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UNDERSTANDING THE PROCESS OF CRM ADOPTION STAGES: A CONCEPTUAL MODEL BASED ON TOE *FRAMEWORK*

Andreia Marisa Gonçalves Pinheiro

Dissertation presented as partial requirement for obtaining the Master's degree in Statistics and Information Management, with specialization in Market research and CRM

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To my grandmother: Thank you for everything, you will always be my hero.

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ABSTRACT

Customer relationship management (CRM) is the technique presented in this study that enables organizations, to know and to better understand their customers' needs, treating each them differently. CRM improves the organization's ability to interact with their customers and to build a competitive advantage, which is continuing to receive considerable attention from scholars and business context.

However, a review of Literature indicates that there is a lack of research related to CRM adoption stages. To fill this gap, this study presents a conceptual model to examine the antecedents, at the firm level, in technology-organization-environment contexts (TOE) *framework,* which affects CRM adoption stages (i.e. intention, adoption, and routinization). Data collected from 277 companies, are used to test the conceptual model. "Partial least squares" (PLS) is the technique used to examine the related hypotheses. The findings and contributions of the study are presented.

KEYWORDS

Customer relationship management (CRM); Information technology (IT); Adoption; Adoption stages; Technology-organization-environment (TOE) framework.

RESUMO

O CRM é a técnica presente neste estudo, que permite às empresas conhecer e compreender melhor as necessidades dos clientes, abordando cada um deles de forma diferente. O CRM vai melhorar a capacidade de interação das empresas com os seus clientes, e desenvolver vantagem competitiva. É uma ferramenta que continua a ter influência para os estudantes e organizações.

No entanto, tendo em conta a revisão da literatura há uma carência de estudos sobre os estágios de adoção do CRM. Para colmatar esta falha, o nosso estudo apresenta um modelo conceptual, em que relaciona fatores do contexto tecnológico, organizacional e do meio envolvente (TOE), com os estágios de adoção do CRM - iniciação, adoção e implementação, nas organizações.

Foi recolhida informação proveniente de 277 empresas para testar o modelo conceptual. A técnica estatística Partial Least Square (PLS) é o método utilizado para testar as hipóteses. Os resultados e contributos do estudo serão apresentados.

PALAVRAS CHAVE

CRM; Tecnologia de informação (IT); Adoção; Estágios de adoção; contexto tecnológico, organizacional e do meio envolvente (TOE).

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LIST OF ABBREVIATIONS AND ACRONYMS

AVE-Average variance extracted

B2C EC-Business to Business electronic commerce

CEO-Chief executive office

CFO-Chief financial officer

CIO-Chief information officer

COO-Chief operating officer

CP-Competitive pressure

CR-Compositive reliability

CRM-Customer relationship management

CRMA-CRM adoption

CRMI-CRM initiation

CRMR-CRM routinization

CS-Cost savings

DOI-Diffusion of innovations

DQ-Data quality and integration

EU-The European Union

FS-Firm size

GS-Global scope

IS-Information system

IT-Information technology

MO-Managerial obstacles

PB-Perceived benefits

PLS-Partial least square

RS-Regulatory support

SC-Security concerns

SEM-Structural Equation Modelling

TC-Technology competence

TI-Technology integration

TMS-Top management support

TOE-Technology, information and environment contexts

TR-Technology readiness

VIF-Variance inflation factor

1.INTRODUCTION

Over the recent years, new ways of communication created by social networks are emerging, such as mobile computing and other data warehouse technologies, shifting consumer behaviours and actively influenced customer relationships (Batra & Keller, 2016). Nowadays, managers have more information, which can be a challenging factor to generate customer insights and manage long-term customer relationships (Payne & Frow, 2017). This panorama, effectively involved customer relationship management (CRM), which continues to be a powerful tool for improving the organization's ability to interact with your customers, as well as to build a competitive advantage (Garrido-Moreno, Lockett, & García-Morales, 2014; Jaber & Simkin, 2016). Hence, CRM is a combination of people, practices and technology, providing a better understanding of customers' needs, and personalizing its products and services, improving customer satisfaction, sustaining customer loyalty, and thus, differentiating from competitors (Alshawi, Missi, & Irani, 2011; Payne & Frow, 2013; Steel, Dubelaar, & Ewing, 2013).

Due to the continuous attention from the academic community, and the huge investments by organizations for integrating CRM into their systems, there still remains a prominent assumption about CRM; an understanding that is usually perceived as either an exclusively technological or a marketing tool. Theoretically it should be seen as a dynamic innovation, that could be controlled for several reasons by external and internal firms in order to maximize operational efficiency and competitive agility for sustainability of the company (Finnegan & Currie, 2010; Garrido-Moreno & Padilla-Meléndez, 2011; Richards & Jones, 2008; Weerd, Sartika, & Brinkkemper, 2016). Nevertheless, while literature often cites CRM projects or CRM performance (see, e.g., Finnegan & Currie, 2010; Hillebrand, Nijholt, & Nijssen, 2011; Josiassen, Assaf, & Cvelbar, 2014; Trainor, Mick, Rapp, & Agnihotri, 2014), there is a perceived need for an holistic perspective of CRM adoption, which can help clear a vision or understanding about its adoption at the firm level (Jaber & Simkin, 2016; Richards & Jones, 2008). Considering these significant gaps in CRM literature, this study aims to understand how CRM is implemented at a firm level, and how that could be influenced by determinants from the contexts of TOE *framework* (i.e. technology-organization-environment). Therefore, this study offers a better understanding about CRM implementation as a dynamic technology, by examining the positive relationship between CRM adoption stages (i.e. initiation, adoption, and routinization) and its factors. Hence, this study also extends the CRM scientific knowledge, due a seemingly non-existence of studies about CRM adoption stages. Moreover, the proposed data quality and integration perceived as a moderator of top management support, helped to gain some interesting findings for scholars and managers. Additionally, it offers a new perspective about contexts of TOE framework, which evaluates CRM adoption stages in different industry sectors. Thus, our study also contributes in extending the great potential of TOE framework over information technology.

