



## Review

# Customer relationship management mechanisms: A systematic review of the state of the art literature and recommendations for future research



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## ABSTRACT

In the information systems, customer relationship management (CRM) is the overall process of building and maintaining profitable customer relationships by delivering superior customer value and satisfaction with the goal of improving the business relationships with customers. Also, it is the strongest and the most efficient approach to maintaining and creating the relationships with customers. However, to the best of our knowledge and despite its importance, there is not any comprehensive and systematic study about reviewing and analyzing its important techniques. Therefore, in this paper, a comprehensive study and survey on the state of the art mechanisms in the scope of the CRM are done. It follows this goal by looking at five categories in which CRM plays a significant role: E-CRM, knowledge management, data mining, data quality and, social CRM. In each category, a couple of studies are presented and determinants of CRM are described and discussed. The major development in these five categories is reviewed and the new challenges are outlined. Also, a systematic literature review (SLR) in each of these five categories is provided. Furthermore, insights into the identification of open issues and guidelines for future research are provided.

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## 1. Introduction

In the 1990s, in the business domain gradually emerges the concept of customer relationship management (CRM) which from the very first years, the CRM prevailed, gained prominence as a legitimate area of scholarly inquiry and stimulated the interest of global business and research community. The CRM is nothing more than an approach that stems from the need to create a new business environment, which allows a more effective management of relationships with customers (Galbreath & Rogers, 1999). The CRM a comprehensive strategy and the process of acquiring, retaining and collaborating with selected customers to create superior value for the company and the customer. It involves the integration of marketing, sales, customer service, and the supply-chain functions of the organization to achieve greater efficiencies and effectiveness in delivering customer value (Giannakis-Bompolis & Boutsouki, 2014; Navimipour & Soltani, 2016). Successful firms and organizations often strive for competitive advantages through the relationships with their customers (Jafari Navimipour, Rahmani, Habibzad Navin, & Hosseinzadeh, 2015). Many of them have implemented customer relationship management (CRM) technology in the hope that it will enable them to better target profitable segments, improve customer service, enhance customer retention and ultimately increase the firm's financial performance (Josiasen, Assaf, & Cvelbar, 2014). In today's business environment, top managers invest in CRM systems as a strategic tool for processing end-to-end customer information to develop customer relationships (Chuang & Lin, 2013b). Many researchers have demonstrated that CRM systems significantly improved customer relationship performance (Keramati, Mehrabi, & Mojir, 2010; Kim & Choi, 2010). Also, the CRM systems have become the backbone of customer relationship development by advancing customer information processing capabilities (Chuang & Lin, 2013b). This is because CRM is a widely implemented strategy for managing organizational interactions with customers. It involves the processes of finding, attracting, and retaining new customers, nurturing and retaining customers the organization already has, enticing former customers back into the fold, and reducing the costs of marketing and customer service. The overall goals of CRM are to create customer satisfaction, trust, loyalty, and retention (Siriprasoetsin, Tuamsuk, & Vongprasert, 2011). Five dimensions named as strategy, organization, technology, segmentation and process, are necessary to implement a CRM project effectively (Lin, Su, & Chien, 2006). The current challenges in the field of CRM can be customer data quality

(Alshawi, Missi, & Irani, 2011; Chuang & Lin, 2013a; Peltier, Zahay, & Lehmann, 2013), online trust (Hwang, 2009; Khosravifar, Bentahar, Gomrokchi, & Alam, 2012; Wrobel, Heupel, & Thiel, 2013), customer knowledge (Ariffin, Hamdan, Omar, & Janom, 2012; Garrido-Moreno & Padilla-Meléndez, 2011; Khodakarami & Chan, 2014), infrastructure capability (Chuang & Lin, 2013b), and organizational learning (Peltier et al., 2013).

Despite the importance of CRM in many fields, there is not any comprehensive study about reviewing and analyzing its important techniques. Therefore, this paper investigates the state of the art mechanisms in the field of CRM. Specifically, this study discusses the five categories of CRM techniques: E-CRM, knowledge management, data mining, data quality, and social CRM. E-CRM is a collection of concepts, tools, and processes that allow an organization to obtain the maximum value from their e-business investment (Mahdavi, Cho, Shirazi, & Sahebjamnia, 2008). Knowledge management is to get the knowledge about customers, constantly improve and share it through those parts of the organization, which need the knowledge to use it hence add value to their work (Sulaiman, Ariffin, Esmaeilian, Faghihi, & Baharudin, 2011). The data mining tools serve as the backbone driving CRM systems to enable the measurement frameworks in place today (Al-Mudimigh, Ullah, & Saleem, 2009; Kellen, 2002). Data quality assessment has focused on four primary areas: data accuracy, timeliness, completeness and consistency (Ballou & Tayi, 1999; Peltier et al., 2013). Finally, Social CRM or CRM 2.0, that is a philosophy and a business strategy, supported by a technology platform, business rules, processes, and social characteristics, designed to engage the customer in a collaborative conversation in order to provide mutually beneficial value in a trusted and transparent business environment. It's the company's response to the customer's ownership of the conversation (Askool & Nakata, 2011; Greenberg, 2009). This study aims at understanding the trend of CRM research by analyzing and examining the published articles. In drafting this review, it is not set out to consider all common techniques in the CRM. Therefore, since the CRM is playing an increasingly important role in the information systems, the purpose of this paper is to survey the existing techniques and to outline the types of challenges that can be addressed. Finally, the guidelines for the existing challenges are presented. To the best of the researcher's knowledge, this survey represents the first attempt to examine the CRM mechanisms systematically with a specific focus on the information system. Briefly, the contributions of this paper are as follows

- Providing a systematic overview of the existing techniques in the field of CRM to highlight the advantages and disadvantages in the each domain.
- Exploring some of the main challenges in the field of CRM.
- Dividing the CRM techniques into five categories.
- Outlining the key areas where future research can improve the use of CRM techniques in the information systems.

The rest of this paper is structured as follows. Section 2 explains basic concepts and related terminologies. Section 3 explains some definition about CRM. Section 4 classifies the articles. Section 5 discusses the CRM mechanisms and categorizes them. Section 6 provides the results, taxonomy, and comparison of the reviewing techniques. Section 7 outlines the Open issues. Finally, the obtained results are described in Section 8.

## 2. Basic concepts and related terminologies

This section introduces the basic concepts and related terminologies, which are used in this paper; in such the following concepts and terminologies are explained:

### 2.1. Customer relationship management (CRM)

CRM consists of guidelines, procedures, processes and strategies which provide organizations the ability to merge customer interactions and also keep track of all customer-related information (Khan, Ehsan, Mirza, & Sarwar, 2012).

### 2.2. Customer orientation

Customer orientation within a CRM system enables the system to support the firm's marketing campaign efficiency. Also, it discovers and satisfies customer needs (Chuang & Lin, 2013b).

### 2.3. Customer knowledge management (CKM)

CKM refers to the sources and application of customer knowledge and how to use information technology to build more valuable customer relationships. It leverages the relevant information and experience in the process of acquiring, developing, and maintaining profitable customer portfolio. In the concept of customer knowledge management, it underlines that in the process of customer management the emphasis is on collecting, storing, sharing and using customer knowledge by advanced information technology (Xu, 2014).

### 2.4. Data mining (DM)

Data mining is a process of discovering hidden patterns and information from the existing data (PhridviRaj & GuruRao, 2014).

### 2.5. Data quality (DQ)

It is the degree of data accuracy, accessibility, relevance, timeliness, and completeness (Turban, Leidner, McLean, & Wetherbe, 2008).

### 2.6. Geographic information system (GIS)

A GIS is an emerging science that puts together geography, computer science, mathematics, statistics, management, surveying and mapping science into one. On the basis of geospatial data, supported by computer hardware and software, it collects, inputs, manages, edits, queries, models and displays spatial data (Wei,

2012).

### 2.7. Information quality

The degree to which information has content, form, and time characteristics that give it value for specific end users (O'Brien & Marakas, 2005).

### 2.8. Information technology (IT)

Information technology, the technology component of an information system or the collection of the computing systems in an organization (Turban et al., 2008).

### 2.9. Information system (IS)

Interrelated components working together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization (Laudon & Laudon, 2011).

### 2.10. Electronic customer relation management (E-CRM)

E-CRM is a strategy for marketing, selling, and integrating an online service that plays a role in identifying, obtaining, and maintaining the customers who are considered as the largest capital of the company. It improves and enhances the relationship between a company and its customers by a means of creating and increasing the relationship with them through modern technology. E-CRM software establishes profiles and histories of each organization's contact with its customers. It is a combination of management software, hardware, applications and commitments (Javadi & Azmoon, 2011; Zablah, Bellenger, & Johnston, 2004).

### 2.11. Knowledge management (KM)

Knowledge management gets the knowledge about the customer, constantly improves it and shares it through the organization (Sulaiman et al., 2011).

### 2.12. Knowledge of customers

Such knowledge is prepared to the customers' requirement, including the product, service and the market condition of the enterprise. The knowledge is transferred to the customers to help them understand the enterprise, production, and the service better, consequently match the requirement from the customers and the product supplied (Lingbo & Kaichao, 2012).

### 2.13. Knowledge about customers

Knowledge about customers is a description of the general information about customers, including the statistical information, purchase history of the customer, etc. Such knowledge is the object focused by the traditional knowledge view and is widely used and researched (Lingbo & Kaichao, 2012).

