MGI

MESTRADO
Gestão de Informação

Customer Relationship Management adoption
Determinants of CRM adoption by firms

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Dissertação apresentada como requisito parcial para obtenção do grau de Mestre em Gestão de Informação

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CRM ADOPTION

por

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Dissertação apresentada como requisito parcial para a obtenção do grau de Mestre em Gestão de Informação e especialização em Marketing Intelligence.

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“PORQUE O CAMINHO FAZ-SE CAMINHANDO”

MARIA ANA CORDEIRO DE SOUSA

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Finish this thesis is the culmination of a big road that was traveled. I had moments of greater understanding and others where I had to go further to discover more.

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ABSTRACT

Customer relationship management (CRM) has become one of the most powerful techniques that a firm can achieve. Various concepts try to define CRM as a combination of people, processes and technology that seeks to understand company´s customers. From the literature review, Technology- Organization -Environment (TOE) framework should be tested among the theoretical framework propose by (Alshawi, Missi, & Irani, 2011) which identify relevant CRM adoption factors , that relate to organizational, technical and data quality predictors. To be consistent with TOE framework we develop a research model concerning the technological, organizational and environment contexts, integrating the various factors given by the (Alshawi, et al., 2011) study.

Data were collected from 209 firms in Portugal and partial least square (PLS) was used to estimate our eleven hypotheses. Evaluating the results, we concluded that compatibility and competitive pressure are the most relevant facilitators of CRM adoption. On other hand, complexity is a powerful inhibitor for CRM adoption. Ultimately, we realize that this study can provide useful practical and technical advices for academics and managers. Suggestions for future research and empirical testing of propositions are offered.

KEYWORDS

RESUMO

O CRM tem adquirido um papel preponderante nas empresas, tornando-se numa das maiores técnicas a ser implementadas. Diversos conceitos procuram definir o CRM como uma combinação de pessoas, processos e tecnologias que pretendem compreender os consumidores dessa mesma empresa.

Segundo a revisão literária, o enquadramento da TOE deverá ser testado consoante o enquadramento teórico proposto por Alshawi, Missi e Irani (2001) que realçam fatores de adoção de CRM relevantes, relacionando com os contextos organizacionais, tecnológicos e de base de dados.

De forma a ser consistente com o enquadramento do modelo TOE, foi desenvolvido um modelo de investigação relacionando os diferentes contextos identificados nos estudos de Alshawi et al. (2001)

Foi recolhida informação proveniente de 209 empresas em Portugal e a técnica estatística partial least square foi utilizada para estimar as 11 hipóteses apresentadas.

Após avaliar os resultados, conclui-se que a compatibilidade e a pressão competitiva são os principais facilitadores na adoção de CRM. Por outro lado, a complexidade é um forte inibidor na adoção desta ferramenta. Por fim, compreende-se que este estudo pode contribuir com explicações úteis a nível prático e técnico para académicos e executivos. Sugestões para investigações futuras e testes empíricos de proposições são também apresentados.

Palavras-chave: CRM; Qualidade na Base de Dados; Adoção de IT; TOE

PALAVRAS-CHAVE

CRM; Qualidade na Base de Dados; Adoção de IT; TOE

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LIST OF ACRONYMS

AVE – Average Variance Extracted

CA- Cronbach´s alpha

CEO- Chief Executive Office

CFO- Chief Financial Officer

COO- Chief Operating Officer

CR- Composite Reliability

CRM- Customer Relationship Management

IS- Information Systems

IT- Information technology

Marketing VP-Marketing Vice President

PLS- Partial Least Squares

TOE- Technology Organization and Environment

VP- Vice President

1. INTRODUCTION

Over recent years, there have been some changes in the philosophy of marketing which many organizations have changed their focus, adopting a new vision. Enhancing and maintaining a customer relationship became their main principles for firms (Chen & Popovich, 2003; Payne & Frow, 2006). Indeed, mass production and mass marketing have tended to be overlapped by a more customer-centric orientation (Chen & Popovich, 2003).

The term customer relationship management (CRM) has achieved several definitions from different academics and practitioners. Literature reports that CRM can be seen as business strategy or as a technological tool (Chen & Popovich, 2003; Payne & Frow, 2005; Zablah, Bellenger, & Johnston, 2004). Therefore, CRM can firstly be defined as a combination of human processes with technological tools and together they seek to understand the company´s customers (Chen & Popovich, 2003). Literature reports significant outcomes for firms, which CRM is able to increase revenues and profits for firms (Abbott, Buttle, & Stone, 2001; Buttle, 2004; Goodhue, Wixom, & Watson, 2002), customize their products and services, develop and retain customers (Campbell, 2003). Information Technologies (IT) has become one of the most important infrastructural elements for organizations and it is recognized as an enabler for adopting CRM (Chen & Popovich, 2003; Goodhue, et al., 2002) and it also enables information to disseminate throughout the organization (Ryals & Knox, 2001) As a result, many have been the organizations implementing CRM in order to compete effectively in a changeable market scenario (Alshawi, et al., 2011).

In our research we realized that there is a limited research conducted in the CRM adoption, which previous studies on CRM have focused on justifying the already existing implementation, for instance, studies based on benefits and value (Alshawi, et al., 2011; Preety Awasthi. & Sangle., 2012). Therefore, the use of (Tornatzky & Fleischer, 1990) technology-organization-environment (TOE) framework enables the reflection and proposed investigation of focused factors likely to influence CRM adoption.

The paper is structured as follows. First, we review the existing literature to clarify the definition of CRM and adoption models. Afterwards, research models and hypotheses will be analyzed and explained. Finally, a final model will be tested and evaluated. Results will be discussed; key conclusions and implications will then be presented.

2. THEORETICAL BACKGROUND

2.1. CRM CONCEPT

Over the past few years, the growth of competition, markets´ globalization, technological development and the continuous change in clients´ preferences have forced many companies to adapt themselves into a constant updating (Chalmeta, 2005).

CRM is a quite recent phenomenon and gathers different meanings amongst its authors. Regarding (Buttle, 2004) CRM was started to be used to describe software applications which automatized marketing processes, sales and other services available by the companies. However, the concept of CRM is much wider. (Zablah, et al., 2004) defines CRM as "a continuous process which involves the market´s development and leverage with the finality of building and securing a profitable relationship with clients." In Payne & Frow, (2006) point of view, CRM is "a business approach which seeks to create, develop and improve relationships with clients carefully segmented, looking forward to increase the company´s value and profitability, and consequently maximizing the shareholders´ value".

By the end of the 20th century, many companies suffered a low growth rate due to their incapacity in recruiting a considerable number of clients (Payne & Frow, 2005). Therefore, new clients had to be gained and older ones secured. This being, a greater focus was given towards relational marketing on detriment to transactional marketing. This new focus on nurturing relationships with clients (relational marketing) is seen as the philosophical basis of CRM (Payne & Frow, 2005; Zablah, et al., 2004). In sum, in this paper I will focus in a principal definition which sees:

"CRM as combination of people, processes and technology that seek to understand a company's customers" (Chen & Popovich, 2003, p. 1).