This study is organized as follows: In the next section, it mentions the concept of CRM providing a background on this technology. In the third section, it presents the conceptual model subsequently providing hypotheses for consideration. In section four it describes the study method and design. In section five we present the final results. In section six we discuss the major findings for managers and academics, followed by purported limitations of the study. In last section we present future lines of research.

2.THEORETICAL BACKGROUND

2.1.THE CONCEPT OF CRM

The concept of CRM does not have an appropriate definition from both business and academic communities (Richards & Jones, 2008). Some authors argue that a lack of understanding regarding CRM exists currently (Rababah, Mohd, & Ibrahim, 2011). According to Rababah et al (2011), the resultant misunderstanding built around the concept of CRM is combined with the distinct academic backgrounds of the researchers, and because of the multidisciplinary nature of CRM, which all are a combination of management, marketing and information systems subjects, this lack of understanding is promulgated.

Thus, CRM could be seen as a business philosophy, which defined CRM as a science of marketing focus in customer relationship orientation; as a business strategy, CRM seeks to satisfy customer's needs and preferences, treating each of them differently and uniquely; as a business process, CRM is defined as a positive influence in changing the whole structure of an organization belonging to different activity levels of the organization, in addition to marketing, customer service, production, and channel management, all with a common purpose – create a customer knowledge base (Peppers & Rogers, 2004; Rababah et al., 2011). As a technology tool, CRM is referred to as an enabler for organizations to develop closer relationship with their customers, across different and new technologies (Rababah et al., 2011). Therefore, CRM involves the integration of people, practices and technology which in many respects, is defined as a form of relationship strategy for the business context or as a relationship marketing technique in the academic community (Payne & Frow, 2013; Richards & Jones, 2008).

However, CRM has been widely regarded as a technologic solution, that enables organizations to manage customer relationship more efficiently through the detailed and accurate analysis of consumer data (Ko, Kim, Kim, & Woo, 2008). In the context of technological solution as cited by CRM systems, are categorized into three distinct categories: (1. Operational, enhanced by the determination to automate and increase the efficiency of CRM processes, customer service and support systems, sales force automation and marketing automation belongs to this category (Rababah et al., 2011); (2. Analytical, used to provide a better knowledge about consumer behaviour as a perceived need of individuals, containing several business intelligence applications such as data mining; and finally, (3. Collaborative, used to manage and integrate communication channels and customer interaction touchpoints, an institutional website. E-mail, and Facebook page are examples of collaborative systems (Khodakarami & Chan, 2014; Rababah et al., 2011). These three categories of CRM systems enable organizations to acquire and generate customer knowledge, across different and multiple touchpoints in order to obtain a comprehensive knowledge about consumer behaviour (Khodakarami & Chan, 2014). In a point of fact, considering the advancement of technologies, some companies are more prepared to achieve competitive advantage by gathering continuous information from different practices, which optimizes the interaction with the costumers, increasing customer value, and companies' profitability (Khodakarami & Chan, 2014; Kotler, 2017).

2.2. PRIOR RESEARCH ON CRM ADOPTION

Based on prior research in CRM adoption, we may assume that most of the studies evaluated the effectiveness and success of CRM in the organizations, such as the institutional theory from Hillebrand et al. (2011), which are applied to contribute better understanding of the effectiveness of CRM activities. Finnegan & Currie (2010), presented in their model the relationship between specific contexts to explain CRM implementation. According to CRM success, Peltier, Zahay, & Lehmann (2013), provides an organizational learning framework by linking organizational processes, customer data quality and firm performance. Additionally, Garrido-Moreno & Padilla-Meléndez (2011) examined the effect with knowledge management to support CRM performance. Furthermore, Jaber & Simkin (2016) analyzed the antecedents of CRM adoption. Some of the studies were applied to contribute to the CRM understanding (see, e.g., Richards & Jones, 2008; Rababah et al., 2011; Payne & Frow, 2013).

On the other hand, Alshawi et al. (2011), proposed to study the organizational, technical and data quality factors as influence drivers to CRM adoption in small and medium-sized enterprises (SMEs). In the same way, Ko et al. (2008), developed in their research the intention, adoption and implementation of CRM, also exploring the impact about organizational characteristics in CRM adoption process, in the Korean context. Hung, Hung, Tsai, & Jiang (2010), suggested an integrated model, that incorporates both organizational and technological factors, as the main determinants of CRM solutions in hospitality. Otherwise, none of them are capable to explain CRM adoption into the three adoption stages, which have been a popular support of research in many technologic innovation studies, as we can see in Table 1

Technology studied	Adoption stages	Source	Adoption factors											
			TC	TR	TI	TMS	FS	SC	CS	MO	PB	GS	CP	RS
Cloud computing adoption	adoption	(Oliveira, Thomas, & Espadanal, 2014)		x		x	x	x	x				x	x
E-business	adoption	(S. Xu, Zhu, & Gibbs, 2004)	x				x					x	x	x
E-business	Initiation, adoption routinization	(K. Zhu, Kraemer, & Xu, 2006)		x	x		x			X		x	x	x
Mobile supply chain (SCM)	evaluation, adoption, routinization	(Chan & Chong, 2013)	x		x	x	x	x					x	
Radio frequency identification (RFID)	evaluation, adoption, routinization	(Chong & Chan, 2012)				x	x	x	x				x	
Software-as-a-service (SaaS)	intention, adoption, routinization	(Martins, Oliveira, & Thomas, 2016)	x			x		x	x					
E-signature	adoption	(Chang, Hwang, Hung, Lin, & Yen, 2007)					x	x						
EDI	adoption	(Kuan & Chau, 2001)	x						x		x			
Hospital information system	adoption	(Ahmadi, Nilashi, Shahmoradi, & Ibrahim, 2017)		x	x	x								
Broadband mobile applications	Initiation, adoption, implementation	(Chen & Chen, 2017)				x							x	x
Electronic commerce (B2C EC)	Intent to adopt	(Alsaad, Mohamad, & Azizi, 2017)		x		x							X	
ERP	ERP assimilation	(W. Xu, Ou, & Fan, 2015)				x	x						x	

Notes: TC-technology competence, TR-technology readiness, TI-technology integration, TMS-top management support, FS-firm size, SC-security concerns, CS-cost savings, MO-managerial obstacles, PB-perceived benefits, GS-global scope, CP-competitive pressure, RS-regulatory support.