### 2.14. Knowledge of customer

Knowledge for the customer is the knowledge a firm purposely provides to its customers or the knowledge shared among customers, which help customers to make better purchase decisions and/or to better use the products/services offered by the firm. For instance, a pharmaceutical company may provide drug information integrated with knowledge about the disease to their

patients (Smith & McKeen, 2005; Wu, Guo, & Shi, 2013).

### 2.15. Likert scale

Likert scales are a common rating format for surveys that rank quality from high to low or best to worst using five or seven levels (Allen & Seaman, 2007).

### 2.16. Lisrel methodology

Lisrel program is used for data analysis of the proposed model that is a simultaneous system of equations having latent constructs and multiple indicators (Mekkamol, Piewdang, & Untachai, 2013).

### 2.17. Structural equation modeling (SEM)

SEM aims to analyze the interconnected relationships among a set of constructs simultaneously (Cheng & Fu, 2013).

### 2.18. Soft issues

Soft issues such as human issues are related to change management, knowledge sharing, team collaboration, and power that still remains as a hurdle for any information system implementation (Ariffin et al., 2012).

### 2.19. Web 2.0

The web 2.0 as an information hub to facilitate information and data transferring (Navimipour & Zareie, 2015; Navin, Navimipour, Rahmani, & Hosseinzadeh, 2014), empowers individuals to take an active role in knowledge co-construction by contributing and debating content with others through a conversational and collaborative approach (Sigala & Chalkiti, 2014).

## 3. Customer relationship management

CRM is a concept that is as old as a business (Harrigan, Soutar, Choudhury, & Lowe, 2015; Payne & Frow, 2006; Sheth & Parvatiyar, 1995). It is a management philosophy and strategy which enables a company to optimize revenue and increase customer value and service quality through understanding and satisfying the individual customers' needs (Assimakopoulos, Papaioannou, Sarmaniotis, & Georgiadis, 2015; Liu & Yang, 2009). CRM is a synthesis of many existing principles from relationship marketing (Jancic & Zabkar, 2002; Morgan & Hunt, 1994; Sheth, Sisodia, & Sharma, 2000) and the broader issue of customer focused management. CRM systems provide the infrastructure that facilitates long-term relationship building with customers. Some examples of the functionality of CRM systems are sales force automation, data warehousing, data mining, decision support and reporting tools (Hendricks, Singhal, & Stratman, 2007; Katz, 2002).

CRM systems mainly fall into three categories: operational systems (Johnson, Oman, Sheridan, & Duda, 2014; Mirzahosseini & Piplani, 2013) which are the systems used for automation and increased efficiency of CRM processes, analytical systems (Ríos, Ríos, Zougagh, & Zougagh, 2013; Thompson, 2011) which are the system used for the analysis of customer data and knowledge, and collaborative systems (Antunes, Herskovic, Ochoa, & Pino, 2012; Gouglidis & Mavridis, 2012) which are the systems used to manage and integrate communication channels and customer interaction touch points (Khodakarami & Chan, 2014). Technology is the key to a successful management of customer relationships which includes front-office applications supporting firm divisions such as marketing and sales, along with back-office applications

that help to analyze the data (Greenberg & Foreword By-Sullivan, 2001; Srinivasan & Moorman, 2005). The front-office elements facilitate the flow of information with customers. In this way, firms that implement CRM aim to facilitate the seamless dissemination of customer knowledge throughout the organization. The back-office elements help with data mining and thus identify and analyze customers' needs and actions. Data from multiple touch-points may be integrated to facilitate improved customer knowledge (Josiasen et al., 2014).

CRM and its related technology market account for substantial value worldwide. According to (Rivera & Van der Meulen, 2014) growth in the CRM software market remains moderate but significant after several years of strong investments; worldwide revenues reached \$23.9 billion in 2014. Key players such as Salesforce,<sup>1</sup> Oracle,<sup>2</sup> SAP<sup>3</sup> and Microsoft<sup>4</sup> offer cutting-edge CRM technological solutions every year, and their information technology (IT) partners earn significant profits through consultancies and the sale of CRM software licenses. We thus must recognize the importance of technology for a CRM strategy (Boulding, Staelin, Ehret, & Johnston, 2005): technology represents a nearly mandatory investment for firms interested in deriving benefits from their relationship marketing (Venturini & Benito, 2015). The CRM market grew by 12.5 percent in 2012 (Columbus, 2013). The four main CRM system vendors include Salesforce, Microsoft, SAP, and Oracle, with Salesforce representing an 18.4% market share, Microsoft representing a 6.2% market share, SAP representing a 12.1% market share and Oracle representing a 9.1% market share in 2015 (Song, Jung, Oh, & Choi, 2015). Other providers also are popular for small and mid-market businesses. For nine different categories of CRM, Enterprise CRM Suite, Midmarket CRM Suite, Small-Business CRM Suite, Sales Force Automation, Incentive Management, Marketing Solutions, Business Intelligence, Data Quality and Consultancies, there are different market leaders. Between the different market leaders, each one's services cater to a different professional field, from healthcare to Manufacturing.

Research has found a 5% increase in customer retention boosts lifetime customer profits by 50% on average across multiple industries, as well as a boost of up to 90% within specific industries such as insurance (Gillies, Rigby, & Reichheld, 2002). Companies that have mastered customer relationship strategies have the most successful CRM programs. For example, MBNA<sup>5</sup> Europe has had a 75% annual profit growth since 1995. The firm heavily invests in screening potential cardholders. Once proper clients are identified, the firm retains 97% of its profitable customers. They implement CRM by marketing the right products to the right customers. The firm's customers' card usage is 52% above industry norm, and the average expenditure is 30% more per transaction. Also, 10% of their account holders ask for more information on cross-sale products (Gillies et al., 2002). Wells Fargo<sup>6</sup> is another example of a company that has successfully implemented CRM into their firm. The Wholesale Banking division of Wells Fargo has almost 300 different products and services, with many business customers who use a range of products. Therefore, customers need a seamless experience from product to product and service to service. The firm implemented cloud computing (Ashouraie, Jafari Navimipour, Ramage, & Wong, 2015; Jafari Navimipour, Masoud Rahmani, Habibizad Navin, & Hosseinzadeh, 2014) to help connect people

<sup>1</sup> [www.salesforce.com/](http://www.salesforce.com/).

<sup>2</sup> [www.oracle.com/](http://www.oracle.com/).

<sup>3</sup> [www.sap.com/](http://www.sap.com/).

<sup>4</sup> <https://www.microsoft.com/>.

<sup>5</sup> <https://www.mbna.co.uk/>.

<sup>6</sup> <https://www.wellsfargo.com/>.

with customers and has seen customer satisfaction drastically improve (Fargo, 2015). Amazon<sup>7</sup> has also seen great success through its customer proposition. The firm implemented personal greetings, collaborative filtering, and more for the customer. They also used CRM training for the employees to see up to 80% of customers repeat (Gillies et al., 2002).

#### 4. Systematic review

A Systematic literature review (SLR) is a critical assessment and evaluation of all research studies that address a particular issue. The researchers use an organized method of locating, assembling, and evaluating a body of literature on a particular topic using a set of specific criteria. A systematic review typically includes a description of the findings of the collection of research studies. Previous researchers have argued that using such an approach to review literature can ensure that the systematic error is limited, chance effects are reduced, and the legitimacy of data analysis is enhanced. All of these benefits lead to more reliable results that form the basis for drawing conclusions (Becheikh, Landry, & Amara, 2006; Reim, Parida, & Örtqvist, 2015). An SLR is a research method originating from the field of medicine (Kitchenham, 2004; Kupaainen, Mäntylä, & Itkonen, 2015) and studies in the domains of engineering and social science have started to adopt this methodological approach more frequently (Gerald, Maylor, & Williams, 2011). In this section, an SLR is used to perform a comprehensive study of the mechanisms of the CRM from 2009. Then, the validity of the study selection procedure was evaluated as described below. In the following subsections, we describe the search process including the article selection process and classification.

Two sets of reviewers independently screened abstracts to look for our candidate theories and to test for relevance. We included all article types written in English and excluded opinion-driven reports (editorials, commentaries, and letters).

##### 4.1. Question formalization

The goal of this section is to name the most relevant issues and challenges in a CRM, including E-CRM, data mining, data quality, CKM, and social CRM solutions. This research effort will thus aim to address the following research questions:

RQ1: How is the importance of CRM over the time?

This aims at the number of studies relevant to CRM and distribution of these studies based on different publications over time, understanding the importance of CRM mechanisms.

RQ2: What are the challenges to CRM in knowledge management and CRM in social media?

This question is aimed at identifying the requirements and challenges towards the development of efficient CRM mechanism in knowledge management and CRM in social media.

RQ3: Which problems and solutions were identified with regard to data mining and data quality in CRM?

The objective of this question is to understand the role of data quality and data mining in CRM, identifying its challenges and techniques used to ensure Quality-of-Service (QoS) in the CRM.

A process as such can lead to detailed answers within the scope of this paper. After identifying the need for research, research questions were formulated a review protocol for the study. This protocol development has different stages, such as search query, selection of source and criteria, quality assessment criteria, data extraction and data synthesis strategy.