2.2. ADOPTION MODELS

The TOE framework is one of the most important adoptions models theories at firm level (Oliveira & Martins, 2011). For this reason, we used TOE framework that was developed by Tornatzky & Fleischer (1990). This model identifies three relevant aspects regarding the contexts which influence the firm in adopting a technological innovation:

Technological Context: it describes the technologies used by the company and those which may be relevant in the future;

Organizational Context: describes the enterprise´s measures, such as the scope, size and managerial;

Environment Context: the setting in which the business takes place, for instance, its core industry, its competitors and relationship with the government.

The TOE framework describes the drive of a firm to adopt technology and change its process. Since its introduction, TOE framework has been applied in several studies to understand the adoption of a new technology (see Table 1). Such as E-CRM (Chuchuen & Chanvarasuth, 2011), Electronic Data Interchange (Kuan & Chau, 2001), Green IT (Bose & Luo, 2011), e-business (Ifinedo, 2011; Oliveira & Martins 2010; K. Zhu, Kraemer, & Xu, 2003; Kevin Zhu & Kraemer, 2005; Kevin Zhu, Kraemer, & Xu, 2006).

		Constructs									
IT adoption	**Source**	Technology Competence/technology	technology readiness	Firm size	Financial Commitment	Competitive Pressure	Gov. Support	Perceived Benefits	Compatibility	Complexity	Top Man. Support
Determinants of e-business Use	(Hsu, Kraemer, & Dunkle, 2006)			*				*	*	*	
E-business adoption	Kevin Zhu & Kraemer, 2005)	*		*	*	*	*				
E-business adoption	(Oliveira & Martins 2010)	*		*		*		*			
E-CRM adoption factors	(Chuchuen & Chanvarasuth, 2011)					*	*		*	*	
Internet – E/business adoption	(Ifinedo, 2011)						*		*	*	*
Open systems adoption	(Chau & Tam, 1997)									*	
Web services adoption	(Lippert & Govindarajulu, 2006)			*		*	*				*
E-business adoption	(Lin. & Lin., 2008)								*	*	
Green IT	(Bose & Luo, 2011)			*					*	*	*
RFID adoption	(Thiesse, Staake, Schmitt, & Fleisch, 2011)			*					*	*	*
Cloud Computing adoption	(Low & Wu, 2011)	*									

Table 1 - Constructs used in TOE framework

3. CONCEPTUAL MODEL AND HYPOTHESIS

3.1. THE CONCEPTUAL MODEL

According the study done by Alshawi, et al., (2011) we intend to seek which factors guide CRM adoption and empirically validate it. For this purpose, the conceptual model is based on TOE framework which serves an appropriate theoretical guideline to assess the CRM adoption factors, as CRM is enabled by the development of technology competence, compatibility, complexity and data quality integration, requires organizational enablers such perceived benefits, financial support by the top management and size, and may be shaped by the external competitive pressure environment.

Therefore, upon theoretically adoption contexts, we stipulate the following conceptual model: Technological context (technology competence, compatibility, complexity and data quality integration), organizational context (perceived benefits, top management support and size) and environment context (customers and suppliers satisfaction, competitive pressure and governmental support).
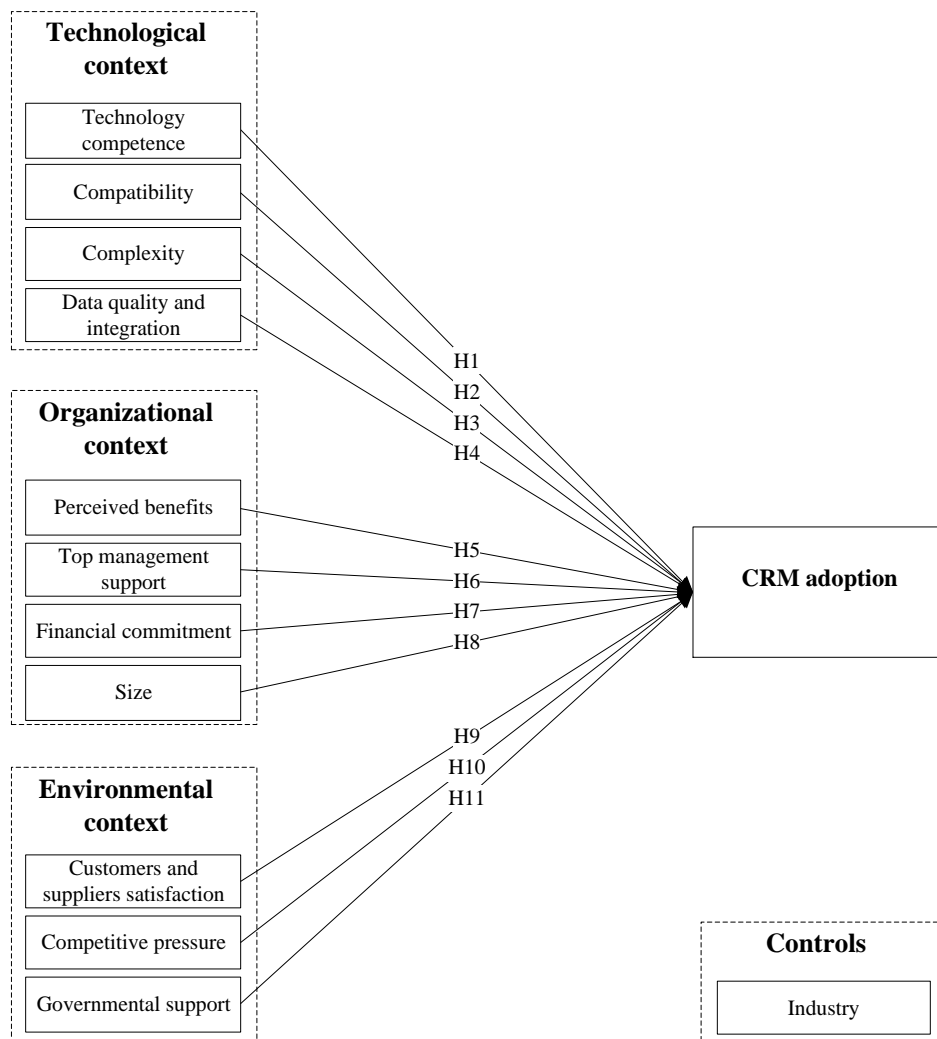
Figure 1 - The conceptual model

3.1.1. Technology context

3.1.2. *Technology Competence*

Behind various considerations on CRM, the technological context found in the TOE model refers to technologies used in the company. Nonetheless, not all companies possess the technological tools needed for CRM systems to provide it with capacities to manage a large portfolio of consumers, as well as maximizing its revenues (Tornatzky & Fleischer, 1990; Zablah, et al., 2004). Various authors enhance the importance in adopting and developing new technologies, as well as the significance of having an adequate infrastructure, human resources and materials capable of facilitating the success of CRM (Chen & Popovich, 2003; Ryals & Knox, 2001; Wilson, Daniel, & McDonald, 2002; Zablah, et al., 2004). An inadequate IT infrastructure may

cause innumerous organizational problems. The best solution for the enterprise is to aggregate its information systems and completely automatize the business processes (Themistocleous, 2004). This being, consistent with the literature, technology competence was used to study e-business adoption and also seems to be appropriate to use as an important predictor in CRM adoption. We therefore formulate the following:

H1- The level of technology competence will positively influence CRM adoption.