Table 1 - Studies from TOE

2.3. ADOPTION MODELS AT FIRM LEVEL

The adoption models at the firm level are applied in several IT adoption models, which are used for examining organizational decisions to accept or reject a technological innovation (Oliveira & Martins, 2011). This process is considered to be successful only if the innovation is accepted, adapted, routinized, and institutionalized into every area of the organization, over a period of time (K. Zhu et al., 2006). The technology-organizational-environmental (TOE) *framework*, introduced by Tornatzky & Fleischer (1990), identifies three relevant variables, having influence in the process of adoption in the company (Hameed, Counsell, & Swift, 2012). The variables are characterized through specific contexts: technology context, refers to the internal and external technology relevant to the organization and also includes the internal and external technologies available and relevant for possible adoption. The organizational context, comprehends the descriptive measures of the organization. The environmental context refers to the limitations and opportunities of a specific market context, containing market elements, competitors and regulators (Martins et al., 2016).

The TOE *framework* includes the environment context, being a better model to explain the IT innovation adoption (Oliveira & Martins, 2011). Since this relevant context, this model has been considered one of the most important models at the firm level, and was the most common application found in the studies, that used only the TOE model or combining with other models (please, see Table 1) broadband mobile applications, cloud computing adoption, hospital information systems, electronic commerce (B2C EC), and e-business are some of them (Ahmadi, Nilashi, Shahmoradi, & Ibrahim, 2017; Chen & Chen, 2017; Oliveira, Thomas, & Espadanal, 2014; Zhu et al., 2006). Among the reasons mentioned, we decided to use TOE *framework*, to explain and estimate our conceptual model.

2.4. ADOPTION STAGES

Rogers (1995), the author of diffusion of innovations (DOI) theory stated the innovation adoption was a process occurring over a sequence of phases, through an awareness or knowledge phase about innovation itself including the advantage's and disadvantage's to adopt it for organizations. This is followed by a perspective, attitude and a formal decision to adopt it, and then, implementation, as a confirmation of the decision (Hameed et al., 2012). According to Hameed et al. (2012), the implementation stage is when the innovation is adjusted and implemented across the entire organization.

Several researchers presented different perspectives about adoption stages. Some of these perspectives were divided into evaluation, initiation, implementation and routinization. Others explain the innovation adoption process into six stages: knowledge, awareness, attitudes formation, decision, initial implementation, and sustained implementation (Hameed et al., 2012). In a similar manner, the adoption process is described within a certain series of activities which include initiation and progression through the adoption, adaptation, acceptance, routinization, and infusion (Hameed et al., 2012). Rogers (1995), presented in his diffusion of innovations theory five stages, stating that a technology will go through the process of knowledge, persuasion, decision, implementation, and confirmation stages (Chong & Chan, 2012). However, early adoption of IT innovation studies have been widely summarized into three stages: initiation, adoption, and routinization (please, see Table 1). These three stages are often stated as pre-adoption, adoption-decision and post-adoption in the IS literature (Hameed et al., 2012). These three adoption stages are consistent with the most previous studies on innovation adoption, such as, in the study of e-business assimilation (Zhu et al., 2006), diffusion of software-as-a-service (SaaS) (Martins et al., 2016), broadband mobile applications diffusion (Chen & Chen, 2017), CRM adoption in the Korean fashion industry (Ko et al., 2008), radio frequency identification diffusion (Chong & Chan, 2012) and mobile supply chain management system diffusion (Chan & Chong, 2013).

In consideration of this study, the theory of adoption stages is relevant. It explains the CRM adoption, which could vary in each stage according to its relevant factors (Chong & Chan, 2012), which makes the current study viable in obtaining a comprehensive understanding of CRM across different adoption stages. Initiation is the first stage, where potential benefits of CRM solutions are being evaluated across all chain activities of the organization, thus forming an attitude towards the CRM adoption (K. Zhu et al., 2006). CRM adoption, is the next stage, defined as the formal stage where the decision to adopt was made (K. Zhu et al., 2006). This stage consists in accepting the idea, and evaluating the technical, financial and strategic perspectives with the all resources needed for its acquisition and implementation (Hameed et al., 2012). The final stage is the routinization, which involves the implementation and integration of CRM solutions, through the organization, preparing them for use of the CRM technology, preforming a trial system for validation of CRM, including the acceptance by users. It also a continues an adoption of all elements of the organization, and possibly, with other supply chain members, as well (Chan & Chong, 2013; Hameed et al., 2012). In Table 1, we can see the studies from TOE, and the adoption stages applied.