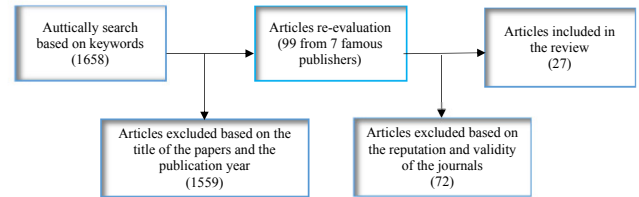


Fig. 1. Systematic review flow diagram.

##### 4.2. Selection criteria

To be qualified for inclusion in this review a quality assessment checklist (QAC) based on Kitchenham et al. (2009) is developed to assess only individual papers from peer-reviewed journals published from 2009 to 2015. The checklist includes the following questions (Kitchenham et al., 2009): (a) Does the research paper clearly specify the research methodology? (b) Is the research methodology appropriate for the problem under consideration? (c) Is the analysis of study properly done? If the study fulfills assessment criteria then it is filled with 'yes'. Fig. 1 summarizes the inclusion–exclusion criteria for our review protocol.

##### 4.3. Article selection process

The article selection strategy is consisted of three main stages as follow:

In stage 1, Google scholar<sup>8</sup> was used as the only search engine, for several keywords (electronic customer relationship management (E-CRM), knowledge management and customer relationship management (CRM), data mining and customer relationship management (CRM), data quality and customer relationship management (CRM), social customer relationship management (CRM)) to find relevant articles.

Stage 2 begins by setting certain practical screening criteria to ensure that only quality publications are included in the review. During this stage the invalid conference articles, working papers, reports, erratum, editorial notes, commentaries, and book review articles were excluded, aiming instead for a focus on journal publications and IEEE conferences. The papers selected based on their title and the publisher including Elsevier,<sup>9</sup> Springer,<sup>10</sup> Emerald,<sup>11</sup> IEEE,<sup>12</sup> ACM,<sup>13</sup> Taylor,<sup>14</sup> and Wiley<sup>15</sup> This limitation also secured the focus on quality publications related to CRM and related concepts. No other quality criteria were used (e.g., journal rankings) for filtering; indeed, publications that cover the topic of CRM may not always be published in highly ranked journals because it is still an emerging topic. The search also excluded articles that were not peer-reviewed or not written in English. For feasibility reasons papers written in other languages than English are excluded.

In stage 3, the authors separately read the full text of the articles' titles and abstracts to test for relevance. Based on the article relevance, publication years and journal rank, each article was either

<sup>8</sup> <https://scholar.google.com>.

<sup>9</sup> <http://www.elsevier.com>.

<sup>10</sup> <http://www.springer.com>.

<sup>11</sup> <http://www.emeraldinsight.com>.

<sup>12</sup> <http://www.ieee.org>.

<sup>13</sup> <http://www.acm.org>.

<sup>14</sup> <http://taylorandfrancisgroup.com>.

<sup>15</sup> <http://eu.wiley.com>.

<sup>7</sup> [www.amazon.com/](http://www.amazon.com/).

included or excluded. This time-consuming process resulted in excluding 1658 articles that did not meet the inclusion criteria. The remaining 27 articles were considered for further analysis. All 27 articles that met the inclusion criterion were read in detail as a final analysis of the content which is provided in Section 3.

An overview of the used process to identify the articles in this study is illustrated in Fig. 1. The Google scholar search engine was used to find the primary studies with automated search. This search resulted in identifying 99 articles considered relevant for analysis. The citation information, abstracts, and keywords of all articles were exported to an Excel spreadsheet for further analysis. The articles resulting from the initial search were refined through three steps. In this section, we automatically search keywords and then found 1658 articles from the journals and conference papers. We choice 7 famous publishers, therefore, 1559 articles was removed. Books were removed in the next step, and finally, 99 articles were obtained. According to the publication time (from 2009), the number of 27 article were selected and analyzed. Also, Table 1 shows the selection funnel in terms of the number of articles after each stage in each category. In the E-CRM, first, the 675 articles were obtained and then the remaining 22 articles are filtered, finally, 6 articles were selected in the E-CRM. In the knowledge management and CRM, first, the 82 articles were obtained and then the remaining 6 articles are filtered, finally, 6 articles were selected. In the data mining and CRM, first, the 565 articles were obtained and then the remaining 40 articles are filtered, finally, 6 articles were selected. In the data quality and CRM, first, the 41 articles were obtained and then the remaining 5 articles are filtered, finally, 5 articles were selected for further investigation. In the social CRM, first, the 295 articles were obtained and then the remaining 27 articles are filtered, finally, 4–6 articles were selected for further investigation.

#### 4.4. Articles classification

The distribution of the classified articles by the CRM mechanism is described in this section. Among the five CRM mechanisms, 22 out of 99 articles, 22.1%, dealt with E-CRM (Table 2), 6 out of 99 articles, 6.1%, dealt with knowledge management (Table 3). 40 articles out of 99 articles, 40.4% (Table 4) dealt with data mining and CRM. Of the 99 articles, 5 out of 99 articles, 5.1% (Table 5), dealt with data quality in CRM (Table 6), 26.3% (26 articles) are related to the social CRM (Table 6).

However, there were relatively few articles covering “knowledge management and CRM” (6 articles), “data quality in CRM” (5 articles). Also, first rank (40 articles out of 99 articles, 40.4%) in terms of subject matter dealt with data mining and CRM. Moreover, the distribution of the articles by year of publication is shown in Fig. 2. It is obvious that publications which are related to E-CRM, knowledge management in CRM, data mining in CRM, data quality in CRM, social CRM have increased significantly from 2009 to June 2015. In 2012, the amount of publication decreased approximately 70% when compared with 2011.

Fig. 3 shows the distribution over time of the 99 articles in 7 journals related to the CRM mechanisms. The distribution of articles by year and publisher is shown in Fig. 3. It is obvious that

publications which are related in 7 journals include Elsevier, Springer, Emerald, IEEE, ACM, Taylor, and Wiley from 2009 to June 2015.

Fig. 4 shows the distribution of the articles among 7 publishers, where 40% of the total article of journals belong to IEEE. To further investigate the foundation journal of the article, 18% of the literature is related to the Elsevier, 16% of the literature are related to springer, 10% of the literature are related to emerald, and the remaining 7% deal with Taylor. While the remaining 5% of the literature are related to the ACM (3%) and Wiley (2%).

## 5. The CRM mechanisms

In this section, the important state of the art mechanisms in CRM as well as their differences, advantageous and disadvantageous are discussed and described. This section is divided into four categories: Section 5.1 E-CRM, Section 5.2 Knowledge management, Section 5.3 data mining, Section 5.4 data quality, and Section 5.5 social CRM and in each part, a definition of the concepts and then the related works are discussed.

### 5.1. E-CRM

Internet and web services as an information hub facilitate information and data transferring and sharing (Navimipour, 2015; Souri & Navimipour, 2014). Feinberg and Kadam (Yu, Nguyen, Han, Chen, & Li, 2015) said that the use of the Internet as a channel for commerce and information presents an opportunity for businesses to use the Internet as a platform for the delivery of CRM functions on the Web E-CRM (Reid & Catterall, 2015). E-CRM is a collection of concepts, tools, and processes that allow an organization to obtain the maximum value from their e-business investment. It helps companies to improve the effectiveness of their interaction with customers while at the same time making the interaction intimate through individualization. To succeed with E-CRM, companies need to match the products and campaigns to prospects and customers. It is aimed to intelligently manage customers' life cycle according to three stages: acquiring customers, increasing the value of the customers, and retaining good customers (Mahdavi et al., 2008). The issue of E-CRM has increasingly become the identification of the success of CRM implementation (Bull, 2003; Wu & C.-Y. Hung, 2009). In this section, some important state of the art mechanisms in this scope is reviewed and analyzed.

Hwang (2009) has examined the effect of uncertainty avoidance, social norms and innovative trust and ease of use in E-CRM. Having implemented free experiment with 209 students who voluntarily participated in the northern region of the U.S, The experiment was conducted in an Internet classroom as suggested by Gefen (2002). The students were asked to navigate [www.amazon.com](http://www.amazon.com), and go through the procedure of purchasing a book without actually submitting the purchase transaction. Next, the students were asked to complete the experimental instrument of an online survey based on their experiences with the website. Results of the data analysis pointed out the three primary findings of the study. First, although social norms influence all three dimensions of online trust beliefs, uncertainty avoidance influences only the benevolence and ability

**Table 1**  
Paper selection funnel.

Stage	E-CRM	KM & CRM	Data mining & CRM	Data quality & CRM	Social CRM
Stage1	675	82	565	41	295
Stage2	22	6	40	5	26
Stage3	6	6	6	5	4