Compatibility

Rogers (1995) defines compatibility as the "degree to which the innovation fits with the potential adopter´s existing values, previous practices, and current needs". Tornatzky and Klein found that innovation is more likely to be adopted when it is compatible with individuals' job responsibility and value system (Thong, 1999).

Compatibility is shown as one of the most important attributes for a successful CRM adoption. For instance, if the purpose to adopt CRM is to take advantage of the data base consumers in order to offer a strategic plan to them, thus technology integration is required before databases can be integrated into a data warehouse (Payne & Frow, 2005). IT has long been recognized as an "enabler to radically redesign business processes in order to achieve dramatic improvements in organizational performance "(Chen & Popovich, 2003, p. 6). Nevertheless, the separation between marketing and IT functions sometimes presents integration issues at the organizational level (Payne & Frow, 2005). We therefore formulate the following:

H2- Compatibility will positively influence CRM adoption.

Complexity

Complexity is the "degree to which an innovation is perceived to be relatively difficult to understand and use" (Rogers, 1995). The higher the intention to adopt CRM, more easily will have to solve problems and difficulties relate with the CRM systems. CRM systems are sometimes complex to operate and normally people must undergo an implementation period and trainee courses. However, most often firms opt to implement the easiest system to avoid extra-cost. Unfortunately, the need for integration is crucial and decisive for successful CRM adoption (Alshawi, et al., 2011; Themistocleous, 2004) Therefore, we formulate the following:

H3- Complexity will negatively influence CRM adoption.

Data Quality and Integration

Data quality has been an issue of interest to practitioners and researchers for many years. Data quality is an area which many companies seem to ignore or are not giving sufficient attention (Farouk, Sarmad, & Guy, 2005; Haug & Arlbjørn, 2011) Some authors have confirmed the dangerous consequences of using a database with low quality (Abbott, et al., 2001; Eckerson, 2002; Haug & Arlbjørn, 2011). In many cases, companies adopt a CRM systems without having enough knowledge about the database actual state (Abbott, et al., 2001). According to a research published by the Gartner Group (Gartner Report. 2006), almost 70% of CRM systems fail due to lack of compatibility in the data, as well as its low quality. The Data Warehousing Institute (TDWI) estimates that a weak quality in the database may cost to the company around $600 billion per year(Farouk, et al., 2005).

CRM is a powerful strategic tool for targeting, communicating and tracking relevant customer data, transforming this information into actionable information based in a strategic plan. Even so, most firms are using a weak database quality generate wrong information. (English, 1999; Farouk, et al., 2005; Haug & Arlbjørn, 2011). In this sense, data quality and a satisfactory integration enable CRM systems to operate rightly. We postulate the following.

H4- Data quality and integration will positively influence CRM adoption.

3.1.3. ORGANIZATIONAL CONTEXT

Perceived Benefits

Perceived benefits refers to the anticipated advantages that CRM can provide the organization. Much higher is degree which an innovation is perceived much better is the perception of the need to allocate managerial, finance and technological resources (Iacovou, 1995; Rogers, 1995). There are several benefits to the company in using CRM: increase revenues and profitability, reduce internal and marketing costs, increase customer retention rate and enhance customer satisfaction (Goodhue, et al., 2002). The results from empirical database are in accordance with the normative literature, which indicate that the perceived benefits are a significant factor for implementing IS such as CRM, Enterprise Resource Planning (ERP) and Web Technologies (Alshawi, et al., 2011). Another study done related to the adoption of Enterprise Application Integration (EAI) supports the idea that organizations must

understand their systems and their barriers before taking any decision (Themistocleous, 2004). We postulate the following:

H5- Higher perceived benefits will positively influence CRM adoption.

Top management support

Ifinedo, (2011) reports that Management support refers to the "active engagement of top management with IS Implementation" and also seems us to be appropriate to be extend to CRM area.

Top management support is one the most addressed characteristics by CRM researchers (Chen & Popovich, 2003; Goodhue, et al., 2002; Payne & Frow, 2006; Zablah, et al., 2004). Indeed, a maximum level of understanding and companionship are key factors in the decision and implementation of a CRM system. Many are the cases where top managers are not even aware of a new technological implementation at the company (Chen & Popovich, 2003). Top management should act as a changing agent who should provide a different view and efficiently communicate the importance that adopting CRM can have in the entire organization (Ifinedo, 2011; Saeed, Kettinger, & Guha, 2011). When top managers understand the relevance of computer technology, they tend to play a crucial role in influencing other organizational members to accept it. On the contrary, when top management support is low or unavailable, technology adoption does not come as a priority to the firm and its workers (Ifinedo, 2011). Although this variable is quite addressed in the field of CRM, it is still not found in models of CRM adoption. Yet, this element has already been used in studies of other technological adoptions. such as the Electronic Data Interchange (EDI) in a research on European trucking industry Chwelos, Benbasat, & Dexter, (2001) and also Ifinedo, (2011) study the factors that influence internet/e-business technologies adoption by SMEs in Canada. We postulate the following.

H6- Organizations with greater top management support are more likely to adopt CRM.

Financial Commitment

Financial resources are another important element when deciding to adopt a new technology (Iacovou, 1995; Kevin Zhu & Kraemer, 2005). Those resources express the available capital in a company for investing on IT (Iacovou, 1995). In this paper, this factor has been chosen because it is compromising in the implementation of CRM. Adopting a CRM system involves many investments, such as hardware, purchase

implementation and integration systems, employee vendor and after sale support and employee training (Alshawi, et al., 2011). Thus, when financial resources are available and there is an existing compromise from top management to participate actively in the implementation, the necessary conditions are created for reaching the success of the CRM implementation (Chen & Popovich, 2003a; Kevin Zhu & Kraemer, 2005). We postulate the following.

H7-Financial commitment will positively influence CRM adoption.

Size

Firm size is an important organizational attribute for innovation diffusion (Rogers, 1995). However, this factor originates contradictory opinions regarding the field of CRM. It is difficult to recognize if there exists a negative or positive relationship regarding these two variables (Alshawi, et al., 2011). Still, many studies indicate that there is a positive relationship between them (Hsu, et al., 2006; Oliveira & Martins, 2010). Many researches indicate that large companies have a greater facility in adopting new technologies thanks to their higher capacity in providing financial resources or in paying integration and installation costs (Damanpour, 1992; Hsu, et al., 2006). On the other hand, some authors defend that the size of the company causes inertia. Large firms will be less agile and flexible in the processes in opposition to smaller companies (Kevin Zhu & Kraemer, 2005). Since, CRM systems requires a high budget to adopt and integrate costs, this research proposes the notion that large firms can easily absorb the risks and the costs of CRM adoption. We postulate the following.