3. CONCEPTUAL MODEL FOR CRM ADOPTION STAGES

The conceptual model (please see Figure 1) is developed through the technology, organizational, and environmental contexts promoted by a TOE *framework*. We considered four constructs: (1. Technology competence (technology context), (2. Top management support (organizational context), (3. Competitive pressure (environmental context), as interpretive of CRM and, (4. CRM initiation, CRM adoption and CRM routinization. We applied data quality and integration as a moderator of the top management support as well because it provides accurate information supporting decision making on CRM solutions. To test the proposed conceptual model, we formulated the hypotheses as follows:

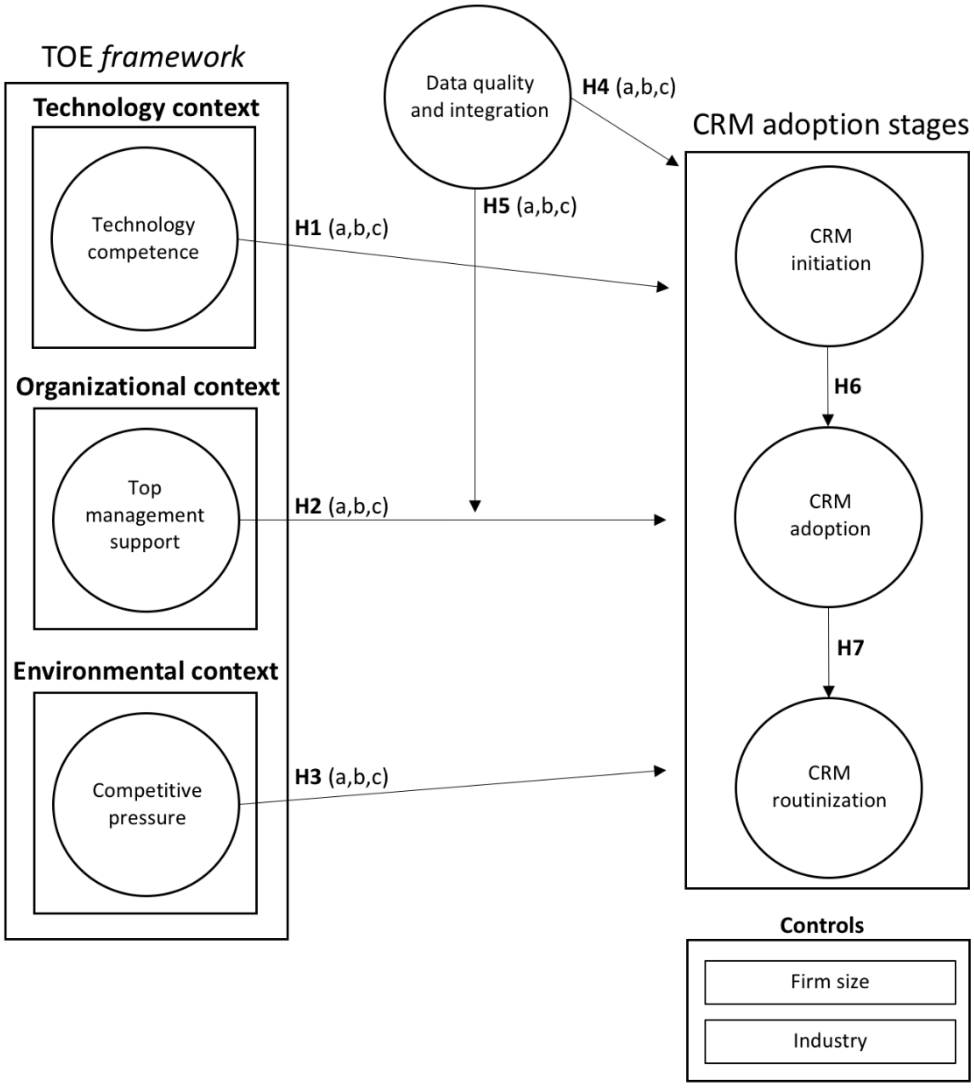

Figure 1. Conceptual model of CRM adoption stages

3.1. HYPOTHESES

Technology competence

Technology competence (TC) corresponds to the technology resources available in the organizations, such as the IT infrastructure, which incorporates installed technologies, systems, and applications. The IT specialists, refers to people in the organization who have the expertise to implement and use information solutions (Martins et al., 2016). Ritter & Gemünden (2004), affirm technology competence as an enabler for organizations, to understand, use and exploit technology internally. In fact, technology competence is a method of support in preparing a technology infrastructure, including adoption of a basic level of knowledge as it relates to the available technology (San-martín, Jiménez, & López-catalán, 2016; Wang, Wang, & Yang, 2010). Therefore, when organizations realize the benefits generated by a particular technology, such as CRM solutions, technology competence has an important role in the context of the firm (San-martín et al., 2016). According, to San-martín et al. (2016), a high level of technology competence has a positive influence on a willingness to achieve an attitude that will improve management of employees and customer information. Also, to innovate a process or a product, which derives a greater benefit through technology development. Therefore, we might assume that technology competence is a key for perceiving benefits, derived from the adoption of CRM solutions. This concept has been proposed in prior studies, such as mobile-CRM strategy or electronic commerce context (San-martín et al., 2016). Thus, it is formulated in the following hypothesis:

H1. Technology competence positively influences CRM initiation (H1a), adoption (H1b), and routinization (H1c).

Top management support

Top management support (TMS) has been used in various studies of innovation technology, as well. Many scholars found TMS statistically significant to support, and validate an innovation technology adoption (see e.g., Chan & Chong, 2013;Hameed et al., 2012; Weerd et al., 2016). Shobaki, Amuna, & Naser (2016) point out TMS as a determinant factor into organizations that can control all processes of strategy planning, and decision making behind Innovation technology. Moreover, a CRM perspective arises from top management support, who align and have a commitment within all practices of the particular organization (Reis & Peña, 2000). Indeed, Garrido-Moreno & Padilla-Meléndez (2011) indicate that top management support as a related factor is able to moderate and thus impact CRM performance, which is a key factor for CRM adoption. Therefore, regarding the vital importance of Top management support for decision making, the following hypothesis is developed:

H2. Top management support positively influences CRM initiation (H2a), adoption (H2b), and routinization(H2c).