**Table 2**  
Distribution of articles by journal and conferences the subject E-CRM.

Publisher	Year	Author	Journal/Conferences Name
Elsevier	2009	(L. Wu & C.-Y. Hung)	Information and software technology
	2011	(Sigala) (Javadi & Azmoon)	Computers in Human Behavior Procedia Computer Science
Springer	2009	(Hwang) (Hadaya & Cassivi) (Romano Jr. & Fjermestad)	Electronic Markets
IEEE	2014	(Shashidhar & Manjaiah)	Proceedings of International Conference on Internet Computing and Information Communications
	2010	(Wahab, Nor, & AL-Momani) (Bhanu & Magiswary) (Jun & Yongcai)	e-Education, e-Business, e-Management, and e-Learning, 2010. IC4E'10. International Conference on Education and Management Technology (ICEMT), 2010 International Conference on E-Business and E-Government (ICEE), 2010 International Conference on Computer Science and Service System (CSSS), 2011 International Conference on Multimedia Technology (ICMT), 2011 International Conference on Business Innovation and Technology Management (APBITM), 2011 IEEE International Summer Conference of Asia Pacific
	2011	(J. Zhang) (Xiong) (Chen, Lin, & Yang)	Computing and Convergence Technology (ICCT), 2012 7th International Conference on Multimedia Computing and Systems (ICMCS), 2014 International Conference on
	2012	(Xin)	Qualitative Market Research: An International Journal
Emerald	2009	(O'Reilly & Paper) (Sophonthummapharn)	Marketing Intelligence & Planning
	2011	(Velarde)	Strategic Direction
	2012	(Shakil Ahmad, Rashid, & Ehtisham-Ul-Mujeeb)	Business Strategy Series
Taylor	2009	(Khalifa & Shen)	Behavior & Information Technology
	2010	(Harrigan et al.)	International Journal of Electronic Commerce
	2014	(Cameron)	International Journal of Multiple Research Approaches

**Table 3**  
Distribution of articles by journal and conferences the subject knowledge management and CRM.

Publisher	Year	Author	Journal/Conferences Name
Elsevier	2010	(Liao, Chen, & Deng)	Expert Systems with Applications
	2014	(Khodakarami & Chan) (Garrido-Moreno, Lockett, & García-Morales)	Information & Management
IEEE	2010	(Faed, Radmand, & Talevski)	P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC), 2010 International Conference on
Emerald	2011	(Ranjan & Bhatnagar)	The Learning Organization
	2014	(Tseng & Wu)	International Journal of Quality and Service Sciences

dimensions of online trust. The result showed that when people have a high tendency to mitigate uncertainty by adopting strict codes of behavior, their belief that the trusted party honestly adheres to these accepted rules of conduct is not directly influenced by this tendency. Thus, the social normative aspects of a website shall be emphasized (such as feedback mechanisms in the online community or media) rather than reducing procedural uncertainty by formal rules of conduct listed on the website for increasing the integrity dimension of online trust IS designer. Second, Trust beliefs of the website should be enhanced through the perception that the target website is easy to use even in the case of innovative and proactive IT users. Third, in developing social norms, internal influences (family and friends) are more important than external influences (media). Social norms also significantly influence PIIT, as expected. There are several advantages in the study. First, given that there are different sources of influence (social and individual) in determining online consumer behavior, the proposed comprehensive model used in the study provides valuable insights into the relationships among the different sources of influence. Second, the study suggests the new and interesting role of multidimensional trust beliefs in the successful implementation of E-CRM. But, rather than including multiple websites or new website unfamiliar to the consumer, only one popular website, [Amazon.com](http://Amazon.com), are used. Also, the model did not include other important antecedents of trust beliefs, such as situational normality, structural assurance, propensity to trust and institutional influence on technology adoption, such as commitment.

Also, in another research, [Sigala \(2011\)](#) has investigated E-CRM 2.0 applications and trends. Having examined the usage and

readiness of Greek tourism firms to embark on such E-CRM 2.0 strategies by conducting an e-mail survey and focused group discussions with tourism professionals that were members of two professional networks, namely the e-Business forum in tourism and/or the DIALOGOI-SETE<sup>16</sup> online forum. These networks were used for designing the study's sample as their members represented tourism professionals that were not only up-to-date with current e-tourism trends and applications, but they also held relevant professional positions. The e-Business forum in DIALOGOI-SETE is an initiative (consisting of 157 members) formed by the Innovation Special Interest Group of the Greek Association of Tourism Enterprises (SETE). Access to members' contacts was possible due to the researcher's participation in these initiatives. After eliminating the networks' databases from duplicating members' entries and members not belonging to industry circles, 278 unique professionals were identified and e-mailed the study's questionnaire (on May 2007). First, the findings revealed an unbalanced exploitation of web 2.0, as tourism firms' E-CRM practices focused mainly on the first and last steps of the relationships life-cycle. Tourism firms should not ignore the potential to exploit web 2.0 for enhancing and enriching customer relationships. To that end, E-CRM activities may include the formation, sponsorship, and management of customer online social networks, the provision of customer support services, web 2.0 enabled customer communication strategies, loyalty customer services, and sales support services. However, in order to agree and commit to any technology

<sup>16</sup> <http://sete.gr>.

**Table 4**  
Distribution of articles by journal and conferences the subject data mining and CRM.

Publisher	Year	Author	Journal/Conferences Name
Elsevier	2009	(Ngai, Xiu, & Chau)	Expert systems with application
	2010	(Hosseini, Maleki, & Gholamian)	
	2013	(J.-T. Wei, Lee, Chen, & Wu)	
Springer	2015	(Bahari & Elayidom)	Procedia Computer Science
	2010	(Rathi)	Information and Communication Technologies
	2011	(Tsai)	Scientometrics
	2013	(Y. Wang & Zhou)	Proceedings of the 2nd International Conference on Green Communications and Networks 2012 (GCN 2012): Volume 2
IEEE		(H.-y. Zhao & Zhao)	2012 International Conference on Information Technology and Management Science (ICITMS 2012) Proceedings
		(lautet also individuelle Kundenansprache)	Neue Wege zum Kunden: Multi-Channel-Banking
		(Hippner & Wilde)	Effektives Customer Relationship Management: Instrumente-Einführungskonzepte-Organization
	2014	(Sun & Xie)	Proceedings of the 9th International Symposium on Linear Drives for Industry Applications, Volume 4
	2009	(Xie & Tang)	Computer Science and Engineering, 2009. WCSE'09. Second International Workshop on
		(Al-Mudimigh, Ullah, et al.)	System of Systems Engineering, 2009. SoSE 2009. IEEE International Conference on
		(Al-Mudimigh, Saleem, Ullah, & Al-Aboud)	Information and Communication Technologies, 2009. ICICT'09. International Conference on
		(Fang & Ma)	Database Technology and Applications, 2009 First International Workshop on
		(Li & Tao)	Management and Service Science, 2009. MASS'09. International Conference on
		(Yan, Lin, & Wei)	Information Technology and Applications, 2009. IFITA'09. International Forum on
		(H. Zhang & Chen)	Fuzzy Systems and Knowledge Discovery, 2009. FSKD'09. Sixth International Conference on
	2010	(Ling, Li, & Jie)	Knowledge Discovery and Data Mining, 2010. WKDD'10. Third International Conference on
		(Yi-xing, Wei, & Zhen-hua)	Logistics Systems and Intelligent Management, 2010 International Conference on
		(Goyal & Sharma)	Advanced Information Management and Service (IMS), 2010 6th International Conference on
	(Ping & Liang)	Computer Application and System Modeling (ICCASM), 2010 International Conference on	
	(L. Zhang)		
	(K. Wu & Liu)	Management and Service Science (MASS), 2010 International Conference on	
	(Guifang & Youshi)	Computer Science and Information Technology (ICCSIT), 2010 3rd IEEE International Conference on	
2011	(D. S. Wu)	Consumer Electronics, Communications and Networks (CECNet), 2011 International Conference on	
	(Sheng)	Electric Information and Control Engineering (ICEICE), 2011 International Conference on	
	(J. Zhao)	Proceedings of the 2011 International Conference on Computational and Information Sciences	
	(Junsheng & Ming)	Internet Technology and Applications (iTAP), 2011 International Conference on	
	(Hua)	E-Business and E-Government (ICEE), 2011 International Conference on	
2012	(Qin & Yue)	Proceedings of the 2012 3rd International Conference on E-Business and E-Government-Volume 05	
2013	(Miranda & Henriques)	Information Systems and Technologies (CISTI), 2013 8th Iberian Conference on	
	(Pei)	Instrumentation and Measurement, Sensor Network and Automation (IMSNA), 2013 2nd International Symposium on	
	(Jiang, Yu, Liu, Zhu, & Guo)	Natural Computation (ICNC), 2013 Ninth International Conference on	
2014	(Virupaksha, Sahoo, & Vasudevan)	Communications and Signal Processing (ICCS), 2014 International Conference on	
	(Deepa, Dhanabal, & Kaliappan)	Computing and Communication Technologies (WCCCT), 2014 World Congress on	
	(Natchiar & Baulkani)	Science Engineering and Management Research (ICSEMR), 2014 International Conference on	
Emerald Wiley	2011	(Ranjan & Bhatnagar)	The Learning Organization
	2013	(Chiang)	Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery
	2011	(Chauhan, Gupta, & Verma)	Data Mining Techniques in CRM: Inside Customer Segmentation

**Table 5**  
Distribution of articles by journal and conferences the subject CRM and data quality.

Publisher	Year	Author	Journal/Conferences Name
Elsevier	2010	(Even, Shankaranarayanan, & Berger)	Decision Support Systems
	2011	(Alshawi et al.)	Industrial Marketing Management
	2013	(Peltier et al.)	Journal of interactive marketing
IEEE	2011	(Chauhan et al.)	SRII Global Conference (SRII), 2011 Annual
	2013	(Hable & Aglassinger)	Advanced Information Networking and Applications Workshops (WAINA), 2013 27th International Conference on

investment and application, firms require hard evidence about the return of investment. The Advantage of such research would be very useful findings to firms which aim to more actively engage their customers in their business processes and enhance the customers' role as co-designers, co-producers, and co-marketers in their business processes. But, despite their small sample limitation, the findings provide some useful practical implications and additional suggestions for future research.