H8- Firm size will positively influence CRM adoption.

3.1.4. Environmental context

Customers and Suppliers satisfaction

CRM has been seen as an opportunity for firms to achieve a competitive advantage, by offering greater value to customers (Campbell, 2003). Alshawi, et al., (2011) reveals that all 10 case studies which they have analyzed reveal that experiencing successful implementation link that with the concept of customer satisfaction, and indicate that the CRM system has helped in facilitating this process. In fact, customer relationship management applications facilitate organizational learning about customers by enabling firms to analyze purchase behaviors across transactions through different channels and customer preferences. Suppliers were either reveal as

costumers, that realize an successful implementation of CRM is very grateful for the business relationship (Alshawi, et al., 2011). We postulate the following:

H9- Customers and supplier satisfaction will positively influence CRM adoption.

Competitive Pressure

Competitive pressure refers to the degree of pressure that the company feels from competitors within the industry (Oliveira & Martins, 2010; Kevin Zhu & Kraemer, 2005). Porter and Millar (1985), when analyzing the strategic rationale underlying competitive pressure suggest that, by using a new innovation firms might be able to alter the rules of competition, affect the industry structure and leverage new ways to outperform rivals, thus changing the competitive landscape. This analysis may be extended to CRM. In fact, empirical evidence suggests that competitive pressure plays a significant role in pushing firms to adopt and use IT (Hsu, et al., 2006; Oliveira & Martins, 2010). Therefore, we assume that.

H10- Competitive pressure will positively influence CRM adoption.

Governmental support

This variable is similar to the regulatory environment factor, which has been considered as a critical factor influencing the diffusion innovation (Kevin Zhu, et al., 2006). In the Internet era and online selling processes , regulation must be strict enough not to compromise consumers (Hsu, et al., 2006). Many studies have been done in the field of e-business and e-commerce which address this factor as influent in the adoption. However, it is still not clear that this variable has significant influence in the field of CRM (Alshawi, et al., 2011). It is nevertheless important to enhance that all companies which possess an internal database compiled by consumers should be registered in a service assured by each government and guarantee its protection (Alshawi, et al., 2011). We postulate the following.

H11-Organizations with greater governmental support are more likely to adopt CRM.

Controls

As suggested in the literature, we used industry as dammy variable to control data variation that would not be explained by the previous variables (Oliveira & Martins, 2010; Soares-Aguiar & Palma-dos-Reis, 2008).

4. RESEARCH METHODOLOGY

4.1. MEASUREMENT

To test the conceptual model, we conducted a survey carried out in Portugal. The questionnaire items were done on literature basis (see Appendix A). We created a questionnaire in English, reviewed for two academic researchers and two CRM practitioners. An English version of the items was translated into Portuguese and reviewed by a group of two languages experts.

The questionnaire was advanced using a pilot test in 30 firms (the firms are not the same as used in the main survey). The objective is to check if the questionnaire was understandable, as well as to test the preliminary evidence of reliability and validity of the scales. Some items were eliminated (i.e. data quality and integration items) in order to simplify and focalize the results that are real important to obtain in our research, other items are simply modified to improve the interpretation. The results of the pilot study confirm reliability and validity of the scales.

The dependent variable CRM adoption was measured by two items, rating the stage of CRM adoption are passing by or how they think the adoption will it happen (Thiesse, et al., 2011). The independent variable technology competence was measured by five items indicate the number of IT professionals as well as IT and skills adequate to implement and operate with CRM systems (Chen & Popovich, 2003; Kevin Zhu, et al., 2006). Compatibility was measured by four items denoting the compatibility between the firm skills, infrastructure, work style and the CRM system (Ifinedo, 2011; Moore & Benbasat, 1991). Complexity was measured by three items which pretends to identify the difficulties to work with CRM systems (Ifinedo, 2011). Data quality and integration was measured by five items determining the importance and the use of data quality and the integration processes in the firm (Farouk, et al., 2005). Perceived benefits were measured by five items reflecting the advantages to CRM systems adoption, such as the reduction of internal and marketing costs or the increment of customer satisfaction (Chwelos, et al., 2001; Stephen & Thomas, 2008; Themistocleous, 2004; Kevin Zhu, et al., 2006). Top management support was measured by five items based on Saeed, et al., (2011) and Seyal, Rahman, & Mohammad, (2007) to determine the importance of top management support in CRM initiatives. Financial commitment was measured by three items determining if the budget allocate to CRM adoption and implementation is adequate to support extra

cost such as trainees courses (Chwelos, et al., 2001). Firm size was measured by two items through the number of employees and the annual business volume. Customers and suppliers satisfaction was measured by three items which pretends to better understand if the CRM systems generate value for the firm and their customers as well as to identify the needs of its consumers and suppliers (Alshawi, et al., 2011; Campbell, 2003; Payne & Frow, 2005). Competitive pressure was measured by four items reflecting the influence of other firms can achieve in CRM adoption decision (Ifinedo, 2011). The last variable is governmental support was measured by two items determining the existing roles, incentives and legislations (Alshawi, et al., 2011; Hsu, et al., 2006; Kevin Zhu & Kraemer, 2005).

To be consistent with the sources, the constructs (technology competence, compatibility, complexity, data quality and integration, perceived benefits, top management support, financial commitment, size, customers and suppliers satisfaction, competitive pressure, governmental support and CRM adoption) use a five-point Likert scale on an interval level ranging from "strongly disagree" to "strongly agree" and also on the interval "not at all significant ~ 5- very significant". The construct (firm size) was measured through the number of employees and the annual business volume (Chwelos, et al., 2001; Kevin Zhu & Kraemer, 2005).

4.2. DATA

To evaluate the theoretical construct, an online survey was carried out over a six weeks period (end of August to September 2012). The respondents show us relevant knowledge to speak about CRM adoption processes (i.e., CEOs, directors, IS managers, CRM technicians, business and product managers, or CFO´s). The sample was obtained from an important source list of Dun & Bradstreet, which is one of the world's leading sources of commercial information and approaching on businesses. The sample was a random draw of firms from Portugal. In total 2000 firms were contacted and 209 completed responses were received of which 82 firms belonged to the manufacturing sector, 108 to the services sector and finally, 18 belong to others, such as distributions and the health sector (Table 2). Then, we examined the common method bias by using Harman's one-factor test in our data set (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). No statically significant differences were found in the data.