Competitive pressure

In the context of innovative technology, competitive pressure corresponds to the degree of pressure felt by an organization from their competitors, who have achieved competitive advantage by using CRM (Oliveira et al., 2014). Accordingly, Missi, Alshawi, & Fitzgerald (2005), the more competitive pressure a firm has perceived, the more likely the firm is convinced to adopt CRM. Effectively, with the market competition, organizations are looking for approaches, solutions and resources more often, to improve customer service or even reduce costs, to achieve competitive advantage (Melville, Kraemer, & Gurbaxani, 2004). In deference to the positive effects on initiation and adoption stages, competitive pressure can also bring negative effects on the routinization stage. This occurs because some firms do not have technical, and managerial skills to reach innovation technology's requirements (Zhu et al., 2006). Zhu et al (2006), indicates that too much competitive pressure drives organizations to change rapidly from one innovation to another without effectively implementing the prior innovation into the organization. Hence too much competition is not a valid indicator for CRM routinization. Thus, the following hypothesis is presented:

H3. Competitive pressure positively influences CRM initiation (H3a) and CRM (H3b), but negatively influences CRM routinization (H3c).

Data quality and integration

Data is a relevant utility in business context when it turns to an input for decision makers, or to organizational decision tasks (Missi et al., 2005). In a world full of products and services, CRM helps organizations to establish customer oriented marketing strategies by having a focus on the customer as an individual with their own needs, habits and preferences (Goodhue, Wixom, & Watson, 2002). To cope with this fact, managers constantly need to obtain information about their consumers. A reliable quality and quantity of data collected is an essential requirement to ensure and support positive relationships with their customers (Khalil, Omar E.M. Harcar, 1999).

Based on review literature, Even, Shankaranarayanan, & Berger (2010) stated that Data quality significantly affects CRM adoption and success of data utilization. In the same way, Alshawi et al. (2011), mentioned that there is a common language between CRM and data quality through all of the processes involved. Effectively, the importance of data quality and data integration processes, which include CRM applications, all transactions, interactions, and networked touchpoints, have been one of the main inhibitors of success in evaluating CRM results. Indeed, behind the issues of data quality and data integration processes, there exists many relative aspects such as, managerial, operational and strategical factors. Therefore, the CRM infrastructure and organizational system compromises an effective strategy including the revenue and profitability of the firm/company(Peltier et al., 2013).

H4. Data quality and integration positively influence CRM initiation (H4a), adoption (H4b), and routinization (H4c).

Thus, before CRM adoption, a theory is emerging that suggests organizations must analyze all implications and efforts, such as individual structure, data volumes available, and organizational changes. It also includes a total commitment by top managers and all individuals of the firm, to take full advantage of CRM benefits (Goodhue et al., 2002). Hence, the following hypotheses are established:

H5. Data quality and integration will moderate the effect of top management support on CRM initiation (H5a), CRM adoption (H5b), and CRM routinization(H5c).

The three stages of CRM adoption

The three stages of CRM adoption begins with the CRM initiation, referring to when CRM is perceived by a firm as an advantage for the processes of organization. In this stage of implementation could be a proposal to adopt CRM solutions (Hameed et al., 2012; K. Zhu et al., 2006). Following, the suggested proposal, the affirmative or negative decision is made in this CRM adoption stage. If therefore CRM is accepted, it will be necessary to reorganized all processes, and resources for the implementation and integration of the CRM system into the organization, thus providing CRM routinization (Zhu et al., 2006).

Therefore, the three adoption stages assuming dependence level to each other, we formulated the following hypothesis:

H6. CRM initiation positively influence CRM adoption.
H7. CRM adoption positively influence CRM routinization.

Controls

The use of controls is very common in information systems (IS) studies. These controls therefore are considered essential when data variation cannot be explained by the explanatory variables (Martins et al., 2016). We use firm size and industry as control variables.

4. METHODOLOGY AND RESULTS

4.1. MEASUREMENT

To evaluate the conceptual model and the associated proposed hypotheses, a questionnaire was developed to conduct a survey of firms covering the manufacturing, construction, services, financial and banking, distribution, and commerce industries. In developing this questionnaire are the following processes to be implemented for the evaluation as follows: Technology competence, as measured, was based on Martins et al (2016), Ritter & Gemünden (2004), and San-martín et al (2016); Top management support, as measured, was based on Garrido-Moreno & Padilla-Meléndez (2011), Reis & Peña (2000), and Shobaki et al. (2016); Competitive pressure, as measured, was based on Melville et al (2004), Missi et al (2005), Oliveira et al (2014), and K. Zhu et al (2006); and Data quality and integration, as measured, was based on Alshawi et al. (2011), Even et al (2010), Khalil, Omar E.M. Harcar (1999), Missi et al (2005), and Watts, Shankaranarayanan, & Even (2009).

CRM initiation, as measured, was based on Hameed et al. (2012), and K. Zhu et al. (2006); CRM adoption, as measured, was based on Goodhue et al. (2002), Hameed et al. (2012), and K. Zhu et al. (2006); and CRM routinization, as measured, was based on Hameed et al. (2012), Jia, Guo, & Barnes (2017), and K. Zhu et al. (2006). These were measured using a five-point range scale where 1 was defined as “strongly disagreeing” to 5 defined as “strongly agree”. To be consistent with the literature review, all developments were operationalized as reflective, therefore, the CRM adoption was measured by dichotomous questions.

4.2. DATA

A pilot test was made in order to evaluate the consistency of the questionnaire. We received 30 responses. Then, an online survey was conducted over an eight week period. Randomly, we invited firms of different sectors, from Dun & Bradstreet, possessing an impressive and important list of commercial information and insight on businesses. To qualify the potential respondents, the invitation also contained certain qualifying questions. In order to reduce any biased responses, we guaranteed anonymity to the respondents, and the opportunity to receive the findings of the study.