Javadi and Azmoon (2011) have aimed at performing of the research to determine the importance and effectiveness of major factors on E-CRM capabilities in System Group branches. Also, it is specified which changes should be created by this company to implement such system and which capabilities should be stressed in order to gain success based on the existing circumstances in each

of the branches. The case study of their research includes branches of the System Group Company.<sup>17</sup> In the research, the most important dimensions and factors which are effective on accepting E-CRM has been classified based on the theoretical model presented by Chen and Popovich. Finally, after adaptation of general factors with the intended purposes of managers, a hierarchical model based on six major dimensions and sixteen indexes has been prepared to test preparation of System Group branches for accepting E-CRM. The research is a quantitative research in which Analytical Hierarchy Process method is applied to analyze data. Due to the strategic role of decision making about the importance of effective

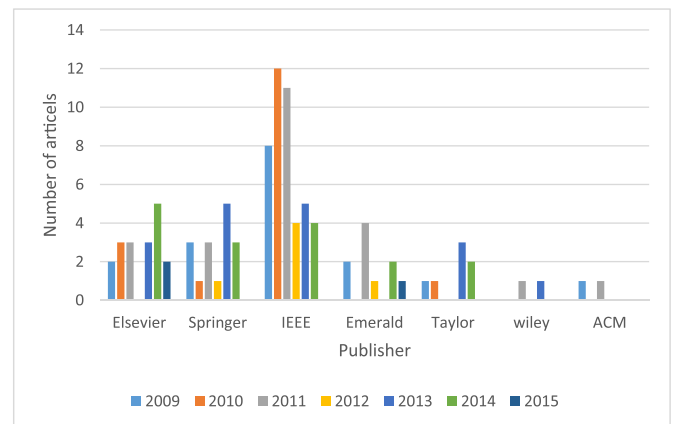
<sup>17</sup> <http://www.systemgroup.net>.



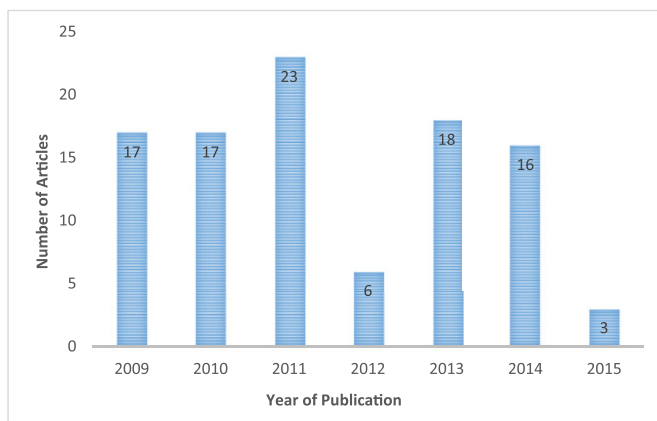
**Table 6**  
Distribution of articles by journal and conferences the subject social CRM.

Publisher	Year	Author	Journal/Conferences Name
Elsevier	2013	(Malthouse, Haenlein, Skiera, Wege, & Zhang)	Journal of Interactive Marketing
	2014	(Trainor, Andzulis, Rapp, & Agnihotri)	Journal of Business Research
		(Giannakis-Bompolis & Boutsouki)	Procedia-Social and Behavioral Sciences
		(Ntalianis, Papadakis, & Tomaras)	Procedia-Social and Behavioral Sciences
Springer	2015	(Ballings & Van den Poel)	European Journal of Operational Research
	2011	(Sanaa Askool & Nakata)	AI & society
		(Greve)	Marketing Review St. Gallen
		(Alt & Reinhold)	Wirtschaftsinformatik
IEEE	2013	(Zwikstra, Hogenboom, Vandic, & FrasinCAR)	7th International Conference on Knowledge Management in Organizations: Service and Cloud Computing
	2014	(Eko)	Proceedings of the First International Conference on Advanced Data and Information Engineering (DaEng-2013)
		(Deng, Zhang, Wang, & Wu)	Information Science and Engineering (ICISE), 2009 1st International Conference on Management of Innovation and Technology (ICMIT), 2010 IEEE International Conference on Web Intelligence and Intelligent Agent Technology (WI-IAT), 2011 IEEE/WIC/ACM International Conference on Granular Computing (GrC), 2011 IEEE International Conference on Information Society (i-Society), 2012 International Conference on System Sciences (HICSS), 2013 46th Hawaii International Conference on
		(SS Askool & Nakata)	Information Science and Engineering (ICISE), 2009 1st International Conference on Management of Innovation and Technology (ICMIT), 2010 IEEE International Conference on Web Intelligence and Intelligent Agent Technology (WI-IAT), 2011 IEEE/WIC/ACM International Conference on Granular Computing (GrC), 2011 IEEE International Conference on Information Society (i-Society), 2012 International Conference on System Sciences (HICSS), 2013 46th Hawaii International Conference on
Emerald	2011	(Heller Baird & Parasnis)	Strategy & Leadership
	2014	(Grossberg)	Journal of Business & Industrial Marketing
		(Wongsansukcharoen, Trimetsoontorn, Fongsuwan, & KarjaluoTO)	Journal of Business & Industrial Marketing
		(Quinton)	Journal of Strategic Marketing
Taylor	2013	(Simkin & Dibb)	Journal of Marketing Management
		(Ali, Melewar, & Dennis)	Journal of Strategic Marketing
ACM	2009	(Choudhury & Harrigan)	Proceedings of the 1st ACM international workshop on Complex networks meet information & knowledge management
		(B. Wu, Ye, Yang, & Wang)	Web Intelligence and Intelligent Agent Technology (WI-IAT), 2011 IEEE/WIC/ACM International Conference on
		(Guillaume)	Proceedings of the Fifth International Conference on Management of Emergent Digital EcoSystems
ACM	2013	(Basaille-Gahitte, Abrouk, Cullot, & Leclercq)	Proceedings of the Fifth International Conference on Management of Emergent Digital EcoSystems

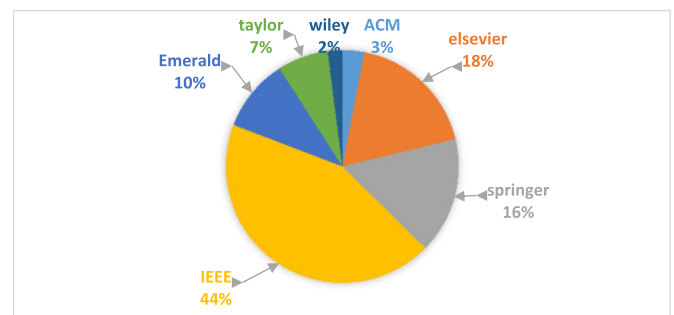
factors in preparation for accepting E-CRM system, the opinion of senior management of the group has been used in order to collect data related to pair comparisons between dimensions and indexes. Because of this reason, they have performed an interview with the group's chief on the board of directors. Paying attention to the point that for the collection of data related to pair comparison among branches, there was a need for guidance of those who were aware of all branch conditions, therefore, a questionnaire was applied. Research results revealed that strategy has the most importance and priority among major factors of preparation for implementing of E-CRM system. Also, among the branches of the group that is called hereinafter as "Base," Tehran North Base has the priority in implementation with regard to main dimensions and indexes. Its advantage is that it is recommended that System Group company acts based on the relative importance of dimensions in spending



**Fig. 3.** The number of the CRM articles from 2009 to Jun 2015 based on different publishers.



**Fig. 2.** The number of the CRM articles from 2009 to Jun 2015.



**Fig. 4.** A pie chart of the percentage of the CRM articles based on different publishers.

time and resources and experts. In addition, it is recommended to act according to the obtained weights of branches in investing and allocating of resources for implementing E-CRM. However, this priority decreases the degree of failure. On the other hand, the limitation was that the study was conducted in another country.

Another research has examined and measured the outcomes of E-CRM system implementation in the Thai banking industry from customers' perspectives (Sivaraks, Krairit, & Tang, 2011). The results show E-CRM implementation to be a viable means of increasing the bank–customer relationship quality and outcome, which comprises overall relationship quality, trust, satisfaction, commitment, loyalty, retention, and willingness to recommend. They indicate that if banks implement E-CRM, especially operational E-CRM, their customers will recognize additional service attributes and the customers' relationships with their banks will improve. The advantages of the study are helping to fill an area of empirical research on E-CRM measurement from the customers' side, which is deficient, especially in the service industry. But, developing E-CRM will take long-term (at least three years according to Foss and Stone (2002)), consistent focus and effort. Also, retention, which is one of the constructs in this research, is a variable construct that might not gather adequate information. Moreover, since data was collected from banks' customers by stratified random sampling, some sample bias existed due to the personal relationships that respondents had previously established with their main banks' staff members. Finally, E-CRM implementation of research was measured by binary variables, and the levels of implementation are not clearly distinguished.