Industries	Obs.	%	By Respondent´s Position		Obs.	%
Manufacturing	82	39%		CIO, CTO, VP OF IS or E-Business	8	3%
Services	108	52%	IS managers	IS Managers, Director CRM technical	33	16%
Others	18	9%		Other managers in IS Department	22	11%
				CEO. President. Director	25	12%
Firm size	**Obs.**	**%**	Non IS managers	Administration/ Finance Manager. Human Resources. CFO	76	36%
<10	6	3%		Other (Marketing VP. Other Managers)	45	22%
10-49	56	27%				
50-250	100	48%				
>250	47	22%				

Table 2 - Sample Characteristics (N=209)

5. RESULTS

We used partial least squares (PLS) to test our model, because: all items have not normal distribution (based on Komogorov-Smirnov test $p<0.01$ for all items), once PLS not require a normal distribution (Ringle, Hair, & Sarstedt, 2011); the conceptual model has not been tested in the literature. For these reason PLS seems to be adequate. In the PLS estimation the minimum sample size should satisfy one of the two following conditions: 1) ten times the largest number of formative indicators used to measure one construct; or 2) ten times the largest number of structural model (Ringle, et al., 2011). The sample in our study involved 209 firms doing so the necessary conditions for using PLS.

Using Smart- PLS software (Ringle, Wende, & Will, 2005); we first examined the measurement model to assess reliability and validity before testing the conceptual model.

5.1. MEASUREMENT MODEL

The results of the measurement model reported in Tables 3 and 4 and Appendix B present the reliability, validity, correlations and factor loadings. First, we evaluated the construct reliability of the scales using the composite reliability (CR) and Cronbach´s alpha (CA). The values in Table 3 reveals that the results for CR and CA are higher than 0.7 suggesting that scales present internal consistency (Henseler, Ringle, & Sinkovics, 2009).

To evaluated indicator reliability, we used this criteria in accordance with (Chin, 1998), factor loadings should be at least 0.6 and preferably greater than 0.7. For this reasons we eliminated eleven items (TC1, CPL1, CPL4, DQ5, PB3, PB4, PB5, FC1, FC4, FC5 and GS1). In Appendix B, we can see that all loadings (in bolt) are greater than 0.70. They are also statistically significant at the 0.01 level.

For assessing validity, two subtypes are usually examined; the convergent validity and the discriminant validity. We analyzed the average variance extracted (AVE) as a criterion of convergent validity (Fornell & Larcker, 1981). An AVE value at least 0.50 indicates sufficient convergent validity, meaning that the measurement model demonstrates convergent validity (Henseler, et al., 2009). As we can see in Table 3, the AVE for all constructs are higher than 0.5.

In PLS path modeling, two measures are adequate to evaluate discriminant validity: The Fornell-Larcker criterion and the cross-loadings. The first criterion requires

that AVE should be greater than the correlations between the construct. Table 4 shows that the square roots of AVEs (diagonal elements) are higher than the correlation between each pair of constructs (off-diagonal elements). The second criterion defends that the loading of each indicator should be greater than all cross-loadings (Chin, 1998). Appendix B reveals that the patterns of loadings (in bolt) are greater than cross-loadings. Thus, both measures are fulfilled.

Constructs	AVE	CR	CA
Technology competence (TC)	0.69	0.90	0.85
Compatibility (CPL)	0.73	0.84	0.63
Complexity (CPX)	0.68	0.86	0.78
Data quality (DQ)	0.70	0.90	0.85
Perceived benefits (PB)	0.90	0.95	0.89
Top management support (TMS)	0.81	0.96	0.94
Financial commitment (FC)	0.99	0.99	0.99
Firm Size (Size)	0.64	0.78	0.43
Customer and supplier satisfaction (CSS)	0.81	0.93	0.88
Competitive pressure (CP)	0.65	0.88	0.82
Governmental support (GS)	na	Na	Na
CRM adoption (CRMA)	0.93	0.96	0.92

Note: Average variance extracted (AVE), composite reliability and Cronbach´s alpha (CA).

Table 3 - Reliability indicators for full sample and sub-samples

	TC	CPL	CPX	DQ	PB	TMS	FC	Size	CSS	CP	GS	CRM Adopt
Technology competence (TC)	**0.83**											
Compatibility (CPL)	0.64	**0.85**										
Complexity (CPX)	-0.22	-0.27	**0.82**									
Data quality (DQ)	0.40	0.53	-0.23	**0.84**								
Perceived benefits (PB)	-0.02	0.00	0.03	0.12	**0.95**							
Top management support (TMS)	0.20	0.29	-0.21	0.26	0.28	**0.90**						
Financial commitment (FC)	0.18	0.17	-0.08	0.17	0.26	0.50	**0.99**					
Firm Size (Size)	0.15	0.14	-0.15	0.18	-0.11	0.00	0.02	**0.80**				
Customer and suppliers satisfaction (CSS)	0.41	0.57	-0.35	0.44	-0.01	0.21	0.07	0.15	**0.90**			
Competitive pressure (CP)	0.34	0.40	-0.13	0.31	-0.04	0.12	0.03	0.08	0.52	**0.81**		
Governmental support (GS)	0.22	0.26	-0.15	0.27	-0.01	0.06	0.17	0.05	0.27	0.17	**na**	
CRM adoption (CRM_A)	0.36	0.54	-0.30	0.42	-0.18	0.17	-0.08	0.22	0.45	0.45	0.10	**0.96**

Note: The diagonal in bold is the square root of the average variance extracted (AVE).

Table 4 - Correlations and AVEs

In summary, our measurement model satisfies construct reliability, indicator reliability, convergent validity criteria and discriminant validity. Thus, constructs developed by this measurement model could be used in structural model.

5.2. STRUCTURAL MODEL

The conceptual model explains 47.5% of the variance of CRM adoption. The significance of the path coefficients was assessed by means of a bootstrapping procedure with 500 times resampling (Chin, 1998). Figure 2, also shows the path coefficients and t-value results.

The results of the statistical analysis of the full sample are shown as: The hypotheses for compatibility ($\hat{\beta}$ = 0.33; p<0.01), data quality and integration ($\hat{\beta}$ = 0.17; p<0.01), top management support ($\hat{\beta}$ = 0.12; P<0.10), firm size ($\hat{\beta}$ = 0.10; p<0.05) and competitive pressure ($\hat{\beta}$ = 0.24; p<0.05) revels significant and positive path to CRM adoption. Thus, H2, H4, H6, H8, and H10 are supported. On other hand, complexity ($\hat{\beta}$ = -0.12; p<0.05) is statistically significant inhibitor for CRM adoption, consequently H3 is also confirmed.