We obtained a sample of 277 responses from various sectors (please see Table 2). 41% of the respondents belonged to the services sector, 26% to distribution and commerce, 18% to manufacturing sector, 8% to financial and banking, and 6% to the construction sector. Based on the respondent's position, 25% of the respondents were administration or finance managers, or CFO's, 16% were IS managers or directors, and business operations experts, managers, or COO's with 14% belonging to sales and marketing operationals or managers, 13% had other specific positions, 11% of the respondents were CEO, CIO, president or director, and 3% of the respondent were CRM managers or specialists. The size of the firms questioned were also considered, thus: 39% of the respondents were from medium firms, and 34% were from small firms; a little less, 22% of the respondents were form large firms, against 5% which represent respondents from micro firms.

By industry	**Obs.**	**%**	**By firm size**(number of employees)	**Obs.**	**%**
Manufacturing	49	18%	<=10	13	5%
Construction	17	6%	11-50	93	34%
Services	114	41%	51-250	109	39%
Financial and banking	22	8%	>250	62	22%
Distribution and commerce	73	26%			
By respondent's position					
CRM managers, CRM technical	9	3 %	Administration/Finance managers, CFOs	70	25%
Sales and Marketing, managers	39	14%	Business operations, managers, COOs	44	16%
IS managers, Directors	43	16%	Others	36	13%
CEOs, CIOs, Presidents, Directors	30	11%			

Table 2 - Sample characteristics (N=277)

5. DATA ANALYSIS AND RESULTS

5.1. RESULTS

Partial least squares (PLS) was used to test the conceptual model. This estimation alternative from "Structural Equation Modelling" (SEM) does not require a normal distribution, focusing on the variance of the dependent variables (Henseler, Ringle M., & Sinkovics R., 2009). Because all items in our data are not normally distributed ($p<0.01$, based on Kolmogorov-Smirnov test), PLS seems to be adequate for application. Using smart PLS 3 software (see, e.g., Hair, Sarstedt, Ringle, & Gudergan, 2017), we estimated the dependent variables, testing the measurement model, and the structural model, to obtain support for conclusions about our model.

5.1.1. MEASUREMENT MODEL

We evaluated the measurement model based on composite reliability, convergent validity, indicator reliability, and discrimant validity. Firstly, in order to analyze the indicator reliability, we analyzed the loadings. All of them are greater than 0.7 (Table 3) and statistically significant. Second, Table 3 shows the composite reliability (CR), and with the square root of the average variance extracted (AVE), these indicators are used to evaluate the developmental reliability and validity. As seen in Table 3, all constructs have CR above 0.7, assuming good levels of reliability, and also evidence of internal consistency (Henseler et al., 2009). Table 3, also shows a sufficient degree of convergent validity, as AVE for each construct are greater than 0.5, we can conclude that the latent variable explains more than half of the variance of its indicators (Henseler et al., 2009).

In addition, we also evaluate discriminant validity: i) the square root of AVE is higher than the correlations between the constructs, thus this criterion is satisfied (Henseler et al., 2009). ii) Table 4 shows the cross-loadings, based on the criterion which requires, that the loading of each indicator should be greater than all cross-loadings (Henseler et al., 2009). As presented in Table 4, this criterion is also satisfied. iii) The Hetrotrait-Monotrait Ratio (HTMT) ratios are bellow 0.9 (see, e.g., Henseler, J., Ringle, C. M., & Sarstedt, 2015), which suggest discriminant validity (results are available through requests directed to the author). Hence, we conclude that all the developmental components demonstrate evidences of discrimination.

Correlations

Construct	CR	AVE	TC	TMS	CP	DQ	CRMI	CRMA	CRMR
Technology competence (TC)	0.91	0.71	**0.84**						
Top management support (TMS)	0.95	0.80	0.35	**0.89**					
Competitive pressure (CP)	0.89	0.67	0.39	0.33	**0.82**				
Data quality and integration (DQ)	0.91	0.72	0.42	0.31	0.35	**0.85**			
CRM initiation (CRMI)	0.96	0.86	0.32	0.41	0.54	0.41	**0.93**		
CRM adoption (CRMA)	na	na	0.32	0.43	0.34	0.39	0.73	na	
CRM routinization (CRMR)	0.98	0.91	0.35	0.43	0.49	0.38	0.83	0.69	**0.95**

Notes: Composite reliability (CP), average variance extracted (AVE), the diagonal in bold is the square root of AVE, non-diagonal is correlation.

Table 3 - Reliability and validity

	Technology competence (TC)	Top management support (TMS)	Competitive pressure (CP)	data quality and integration (DQ)	CRM initiation (CRMI)	CRM routinization (CRMR)
TC2	**0.846**	0.293	0.293	0.330	0.246	0.259
TC3	**0.828**	0.298	0.301	0.365	0.236	0.236
TC4	**0.857**	0.264	0.337	0.289	0.257	0.309
TC5	**0.845**	0.313	0.360	0.430	0.313	0.354
TMS1	0.301	**0.912**	0.321	0.351	0.437	0.408
TMS2	0.344	**0.893**	0.300	0.325	0.397	0.383
TMS3	0.259	**0.886**	0.234	0.200	0.334	0.309
TMS4	0.324	**0.889**	0.306	0.229	0.328	0.392
TMS5	0.316	**0.886**	0.314	0.243	0.337	0.394
CP1	0.409	0.355	**0.784**	0.369	0.499	0.489
CP2	0.230	0.233	**0.766**	0.167	0.406	0.348
CP3	0.282	0.236	**0.858**	0.308	0.407	0.392
CP4	0.307	0.233	**0.866**	0.269	0.422	0.351
DQ1	0.357	0.309	0.335	**0.911**	0.392	0.370
DQ2	0.365	0.297	0.338	**0.931**	0.403	0.371
DQ3	0.370	0.241	0.231	**0.741**	0.268	0.219
DQ4	0.356	0.183	0.268	**0.790**	0.310	0.310
CRMI1	0.265	0.370	0.450	0.325	**0.893**	0.690
CRMI2	0.281	0.376	0.510	0.379	**0.916**	0.767
CRMI3	0.325	0.398	0.506	0.422	**0.946**	0.819
CRMI4	0.301	0.396	0.528	0.398	**0.962**	0.811
CRMR1	0.324	0.405	0.461	0.378	0.816	**0.956**
CRMR2	0.319	0.386	0.424	0.339	0.768	**0.947**
CRMR3	0.373	0.413	0.523	0.394	0.815	**0.961**
CRMR4	0.316	0.416	0.470	0.344	0.776	**0.954**