Mekkamol et al. (2013) have designed a quantitative measure of E-CRM for community tourism in Upper Northeastern Thailand. The purpose was to develop the E-CRM model in the upper Northeast of Thailand. It is found from the study that the effect of website character and shopping convenience, on care and service through website contact interactivity. There was a positive relationship between shopping convenience and website contact interactivity dimensions of E-CRM for community tourism in Upper Northeastern Thailand. There was a positive relationship between website character and website contact interactivity dimensions of the modeling E-CRM for community tourism in upper northeastern Thailand. There was a positive relationship between website contact interactivity and care and service dimensions of the Modeling E-CRM for community tourism in upper northeastern Thailand. The advantage is that their study provided some guidelines for tourism entrepreneurs handling E-CRM model across the country. In addition, limitations of the study are as follows: First, cross-sectional data were used in the paper. Second, the conceptualization of E-CRM structure may be somewhat limited and it is arguable that E-CRM structure may consist of more than market information gathering, and the development and implementation of a market-oriented strategy. Third, the LISREL methodology may be construed as a limitation because the results presented here are based on the analysis of a causal non-experimental design.

Finally, Yu et al. (2015) have investigated that how differential treatment of customers may affect their perceptions of fairness in a firm and its personalized E-CRM activities. They also developed an integrated model of fairness in E-CRM that incorporates four key variables internal to the firm—service quality, price, communication efforts, and differential treatment. They choose the online retail services sector for they study, given the objective was to address issues of E-CRM and fairness and its theories through tests in a natural and realistic setting (Ashworth & McShane, 2012). The study has established that as customers' perception of firms' differential treatment change, their perceptions of the firms' fairness also change. They showed that perceived service quality, price consciousness, and communication are predictors of attitudes

towards fairness, and subsequently links with re-patronage intentions. These results have implications for offerings pertaining to personalization or tailored differentiation and E-CRM schemes (Nguyen & Simkin, 2013). Also, the paper provides a new integrated model using multiple E-CRM activities to explain why customers are likely to return to a firm, when they are treated differentially, for services, prices, and communication. Furthermore, a clear interpretation of the findings indicates that negative inferences lead to customers' unfavorable beliefs in firms' E-CRM offerings. However, as it deals with online retail services, it cannot be guaranteed that the results are generalizable to other settings. Also, since cross-sectional data capture the variables' relationships at a single point in time, there may be idiosyncrasies, which are detected if the data were collected at other periods. Finally, the use of variables to represent E-CRM may be exploratory and not exhaustive.

Table 7 shows the side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed mechanisms.

## 5.2. CRM in knowledge management

Knowledge is the concept, skill, experience, and insight that provides a framework for creating, evaluating, and using the information (Charband & Jafari Navimipour, 2016; Laudon & Laudon, 2004; Zareie & Jafari Navimipour, 2016). Some researchers such as Campbell and Rowley define the customer knowledge via analyzing the logic relationship between data, information, and knowledge of customers. In fact, customer knowledge is in the flow of CRM, that is to say, it is in the process of understanding the requirement of customers, supplying product and service, and getting feedback from the customers (Lingbo & Kaichao, 2012). Knowledge, defined as information combined with experience, context, interpretation, and reflection, can be divided into explicit knowledge and tacit knowledge. KM is the explicit and systematic management of vital knowledge and its associated processes of creation, organization, diffusion, use and exploitation and CKM is the external perspective of KM (Lopez-Nicolas & Molina-Castillo, 2008; Rollins & Halinen, 2005). As such, customer knowledge management is concerned with the management and exploitation of customer-related knowledge. In general, customer-related knowledge involved in the interactions between a firm and its customers can be classified into three types of knowledge about customer, knowledge from customer, and knowledge for the customer (Wu et al., 2013). The value of knowledge management and CRM is well recognized by many leading companies. KM sees the knowledge available to a company as a major success factor. Davenport and Prusak (1998) have emphasized that KM addresses the issues of creating, capturing, and transferring knowledge-based sources. Both CRM and KM approaches have a positive impact on reducing costs and increasing revenue (Lin et al., 2006). In this section, some importance state of the art mechanisms in this scope is reviewed and analyzed.

Garrido-Moreno and Padilla-Meléndez (2011) have analyzed the impact of knowledge management on the success of CRM. Their findings show that even if the firm carries out KM initiatives, acquires the most advanced technology, and tries to generate a customer-centric orientation. If these initiatives are not integrated into the organization, the firm does not redesign its organizational structure or processes, organization members do not all participate in the project, and change does not lead appropriately, the implementation of CRM will not be successful. The current analysis shows that simply introducing KM initiatives or CRM technologies do not generate advantages for the firm or translate into a positive impact on the results. In order for the initiatives to be successful, the firm first needs to engineer a change at the organizational level. Thus according to this theoretical approach, the efficiency and

**Table 7**

Side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed E-CRM mechanisms.

Researcher	Advantages	Disadvantages
Hwang (2009)	<ul style="list-style-type: none"> <li>• It provides insights into the relationships among the different sources,</li> <li>• It provides the new role of multidimensional trust beliefs.</li> </ul>	<ul style="list-style-type: none"> <li>• Only one popular website is analyzed.</li> <li>• The model did not include other important antecedents of trust beliefs.</li> </ul>
Sigala (2011)	<ul style="list-style-type: none"> <li>• Enhances the customers' role as co-designers, co-producers, and co-marketers in business processes</li> </ul>	<ul style="list-style-type: none"> <li>• It Suffers from small sample</li> </ul>
Javadi and Azmoon (2011)	<ul style="list-style-type: none"> <li>• The system Group company acts based on the relative importance of dimensions in spending on time, resources and experts.</li> </ul>	<ul style="list-style-type: none"> <li>• The study was carried out in one country.</li> </ul>
Sivaraks et al. (2011)	<ul style="list-style-type: none"> <li>• It helps in filling an area of empirical research on E-CRM measurement from the customers' side.</li> </ul>	<ul style="list-style-type: none"> <li>• The lack of clear information</li> <li>• Implementation of level retention is a variable construct that might not gather adequate information.</li> </ul>
Mekkamol et al. (2013)	<ul style="list-style-type: none"> <li>• It provides guidelines for tourism entrepreneurs.</li> </ul>	<ul style="list-style-type: none"> <li>• It uses cross-sectional data</li> <li>• Use the LISREL methodology</li> </ul>
Yu et al. (2015)	<ul style="list-style-type: none"> <li>• It treats all customers differentially based on their needs.</li> </ul>	<ul style="list-style-type: none"> <li>• Find out in a single study</li> <li>• Cross-sectional data</li> <li>• Time limit</li> <li>• Financial constraints</li> </ul>

success of firms will be a function of their abilities, skills and competencies in developing a management of the resources that facilitates the creation of sustainable competitive advantages (Barney, 1991; Grant, 1991). The results showed that the CRM technology and the customer-centric orientation are integrated into and internalized by the whole organization, thus, CRM is difficult to imitate and reproduce and hence a source of sustainable competitive. In other words, the results showed that as firms use CRM, they experience an organizational learning that helps them to use the strategy more efficiently, and so the results of the strategy improve. In general terms, the advantage of this research is that they have found positive influences in CRM success of all proposed factors (KM, organizational, technological, customer orientation and CRM experience). Also, they have found the organizational variables (strategy, top management support, organizational structure, and human resources) to be the key success factors for CRM. Finally, they have found that the KM process is highly dependent upon the human resources of a firm and other organizational variables. The advantages of the study are that developed model can be used in other service sectors. But, the use of cross-sectional data prevents us from examining the evolution in time of the phenomenon under analysis. Also, the sample size is rather small and, the use of managerial perceptions to evaluate the different model variables as a limitation. Furthermore, the empirical study has focused specifically on the Spanish hotel sector, so the obtained results here may not be entirely generalizable to other sectors of activity or other countries.

As another research, Sulaiman et al. (2011) have proposed that the process of data collection was commenced after getting the approval of the questionnaire. It includes selecting random numbers of students in 3 main leading universities of Malaysia, University of Malaya (UM)<sup>18</sup> in Kuala Lumpur, University Putra Malaysia (UPM)<sup>19</sup> in Serdang and University Kebangsaan Malaysia (UKM)<sup>20</sup> in Kajang where they are up-to-date and familiar with the latest technology, so their demands should be placed as the future demands of their progressive society. Based on their finding, first, Malaysia progression leads mobile service clients in situations to be a knowledgeable demand-oriented customer. Second, Malaysia mobile penetration rate rises rapidly, which enforce companies to apply an instrument to manage millions of

clients' knowledge and use it to enhance service providing. Third, the tough competition between mobile service providers and essence of using CKM as a competitive tool is recognized. CKM is still passing pre-maturity age with lots of theories, which need to observe the application practicality. The advantage of this was that respondents showed their competency and ability to share knowledge through CKM desired channels with mobile service providers to get better and enlarged services. But, limitations of the study were that the respondents into three main universities in Malaysia were limited.

