3 <- ISP	0,92	41,36	0,022
ISP4 <- ISP	0,91	34,88	0,026
PEOU1_WALL <- PEOU	0,91	67,46	0,013
PEOU2_WALL <- PEOU	0,81	25,40	0,032
PEOU3_WALL <- PEOU	0,92	60,24	0,015
PEOU4_WALL <- PEOU	0,85	27,03	0,032
PEOU5_WALL <- PEOU	0,91	70,82	0,013
PMR1 <- PMR	0,81	19,02	0,043
PMR1 <- CRMDS	0,50	6,60	0,075
PMR2 <- PMR	0,89	46,62	0,019
PMR2 <- CRMDS	0,68	16,62	0,041
PS1 <- PS	0,92	14,23	0,065
PS2 <- PS	0,95	21,71	0,044
PU1_WALL <- PU	0,94	78,59	0,012
PU2_WALL <- PU	0,95	80,85	0,012
PU3_WALL <- PU	0,95	117,05	0,008
PU4_WALL <- PU	0,89	41,29	0,022
SPD1 <- SPD	0,82	22,11	0,037
SPD2 <- SPD	0,82	22,98	0,036
SPD3 <- SPD	0,87	30,12	0,029
SPD4 <- SPD	0,83	23,89	0,035
SPD5 <- SPD	0,93	77,91	0,012
SPP1 <- SPP	0,92	41,03	0,022
SPP2 <- SPP	0,94	60,40	0,016
TMS1 <- TMS	0,92	62,76	0,015
TMS1 <- CRMDS	0,60	8,92	0,067
TMS2 <- TMS	0,87	32,12	0,027
TMS2 <- CRMDS	0,55	8,71	0,063
TMS3 <- TMS	0,95	102,81	0,009
TMS3 <- CRMDS	0,63	9,99	0,063
TR1 <- TR	0,83	20,89	0,040
TR1 <- CRMDS	0,49	6,34	0,078
TR2 <- TR	0,90	47,16	0,019
TR2 <- CRMDS	0,66	12,29	0,053
TR3 <- TR	0,78	18,57	0,042
TR3 <- CRMDS	0,59	9,12	0,065
UI1 <- UI	0,87	34,27	0,026
UI1 <- CRMDS	0,62	9,92	0,063
UI2 <- UI	0,92	52,17	0,018
UI2 <- CRMDS	0,62	10,82	0,057
UI3 <- UI	0,90	51,21	0,018
UI3 <- CRMDS	0,65	10,57	0,062

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