Table 4 - Cross-loadings

5.1.2. STRUCTURAL MODEL

To assess the results of the structural model, we developed some assessment procedures. First, we analyzed the variance inflation factor (VIF). As VIF shows values lower than 5, all latent variables are no concerns of multicollinearity. Moving forward, we tested path coefficients and t-statistics levels, which were estimated using the bootstrapping method with 5,000 samplings. Based on Table 5, we can see the r-squares (R^2). The conceptual model explains: 41.1% of the variation in CRM initiation, 57.9% of the variation in CRM adoption, and 57.5% of the variation in CRM routinization. Thus, we consider this a satisfactory model.

Based on Table 5, we can see that within the technology context, we found that technology competence has a significant path in CRM adoption (**H1**b) ($\hat{\beta}$ = 0.069; p<10), being statistically significant in explanation of this stage. However, it doesn't explain CRM initiation **(H1**a) ($\hat{\beta}$ = 0.002; p>0.10), and CRM routinization (**H1**c) ($\hat{\beta}$ = 0.031; p>0.10) are not statistically significant. Within the organizational context, top management support ($\hat{\beta}$ = 0.207; p<0.01), ($\hat{\beta}$ = 0.135<0.01), ($\hat{\beta}$ = 0.085; p<0.05) is found to be statistically significant in explaining the three stages of CRM adoption. Hence **H2**a, b, c are supported. Within the environmental context, competitive pressure has positive paths to CRM initiation (**H3**a)($\hat{\beta}$ = 0.398; p<0.01), and CRM routinization (**H3**c)($\hat{\beta}$ = 0.264; p<0.01), but negative path to CRM adoption (**H3**b) ($\hat{\beta}$ = -0.137; p<0.01). Consequently, Hypothesis 3 is partially supported.

On the other hand, data quality and integration are statistically significant to CRM initiation (**H4**a) ($\hat{\beta}$ = 0.174; p<0.01), also to CRM adoption (**H4**b) ($\hat{\beta}$ = 0.110; p<0.05), but are not statistically significant to explain CRM routinization (**H4**c) ($\hat{\beta}$ = 0.007; p>0.10). The data quality and integration have a moderate effect on top management support for CRM adoption (**H5**b) ($\hat{\beta}$ = 0.059; p<0.05), but are not statistically viable for CRM initiation (**H5**a) ($\hat{\beta}$ = 0.012; p>0.10), and on CRM routinization (**H5**c) ($\hat{\beta}$ = -0.021; p>0.10).

Within the three adoption stages, CRM initiation is statistically significant to explain CRM adoption ($\hat{\beta}$ = 0.685; p<0.01). CRM adoption has a positive and statistically significant path to explain CRM routinization ($\hat{\beta}$ = 0.532; p<0.01). Hence, we conclude that **H6** and **H7** are both supported.

	CRM initiation	CRM adoption	CRM routinization
R^2	41.1% (9.209)	57.9% (15.626)	57.5% (12.833)
Technology competence (TC)	0.002 (0.030)	0.069* (1.438)	0.031 (0.682)
Top management support (TMS)	0.207*** (4.113)	0.135*** (3.141)	0.085** (1.974)
Competitive pressure (CP)	0.398*** (8.073)	-0.137*** (2.726)	0.264*** (5.238)
Data quality and integration (DQ)	0.174*** (3.067)	0.110** (2.190)	0.007 (0.141)
DQ*TMS	0.012 (0.270)	0.059** (2.045)	-0.021 (0.793)
CRM initiation (CRMI)		0.685*** (16.079)	-
CRM routinization (CRMA)			0.532*** (10.663)

Notes: T-statistic are shown in parentheses. ***p<0.01; **p<0.05; *p<0.10

Table 5 - Structural model with path coefficients, and r-squares for CRM adoption stages.

6. DISCUSSION

6.1. THEORETICAL IMPLICATIONS

Our study addresses important contributions for the academic community, and a great interest for CRM literature. Therefore, we provide more consensus about CRM implementation, because we developed a conceptual model with a dynamic approach, using the contexts from TOE *framework* Tornatzky & Fleischer (1990), to explain the behaviour of each of the CRM adoption stages. Since then, no early studies have presented a conceptual model that explains the three CRM adoption stages in this manner (please, see Table 1). It is therefore noted, that the existing technology adoption studies have focused on a single stage, especially, on the adoption stage. To the contrary, our study presented an innovation for CRM adoption research, providing an integral perspective along the three stages, which contributes to a clear understanding of CRM adoption at the firm level.

Moreover, we tested data quality and integration as a moderator to the top management support. To date, no study has empirically tested these factors as dependence on each other. Consequently, we address an important research issue, because the results show us that data quality and integration, as a moderator to the TMS, have positive influence on the CRM initiation and CRM adoption. As also noted, top management support indicates a strong relationship during the three stages. Thus, we incorporate a relevant perspective for future researches, also, it contributes to scientific knowledge on CRM adoption and use. Competitive pressure, has influence throughout CRM initiation and routinization stages, which helps to enrich empirical support of TOE *framework* as a theoretical model to explain these stages. This finding helps decision makers to be aware about conditions and characteristics of each stage, and formulates strategies to achieve better results on CRM implementation. In the following section, we will present findings and contributions for managerial support.