Ariffin et al. (2012) have discussed on the implementation of CRM in Research and Development Centers of Public Universities in Malaysia. They investigated the current scenario of CRM implementation Research and Development Centers of Public Universities in Malaysia. The study showed that the organizational CRM knowledge has a relationship with organizational issues such as human, culture, financial and technology issues. However, organization CRM knowledge has a negative relationship with technology issues which showed that higher their organization CRM knowledge, lower their perceived about technology issues. Results from the hypotheses revealed that an appropriate knowledge in CRM would contribute insight understanding about CRM implementation. The advantage is that research proposes CRM implementation should adopt knowledge management tools and techniques to ensure the quality of customer knowledge management in their organization. Therefore, knowledge management methods are suggested to support the CRM implementation in the organization. Limitations of the study are that only one university in Malaysia is investigated that even its name are not mentioned.

Also, in another research, Khodakarami and Chan (2014) have investigated the role of CRM customer knowledge creation system. Their study explored that the CRM systems support customer knowledge creation processes, including socialization, externalization, combination, and internalization. CRM systems are categorized as collaborative, operational, and analytical. An analysis of CRM applications in three organizations reveals that analytical systems strongly support the combination process. Collaborative systems provide the greatest support for externalization. Operational systems facilitate socialization with customers while collaborative systems are used for socialization within an organization. Collaborative and analytical systems both support the internalization process by providing learning opportunities. Furthermore, three-way interactions between CRM systems, types of customer knowledge, and knowledge creation processes are explored. However, the number of studied organizations (three)

<sup>18</sup> <https://www.um.edu.my>.<sup>19</sup> <http://www.upm.edu.my>.<sup>20</sup> <http://www.ukm.my>.

restricted the generalizability of their results.

Garrido-Moreno, Lockett, and García-Morales (2014) have investigated paving the way for CRM success with emphasis on the role of mediator between knowledge management and organizational commitment initially. They study develops and tests a research model analyzing the process through which CRM technology infrastructure translates into organizational performance, drawing on the resource-based view (RBV) and the knowledge-based view (KBV) of the firm. Based on an international sample of 125 hotels, the results suggest that organizational commitment and knowledge management fully mediate this process. They study makes two important contributions: (1) empirically displaying the mechanism through which CRM technology infrastructure transforms the firm performance, the different resources involved in the process and how they interrelate. (2) Providing evidence of the crucial role played by organizational commitment in this process, which not only acted as a relevant mediator but also exerted the strongest direct impact on CRM success. But, the variables are measured based on the perceptions of general managers (single respondents), and consequently have a certain degree of subjectivity. Also, this is a cross-sectional piece of research, which highlights the need to carry out longitudinal studies in the future in order to explore how the variables in our analysis evolve over time. Finally, the survey respondents were limited to college students from three main universities in Malaysia.

Finally, Tseng and Wu (2014) have explored the impact of the customer knowledge and CRM on service quality based on the company's perception. Enterprises realize that customers are their most important asset and recognize that a high level of customer satisfaction can only be achieved by enhancing service quality. Thus, how enterprises acquire customer knowledge by which to initiate and maintain customer relationships, as well as to enhance service quality has become an important issue. The results indicated that the customer knowledge has a positive influence on service quality and CRM is the partial intervening variable between customer knowledge and service quality. That is, customer knowledge enhances the CRM, while CRM, in turn, increases service quality and provides competitive advantages. The results found that customer knowledge is indeed an important source of competitive advantage. Hence, enterprises should acquire valuable customer knowledge in order to enhance the relationship with customers, as well as enhance their service quality. The advantages of their study show that if an enterprise can acquire valuable customer knowledge, it will be possible to service quality. Furthermore, the research indicated that effective sales personnel and communication, quality and service are the most crucial variables to determine service quality. Moreover, CRM can be used to build customer knowledge related to interactions occurring between enterprises and their customers during the process of service delivery and can as a result, eventually enhance service quality. Limitations of the study are that the research explored the impact of customer knowledge and CRM on service quality based on the company's perception and there was no validation of the customers' perception of the company.

Table 8 shows the side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed mechanisms.

### 5.3. CRM in data mining

Nowadays, data mining has given a great deal of concern and attention in the information industry and in society as a whole. This technique is an approach that is currently receiving a great attention in data analysis and it has been recognized as a newly

emerging analysis tool (Natek & Zwilling, 2014; Osei-Bryson, 2010; Sinha & Zhao, 2008; Wan & Lei, 2009). DM, a useful technology extracting knowledge from complicated customer data, is helpful to identify customer demand accurately and promote customer value effectively (Guozheng, Yun, & Chuan, 2006). It aims to identify valid, novel, potentially useful, and understandable correlations and patterns in data (Chung & Gray, 1999). DM can also be considered as a process and a technology to detect the previously unknown in order to gain competitive advantage. The data mining plays an import role in CRM, such as creating more profit for customers, reserving the valued customers and so on (Jiawei & Kamber, 2001; Yan et al., 2009). Strongly related to knowledge management, successful CRM is predicated on effectively transforming customer information to customer knowledge (Plessis & Boon, 2004). With the help of DM, CRM has stronger functions such as customer segmentation, customer relationship lifetimes, and so on. CRM based on DM can help to obtain and maintain a competitive advantage. CRM based on DM can understand customer's need as much as possible, improve customer satisfaction, gain more quotes in the market and promote the profitability, thus enhance enterprise's competitive advantage (Guozheng et al., 2006). In this section, some importance state of the art mechanisms in this scope is reviewed and analyzed.

Chang, Lin, and Wang (2009) have investigated mining the text information to optimizing the customer relationship management. have collected customer service center data from three sources: (1) the electric news system; (2) the customer service hotline; and (3) data from various conferences. The following is a description of these three types of data: used customer data were mainly imported from e-mail, the contents of which were diversified as not manifestly structured. Therefore, the study used content analysis for quantitative analysis. Content analysis was used to analyze text data. OLAP analysis and decision tree criteria were used to discover customer knowledge and marketing strategies of CRM models were suggested based on these criteria. However, when there was not a good information system in place and the structured data was sparse. Data mining did not yield any significant discoveries, so the data analysis was indeed cursory. Therefore, the study's recommendations still focus on the execution process of complete CRM and on establishing a complete system loop in order to reinforce interactions with customers. They also used the established categories by classifying text data in follow-up studies. Furthermore, the process of using content analysis to transform text data into structured data is used to supplement the training of system operation personnel. Finally, an implementation model was established. The process of implementing this model not only introduces participating personnel to the concepts of CRM but also provides an actual foundation for building a CRM system. The advantage of the study was to develop a model easily implements CRM ended and a real foundation to build a CRM system provides. However, the research was conducted in a limited number of companies.

As another research, Hosseini et al. (2010) have developed a methodology, which was implemented in SAPCO company<sup>21</sup> from 2008/3/20 to 2008/11/21. They have combined the expanded WRFM model into K-means algorithm, for which the tremendous improvements in classifying accuracy are reached. As the distance and the integrated rate of each cluster commonly used by many researchers as a separate and independent parameter, in their study, the combination of these two parameters has been considered. The result showed that a tremendous capability of the firm to assess the customer loyalty in a marketing strategy designed have

<sup>21</sup> <http://scm.sapco.com>.

**Table 8**

Side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed CRM in knowledge management mechanisms.

Researcher	Advantage	Disadvantage
Garrido-Moreno and Padilla-Meléndez (2011)	<ul style="list-style-type: none"> <li>• The model develops can be used in other parts of the service.</li> </ul>	<ul style="list-style-type: none"> <li>• The use of cross-sectional data.</li> <li>• The sample is similar.</li> <li>• The empirical study has focused specifically on the Spanish hotel sector.</li> </ul>
Sulaiman et al. (2011)	<ul style="list-style-type: none"> <li>• It respondents demonstrated their ability to share knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>• It respondents are limited to three major universities in Malaysia.</li> </ul>
Ariffin et al. (2012)	<ul style="list-style-type: none"> <li>• It uses knowledge management tools in CRM implementation</li> </ul>	<ul style="list-style-type: none"> <li>• The research was carried out in only one country.</li> </ul>
Khodakarami and Chan (2014)	<ul style="list-style-type: none"> <li>• It highlights the importance of 3-way interactions among customer knowledge types, knowledge creation processes.</li> </ul>	<ul style="list-style-type: none"> <li>• It limits the number of studied organizations (three).</li> </ul>
Garrido-Moreno et al. (2014)	<ul style="list-style-type: none"> <li>• Organizational commitment has a direct effect on the success of CRM</li> </ul>	<ul style="list-style-type: none"> <li>• Variables are measured based on the perceptions of general managers.</li> <li>• A limited number of respondents to the University of Malaysia.</li> </ul>
Tseng and Wu (2014)	<ul style="list-style-type: none"> <li>• Enterprise can acquire valuable customer knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• There was no validation of the customers' perception of the company.</li> </ul>

obtained. The result of statistical tests for model validation has shown that the developed methodology for CRM has an acceptable result with a high level of confidence in comparing with other commonly used models by researchers. But, the company had the advantage of customer loyalty in the financial sector assessment.

Also, in another research, Khan et al. (2012) have integrated CRM and Data Warehousing. They have extracted and analyzed available facts and information to make a critical evaluation. The in-depth study and evaluation of available information have enabled to determine several benefits that integration of CRM and data warehousing can bring to the industry as well as customers. With all the benefits outlined, it is concluded that integration of CRM with data warehousing can provide a reduction in cost to acquire customers, sell and serve and reduction in time to serve. Similarly, CRM enhances the following: customer satisfaction, relationship returns, competitive advantage, and a number of customers, customer retention rate, and collection of analytic assessment to measure customer's value, revenue per customer and influence of order fulfillment, returns and call center goings-on on tangible sales performance. Limitations of the study are that only one company is considered and can be an evaluation of the services provided by the loyalty of our customers.