Technology competence ($\hat{\beta}$ = -0.03; p>0.10), customer and supplier satisfaction ($\hat{\beta}$ =0.02; p>0.10) and governmental support ($\hat{\beta}$ = -0.07; p>0.10) are not statistically significant. Thus, hypotheses H1, H9, H10 are not confirmed. Hypotheses, perceived Benefits ($\hat{\beta}$ = -0.17; p<0.01) and financial commitment ($\hat{\beta}$ = -0.18; p<0.01) are statistically significant but with reversed directionality, so H5 and H7 are not confirmed.
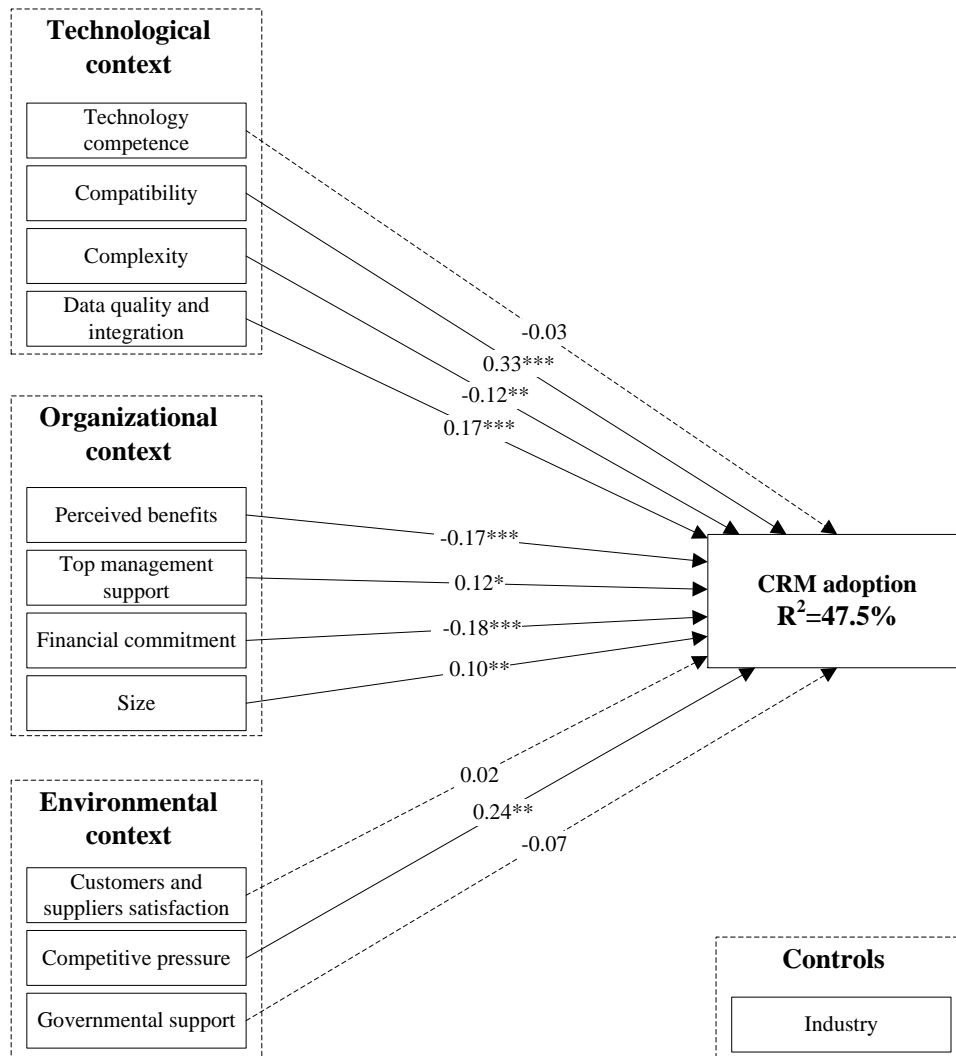
Figure 2 - Path model

Note: * Significant at 0.1; ** Significant at 0.05; *** Significant at 0.01.

The paths dashed are not statically significant.

6. DISCUSSION

6.1. THEORETICAL IMPLICATIONS

Our conceptual model is based on technology-organization-environment (TOE) framework (Tornatzky & Fleischer, 1990). We realize, that this study provides a great approach for academics since that was none study have been done, using TOE framework as a predictor of CRM adoption. Moreover, it might be useful for managers to assess their mechanisms for facilitation CRM initiatives and the adoption decision process. Our empirical results generally support the model and we have identified significant drivers of CRM adoption. Based on that, we summarized underneath.

6.2. PRACTICAL IMPLICATIONS

Technology competence **(H1)** is not a relevant factor in CRM adoption. The results show us that the compatibility factor seems to be the most important predictor to explain CRM adoption. A plausible explanation is that managers possibly regard other important factors such as funding support to purchase necessary extra courses or integration platforms instead not adopting CRM systems based on technology competence issues.

Compatibility **(H2)** is a facilitator for the adoption of CRM (Figure 2). The findings are consistent with related studies in the literature (Chen & Popovich, 2003a; Haug & Arlbjørn, 2011; Payne & Frow, 2005). Technology integration, labor style preferences and cultural and organizational acceptance of an innovation adoption are factors that facilitate the adoption of CRM (Chen & Popovich, 2003; Haug & Arlbjørn, 2011; Payne & Frow, 2005). Moreover, this hypothesis is formulated based by the importance that a higher level of synergy between marketing and IT workforce supports business growth and a better CRM integration (Campbell, 2003; Geffen & Ridings 2002).

Complexity **(H3)** is an inhibitor for the CRM adoption. It was shown that the perception of high complexity had a negative effect on the selection of the CRM systems. Consumers prefer to choose a simpler system to avoid implementation and training costs (Alshawi, et al., 2011; Kevin Zhu, et al., 2006). The concept of complexity is not different in other domains of innovation technologies, which the perceptions are related with the discomfort and insecurity to operate with a new system, becomes a strong inhibitor to the adoption (Chwelos, et al., 2001).

The previous hypothesis is data quality and integration **(H4)**. As expected, data quality and integration are greater for firms considering CRM adoption. This is

consistent with earlier studies that also identify data quality and integration as a facilitator of CRM adoption (Alshawi, et al., 2011; Haug & Arlbjørn, 2011). CRM systems should work when the integration data process is concluded and after it has been certified that the data basis is well organized and consistent with original sources (Farouk, et al., 2005). This hypothesis is compliant with relevant CRM literature, because the data basis is the raw material which enables CRM systems to operate.

Perceived Benefits **(H5)** is an inhibitor for the CRM adoption. The results have shown us a negative relation between our hypothesis and the results obtained. A possible explanation is that the firms are adopting CRM for different reasons from those listed in survey. (i.e., perceived benefits such as costs reduction, increase retention rates, improving consumer satisfaction can represent to the firm intangible benefits). According to (Shang & Seddon, 2002) it is difficult to identify and quantify the benefits before the implementation. Some questions are made by managers;
"When will these benefits be perceived or will our investment pay off?". Contrarily, other studies have identified a positive relation between this particular perceived benefits and the adoption of innovations (Alshawi, et al., 2011; Goodhue, et al., 2002; Themistocleous, 2004).