6.2. MANAGERIAL IMPLICATIONS

The findings of this study show that technology competence is only significant at the CRM adoption stage (H1b), not during CRM initiation nor routinization. Therefore, during the adoption stage, companies need to have all the technology resources available, including IT infrastructure and IT professionals, to support an increased comprehension about CRM benefits, succeeding the formal acquisition. This finding brings the importance of broader IT infrastructure on the adoption stage, because it may ensure the CRM adoption and its effective use in the organization. It is consistent with findings from related study in the literature (Martins et al., 2016). However, technology competence was not found to have an effect on CRM initiation (H1a) and CRM routinization (H1c). According to CRM initiation, we may assume that companies do not need these types of resources to recognize CRM as an advantage, using other resources. In a similar way, at the CRM routinization stage, managers don't need to access more technological skills to apply and assimilate CRM in the business processes of organization (Martins et al., 2016).

On the other hand, top management support has a significant impact for all three stages of CRM adoption (H2a, H2b, H2c), thus positively affecting the whole process of CRM adoption. This finding is consistent with conclusions from related studies (see, e.g., Chong & Chan, 2012; Chan & Chong, 2013), which have found top management support as a significant driver to recognize, adopt and implement a new technology at the firm level. This result, suggest that top managers should cultivate CRM in their business strategy, engaging all the professionals for a clear definition of CRM and its benefits, with the alignment of the overall organization mission. Thus, the effective commitment from top management support in all business activities serves as a proxy for CRM implementation in organizations, and also contributes to increased success results (Chan & Chong, 2013). Otherwise, without support from top managers through the whole process of CRM adoption, the probability to finish before the effective use is huge. Thus, it is advisable to carry out top management support at the outset, to ensure the effective implementation, and optimal use in the firms.

Competitive pressure is an important factor for CRM initiation (H3a) and CRM routinization (H3c). This shows that competitive pressure is a significant driver for both stages, increasing a company's incentives to embrace new technologies, overcoming higher incremental results from competitors. This finding is similar to related studies (see, e.g., Chong & Chan, 2012; K. Zhu et al., 2006), which point out that, a high level of competition incentivizes organizations to seek CRM solutions more aggressively. This could occur without understanding the requirements established from prior technology on the business processes which could ultimately threaten CRM performance. Thus, the findings are consistent with the hypothesis formulated, which revealed that market trends, and the firm's response can have a substantial impact in perceiving CRM as a future innovation to adopt, and afterwards, the effective implementation of CRM. Thus, managers should have time to understand, learn and integrated CRM into the business processes, in order to recognize the full advantage of this technology, hopefully improving overall profitability of the organization. Otherwise, competitive pressure doesn't have an impact on CRM adoption, thus, in this stage, we can assume that managers do not need to be concerned about market trends, and local context, when deciding to adopt CRM.

Data quality and integration were found to be a predictor in the first two stages of CRM adoption - CRM initiation (H4a) and CRM adoption (H4b). In fact, with a large data base, implies that it is essential to have suitable information in order to realize CRM as a valuable tool, being an advantage for organizational profitability. As a moderator to the top management support, only have influence on CRM adoption stage (H5b). This result shows data quality and integration as a facilitator for decision making by top managers. Therefore, with data quality and integration, managers may be well prepared to take better decisions based on CRM adoption. This data supplied information suggests that managers should have, permanently available, data quality and integration in their projects, to achieve correct managerial decisions.

The findings of our study reveal that the three CRM adoption stages are independent of each other. This expected result is consistent with early researches (Chan & Chong, 2013; Martins et al., 2016). Thus, we may assume that each stage of CRM adoption is crucial to ensure an effective CRM implementation in companies.

6.3. LIMITATIONS AND FURTHER RESEARCH

This study has some limitations, as it also outlines proposals for future investigations. First, the sample is limited to 277 companies in a Southern European country. It would be interesting to test our conceptual model using a different country aside from the European Union or compare with another country out of the EU, in the same study.

Secondly, considering our definition of CRM adoption stages may be too narrow, we suggest adding other relevant variables that shape, in a different way, the stages of CRM. In our study, we use data quality and integration as a moderator to the top management support. It would be interesting to use this factor to moderate other dimensions of study in the future. Another limitation: Based on findings of this study which were concentrated on manufacturing, construction, services, financial and banking, and distribution and commerce industries, a future study for consideration could be conducted on other industries not analyzed in this particular study.

7. CONCLUSIONS

CRM is a powerful technique that helps firms to achieve improved profitability through the analysis of consumer behaviour. Thus, CRM enables an increased knowledge of customers, more understanding on ways to increase their satisfaction and loyalty. Thus, CRM is a great facilitator of the firms' profitability. This study is motivated by the dynamics surrounding CRM techniques, which amplifies the ability to understand the role of each CRM adoption stage. To perform this ambitiously, we tested some factors from TOE *framework* Tornatzky & Fleischer (1990), across the CRM initiation, CRM adoption and, CRM routinization.

Therefore, the results of this study provides valuable insights for managers and scholars. Thus, we conclude that top management support is an important operational factor to the three CRM adoption stages. Therefore, the role of top managers along the CRM adoption process is crucial to guarantee its applicability and success of the firms. Competitive pressure has influence in CRM initiation and CRM routinization. Technology competence is a strong enabler for CRM adoption, yet, data quality and integration also have a substantial impact in CRM initiation and CRM adoption. However, as a moderator, data quality and integration encourages positive movement towards CRM adoption, being the most important contribution of this study. The findings also showed that there exists a dependence relationship among CRM adoption stages.

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