Our study demonstrated that top management support **(H6)** is a significant factor to a successful adoption of CRM. This is consistent with conclusions from related studies (Coltman, 2007; Dong & Zhu, 2008; Ifinedo, 2011) that has recognized the importance of top management support in adoption and implementation process new technologies. It seems to us pertinent to extend this conclusion to CRM area.

Financial commitment (**H7**) is an inhibitor for the CRM adoption. The results explain that the firms which a comfortable budget are the least likely to adopt CRM, contrarily the firms with a reduced budget are the most likely to adopt this tool. Plausible reasons for this, concern that companies need more financial resources to implement more. However, we believe the financial commitment can be a good predictor to explain IT adoption (Alshawi, et al., 2011; Chwelos, et al., 2001).

The results show that firm size **(H8)** is a facilitator for the CRM adoption. The result is consistent with the literature. It argues that large firms have more resources to adopt and carry the risks of this adoption (Damanpour, 1992). CRM adoption should be seen as a great investment and evaluated in a long term period. This explanation is useful to large firms which pretend to invest in CRM systems.

Customer and supplier satisfaction **(H9)** is not a significant factor for CRM adoption. CRM system can be seen as a facilitator to increase the revenues and reduce

costs, but other benefits should be considered, such as the facility that systems can offer meeting the consumer's needs and goals (Shutao, 2011). This result it is possibly justify by the lack of knowledge about CRM systems and the possible advantages for the firm. Sometimes, are still operating with obsolete techniques.

Competitive pressure (**H10)** is an important and facilitator predictor in CRM adoption. The findings are consistent with related literature (Iacovou, 1995; Kevin Zhu, et al., 2006). Prior studies on technology diffusion have found that competitive pressure increases a firm's incentives to adopt a new technology. However, it is important to understand that the environmental context, such as competitive pressure, can not be the main responsible for the adopt intention. Other relevant factors should be regarded as essential.

Finally, governmental support **(H11)** shows that is not a significant predictor to CRM adoption. In fact, there is a suitable justification for that. CRM is an independent strategic technique and is usually used as a technological working tool and so does not need to be regulated, except for campaigns done through internet, fax or phone. In these cases, consumers' information should be assured by national commission for data protection.

7. LIMITATIONS AND FUTURE DIRECTIONS

This study presents some limitations as well as offer several contributions to future research. First limitation is that the sample size is limited to Portugal. Future research can test our theoretical model using a broader across countries. Secondly, our sample was obtained within various sectors, such as manufacturing, services, distribution and health. It could be interesting to use the same model and analyze the differences in different sectors, in order to adequate the model to a specific sector. Lastly, in our research we focused our attention to identify the main factors to CRM adoption. However, CRM area deserves to study pos-adoption process in order to understand the value contribution of CRM system to the firm.

8. CONCLUSIONS

Customer relationship management (CRM) has become one of the greatest technological, organizational and strategic contributions to firms. CRM provides firms to use powerful techniques to retain and gain new clients through different channels and campaigns. This study aims to identify the determinants of CRM adoption. For this purpose, we realize that the study done by Alshawi, et al., (2011) projected an important qualitative research on CRM adoption factors, achievable to settle in TOE framework. A research model was developed, that is based in 209 firms from Portugal in different sectors.

The study concludes that we could validate some important drivers to CRM adoption factors (i.e., compatibility, data quality and integration, top management support, firm size and competitive pressure). Lastly, complexity show to be a strong inhibitor for CRM adoption.

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10.APPENDIX

10.1. APPENDIX A: TABLE A - MEASURE ITEMS

Independent variables

	Constructs	Indicators	References
Technological context	*Technology competence*	TC1- Number of IT professionals (#) Rate the following statements in terms of technological competence (1~5): TC2- Adequate IT infrastructure to implement CRM systems TC3- Adequate IT infrastructure to operate with CRM systems TC4- Adequate skills to implement CRM systems TC5- Adequate skills to operate with CRM systems	(Chen & Popovich, 2003b; Kevin Zhu, et al., 2006)
	Compatibility	CPL1- Use of CRM systems is compatible with all aspects of our business operations CPL2- Use of CRM systems is compatible with actual hardware and software of the firm CPL3- Use CRM systems into our working style CPL4- Use of CRM systems is completely compatible with our current business operations	(Moore & Benbasat, 1991; Princely, 2011)
	Complexity	CPX1- Using CRM systems require a lot of mental effort CPX2- Using CRM systems s frustrating CPX3- Using CRM systems is too complex for our business operations	(Ifinedo, 2011)
	Data quality and integration	DQ1 Data quality issues is relevant to your organization when implementing CRM systems DQ2- Data integration issues is relevant to your organization when implementing CRM systems DQ3- CRM systems are supported with data quality and data integration tools DQ4- Customer data needs to be integrated and checked for quality DQ5- It is needed to integrate external data sources	(Farouk Missi., Sarmad Alshawi., & Fitzgerald., 2005)
Organizational Context	*Perceived benefits*	Rate the advantages that led to the adoption or not of CRM systems(1~5): PB1-Reduce internal costs PB2-Reduce marketing costs PB3-Increase customer satisfaction PB4- Higher customer retention rates PB5-Increase revenues and profitability	(Chwelos, et al., 2001) (Stephen & Thomas, 2008; Themistocleous, 2004; Kevin Zhu, et al., 2006)
	Top management support	Rate the following statements in terms of support from Top Management (1~5) TMS1- Top management supports the adoption of CRM systems TMS2- Top management supports the operation of CRM systems TMS3- Top management is actively involved in the CRM business philosophy and are able to link this to their enterprise strategy and objectives TMS4- Top management is willing to take risks (financial and organizational) involved in the adoption of CRM systems TMS5- Top management is willing to take risks (financial and organizational) involved in the operation of CRM systems	(Saeed, et al., 2011; Seyal, et al., 2007)
	Financial commitment	FC1- In the context of your organization's overall information systems (IS) budget (1- not at all significant ~ 5- very significant) How significant would the financial cost of developing a CRM system be? How significant would the financial cost implementing a CRM system be?	(Chwelos, et al., 2001)
		Rate issues in terms of financial commitment for the CRM system in your company (1~5) FC2- The company's budget allocated for adoption of CRM systems is FC3- The company's budget allocated for operation of CRM systems is appropriate FC4- The company support CRM implementation FC3- The company support CRM utilization costs	(Alshawi, et al., 2011)
	Size	S1- Number of employees (#) S2- Annual Business Volume ((1) <2,000,000€; (2) 2,000,000€ -10,000,000€; (3) 10,000,000€-50,000,000€; (4) >50,000,000€.)	(Chwelos, et al., 2001; Hsu, et al., 2006; Kevin Zhu & Kraemer, 2005)

Environment Context	*Customers and suppliers satisfaction*	Rate the following statements relating to the satisfaction of consumers and suppliers (1~5) CSS1- The CRM system is seen in his company as a tool that creates value for consumers and suppliers. CSS2- The adoption of the CRM systems in your company could increase the satisfaction of consumers and suppliers. CSS3- The adoption of the CRM systems in your company could better understand and meet the needs of its consumers and suppliers.	(Alshawi, et al., 2011; Campbell, 2003; A. Payne & P. Frow, 2005)
	Competitive pressure	Rate the following statements in terms of competitive pressure (1~5) CP1- Firms think that CRM system has an influence on competition in their industry. CP2- Our firm is under pressure from competitors to adopt CRM systems . CP3- Some of our competitors have already started using CRM systems. CP4- Our competitors know the importance of CRM system and are using them for operations	(Princely, 2011)
	Governmental support	Rate the following statements in terms of government incentives (1~5) GS1- There are government incentives for the adoption of CRM systems GS2- The data protection policies are regulated	(Hsu, et al., 2006; Kevin Zhu & Kraemer, 2005) (Alshawi, et al., 2011)

Dependent variables

Adoption	*CRM adoption*	CRM_A1- At what stage of CRM systems adoption is your organization currently engaged? Not considering; Currently evaluating (e.g.. in a pilot study); Have evaluated. but do not plan to adopt this technology; Have evaluated and plan to adopt this technology; Have already adopted services, infrastructure or platforms of CRM. CRM_A2 - If you're anticipating that your company will CRM in the future. How do you think will it happen? Not considering; More than 5 years; Between 2 and 5 years; Between 1 and 2 years; Less than 1year; Have already adopted services, infrastructure or platforms of CRM.	(Thiesse, et al., 2011)

10.2. APPENDIX B: PLS LOADINGS AND CROSS-LOADINGS

Constructs	Items	TC	CPL	CPX	DQ	PB	TMS	FC	Size	CSS	CP	GS	CRMI
Technology competence (TC)	TC2	**0.81**	0.48	-0.22	0.29	0.04	0.18	0.22	0.09	0.32	0.22	0.21	0.22
	TC3	**0.79**	0.55	-0.18	0.33	-0.04	0.16	0.11	0.15	0.37	0.26	0.23	0.26
	TC4	**0.85**	0.51	-0.11	0.26	0.00	0.15	0.11	0.09	0.30	0.31	0.13	0.30
	TC5	**0.87**	0.59	-0.23	0.42	-0.05	0.16	0.18	0.15	0.37	0.33	0.18	0.37
Compatibility (CPL)	CPL2	0.55	**0.81**	-0.12	0.40	0.03	0.16	0.12	0.02	0.30	0.29	0.26	0.40
	CPL3	0.55	**0.89**	-0.32	0.49	-0.01	0.31	0.16	0.20	0.64	0.38	0.19	0.51
Complexity (CPX)	CPX1	-0.02	-0.02	**0.66**	-0.02	0.05	-0.10	-0.09	-0.07	-0.02	0.09	-0.05	-0.11
	CPX2	-0.26	-0.34	**0.89**	-0.29	-0.05	-0.16	-0.04	-0.14	-0.42	-0.17	-0.16	-0.28
	CPX3	-0.19	-0.22	**0.90**	-0.18	0.08	-0.22	-0.08	-0.14	-0.29	-0.13	-0.13	-0.30
Data quality (DQ)	DQ1	0.35	0.46	-0.27	**0.90**	0.05	0.26	0.19	0.21	0.41	0.30	0.21	0.41
	DQ2	0.36	0.50	-0.22	**0.93**	0.12	0.24	0.13	0.14	0.40	0.30	0.24	0.40
	DQ3	0.31	0.42	-0.09	**0.70**	0.11	0.22	0.15	0.11	0.29	0.16	0.29	0.27
	DQ4	0.32	0.38	-0.16	**0.79**	0.15	0.15	0.09	0.11	0.38	0.26	0.20	0.31
Perceived benefits (PB)	PB1	-0.01	0.03	0.02	0.14	**0.95**	0.28	0.26	-0.14	-0.02	-0.08	0.02	-0.18
	PB2	-0.02	-0.02	0.04	0.09	**0.95**	0.25	0.23	-0.08	0.00	0.00	-0.04	-0.17
Top management support (TMS)	TMS1	0.18	0.29	-0.22	0.32	0.28	**0.94**	0.44	0.08	0.24	0.15	0.10	0.21
	TMS2	0.24	0.28	-0.24	0.27	0.25	**0.91**	0.43	0.00	0.25	0.13	0.06	0.17
	TMS3	0.15	0.20	-0.15	0.16	0.25	**0.90**	0.42	-0.04	0.13	0.07	0.06	0.12
	TMS4	0.16	0.27	-0.14	0.17	0.23	**0.88**	0.49	-0.05	0.12	0.08	0.02	0.13
	TMS5	0.13	0.24	-0.12	0.16	0.23	**0.87**	0.50	-0.06	0.13	0.07	0.03	0.09
Financial commitment (FC)	FC2	0.18	0.16	-0.08	0.17	0.27	0.48	**0.99**	0.03	0.08	0.03	0.18	-0.07
	FC3	0.19	0.17	-0.08	0.17	0.25	0.50	**1.00**	0.02	0.07	0.04	0.16	-0.08
Firm Size (Size)	S1	0.06	0.07	-0.10	0.08	-0.10	0.01	0.02	**0.82**	0.08	0.00	0.01	0.19
	S2	0.18	0.17	-0.14	0.20	-0.08	-0.01	0.02	**0.77**	0.17	0.14	0.07	0.17
Customer and supplier satisfaction (CSS)	CSS1	0.42	0.56	-0.34	0.37	0.05	0.26	0.15	0.08	**0.82**	0.38	0.22	0.40
	CSS2	0.34	0.48	-0.30	0.41	-0.04	0.12	0.00	0.14	**0.94**	0.54	0.28	0.42
	CSS3	0.35	0.49	-0.31	0.41	-0.04	0.18	0.05	0.18	**0.93**	0.49	0.23	0.39
Competitive pressure (CP)	CP1	0.37	0.45	-0.18	0.32	0.04	0.12	0.02	0.03	0.56	**0.74**	0.10	0.42
	CP2	0.19	0.24	-0.02	0.14	0.07	0.13	0.05	0.01	0.30	**0.73**	0.06	0.24
	CP3	0.25	0.29	-0.11	0.29	-0.11	0.08	0.01	0.11	0.42	**0.88**	0.17	0.40
	CP4	0.25	0.26	-0.08	0.21	-0.11	0.07	0.05	0.11	0.34	**0.87**	0.20	0.35
Governmental support (GS)	GS2	0.22	0.26	-0.15	0.27	-0.01	0.06	0.17	0.05	0.27	0.17	**1.00**	0.10
CRM adoption (CRMA)	CRM_A1	0.34	0.51	-0.28	0.38	-0.21	0.16	-0.07	0.22	0.43	0.46	0.13	**0.96**
	CRM_A2	0.35	0.53	-0.30	0.43	-0.15	0.18	-0.08	0.21	0.45	0.42	0.07	**0.96**