As another research, Wei et al. (2013) have stated that the hairdressing industry has played an increasingly important role in the service industries. They adopted RFM model by applying a two-stage clustering method suggested by prior literature by combining SOM and K-means techniques to systematically analyze customer profiling for a hair salon in Taiwan. The analysis results of RFM model indicated that the customers in the hair salon can be grouped into four types of customers, i.e., loyal customers, potential customers, new customers and lost customers. Marketing strategies for the hair salon are suggested in accordance with the four types of customers in the studies. The DM techniques in the study help systematically examine customers profile and segment customer types and thus facilitate to develop unique marketing strategies for each type of customers in the hair salon. This benefits the hair salon to effectively target valuable customers and implement differential marketing strategies. But, it can be noted that the study was conducted in only one country and that is only focused on specific customer data. In addition, take advantage of the unique marketing strategies for the hair salon can be noted. Given that they have reviewed the work carried out on this topic the table summarizes the methods used and that there were advantages and disadvantages to that.

The customer information based on data mining is analyzed by Jiang et al. (2013). The latitudinal and longitudinal geographic coordinates of the customers are offered by GIS. Then, the geographic

position, age, gender, tuition, and school time are analyzed by data mining technology to procure implicit knowledge of marketing personnel to understand the current status and change trends of the market. Also, 50,000 customer data from several training departments in the past three years are extracted. The latitude979and longitude geographic coordinates of the customers are provided by Google Maps API.<sup>22</sup> Then, an improved clustering algorithm is proposed to analyze the customer information, discover the market rules, and achieve precise advertising and sales promotion, which improves the cost-effectiveness ratio of advertisement campaigns, reduces the marketing cost associated with each customer, and increases market share and enterprise profit. The results showed that with the help of Google Maps API, the error range is reduced from kilometer to meter for the address and distance of massive customer information, which provides a more valuable and accurate dataset for further data mining processing and analysis. Based on the classical k-means and k-centroids, an improved clustering algorithm is proposed to dig-out the clustering characteristics of customer geographic information in education and training industry, which improves the efficiency of marketing promotions and campaigns, and increases the conversion rate of advertising investment. As a kind of decision-making tool, it is useful for marketing strategy analysis. The improved algorithm can quickly deal with the accurate address information, and increase the calculation speed and precision for massive data. With the flexible parameter settings, the algorithm is reusable and suitable for much other B2C market analysis and chain-store customer data analysis. . The advantage of the study is that an improved clustering algorithm is proposed to mine and provide strategic marketing information for the training and education institutions. But it was not considered in the population structure and population size of different communities.

Finally, Bahari and Elayidom (2015) have presented the model to predict the behavior of customers to enhance the decision-making processes for retaining valued customers. The used dataset contains the results of direct bank marketing campaigns (Moro, Laureano, & Cortez, 2011). It includes 17 campaigns of a Portuguese bank conducted between May 2008 and November 2010. The customer was offered a long-term deposit application by contact over the phone. In their experimental dataset, 10% of the pre-processed dataset is used and it contains 16 input variables. Also, two classification models were used to predict the customer behavior. They also compared the performance of classifiers in terms of accuracy, sensitivity, and specificity. Furthermore, they proposed an efficient

<sup>22</sup> <https://developers.google.com/maps/>.

CRM-data mining framework and two classification models, Naïve Bayes, and Neural Networks are studied to show that the accuracy of Neural Network is comparatively better. The proposed model helps in predicting the behavior of the customers. Model evaluation and visualization measure the effectiveness of the model for enhancing their performance. Limitations of the study are that the focus is only on the Neuro-fuzzy classifiers. In this section, some important state of the art mechanisms in this scope is reviewed and analyzed.

Table 9 shows the side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed mechanisms.

#### 5.4. Data quality in CRM

Data quality is a key factor in the successful application of CRM software (Akoka et al., 2007). Data quality improvement practices can be roughly divided into the following activities (Moss, Abai, & Adelman, 2005): data profiling, data cleansing, and data defect prevention (Hable & Aglassinger, 2013). Traditionally, data quality assessment has focused on four primary areas: data accuracy, timeliness, completeness and consistency (Ballou & Tayi, 1999; Wang & Strong, 1996). Consistent with this view, Zahay and Griffin (2004) linked data quality to specific types of CRM systems needs including customer touch points (i.e. Internet contacts, email, telephone), transaction data (i.e. purchase history, credit history, payment history), loyalty/satisfaction data (i.e. loyalty programs, satisfaction surveys) and customer lifetime value data (i.e. retention, share of wallet). Previous studies have demonstrated that the use of CRM systems significantly improves customer relationship performance. The issue of data quality is emerging as one of the greatest challenges to confront the CRM industry (Thompson & Sarner, 2009). This dimension is validated according to the literature that suggests that customer data quality issues have a direct influence on the adoption of CRM, and the importance of this issue is widely underestimation in industry (Alshawi et al., 2011; Eckerson, 2002; Missi, Alshawi, & Fitzgerald, 2005; Xu, Nord, Brown, & Nord, 2002). In this section, some importance state of the art mechanisms in this scope are reviewed and analyzed.

Even et al. (2010) have evaluated a model for optimizing the configuration of tabular datasets in a real-world setting and assessed its potential contribution to better DQM of data resources. They have demonstrated this argument by evaluating a macro-economic model that links the handling of data quality defects, such as outdated data and missing values, to economic outcomes: utility, cost, and net-benefit. The evaluation is set in the context of CRM and uses large samples from a real-world data resource used for managing alumni relations. The motivated notion is that DQM can benefit from understanding the link between quality

configuration decisions and economic outcomes such as utility, costs, and net benefits. They have examined this notion in the context of managing alumni data, a context in which utility/cost tradeoffs are significantly affected by DQM configuration choices. They evaluated a model for optimizing the configuration of a tabular dataset within this context. An evaluation highlights the need for a broader perspective of DQM. The results of the evaluation indicated the need to methodically address the economic aspects involved in DQM configuration and on-going maintenance. Moreover, the monetary utility measurement used in the study is applicable to CRM. Other business domains (e.g. finance, health-care, insurance, human resources) may need different ways of conceptualizing and measuring utility. Their analysis is not without limitations, their dataset optimization considered existing usages only. To assume a higher likelihood of inaccuracy defects in data that has not been audited recently (this has been confirmed by the managers who were involved in the evaluation process). The lack of a baseline that would permit assessing accuracy efficiently is a common issue in many real-world data management environments.

As another research, Alshawi et al. (2011) have aimed at increasing the understanding around the adoption of CRM in SMEs. The findings confirmed that except for the organization size dimension, the majority of factors influencing the adoption of CRM are similar in nature to factors influencing SME adoption of other previously studied ICT innovations. Moreover, the study showed that there is a distinct similarity between the data quality factors that affect SMEs and those that affect large organizations when implementing CRM innovations. The findings also confirm that factors affecting the adoption of CRM in SMEs are largely similar to the factors affecting CRM adoption in previously studied other types of organizations. The advantage of this is that it, therefore, provides improved support to decision makers associated with the evaluation and adoption of CRM in this type of organizations. Also, it will enhance the quality of the evaluation process, and help support SME decision makers in exploring the implications surrounding CRM adoption. However, the research carried out in small and medium enterprises.

Also, in another research, Peltier et al. (2013) have described the antecedents of data quality, including direct and mediated relationships. Their model focused on how an organization's vision for data quality management affects inter- and intra-functional knowledge management practices. The findings showed that high-quality customer data affects both customer and business performance and that the most important driver of customer data quality comes from the executive suite. A large portion of the impact of organizational culture on performance is mediated by customer data quality and data sharing. The results support the presence of a hierarchy of effects for enhancing data quality that runs from organizational learning to cross-functional learning and

**Table 9**  
Side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed CRM in data mining mechanisms.

Researcher	Advantages	Disadvantages
Chang et al. (2009)	<ul style="list-style-type: none"> <li>• It develops an easily executed model and completed implementation of CRM,</li> <li>• It provides a foundation for building a CRM.</li> </ul>	<ul style="list-style-type: none"> <li>• The study was conducted in a limited number of companies.</li> </ul>
Hosseini et al. (2010)	<ul style="list-style-type: none"> <li>• Service sectors in evaluating their customer loyalty</li> </ul>	<ul style="list-style-type: none"> <li>• Limits research on a firm</li> </ul>
Khan et al. (2012)	<ul style="list-style-type: none"> <li>• It improves customer services and customer retention.</li> </ul>	<ul style="list-style-type: none"> <li>• Focuses analyzes in only one country</li> </ul>
Wei et al. (2013)	<ul style="list-style-type: none"> <li>• It develops unique marketing strategies.</li> </ul>	<ul style="list-style-type: none"> <li>• The study focuses on a single country</li> <li>• Focus on specific customers data</li> </ul>
Jiang et al. (2013)	<ul style="list-style-type: none"> <li>• It provides strategic marketing information for the training and education institutions.</li> </ul>	<ul style="list-style-type: none"> <li>• Not considers in the population structure and population size of different communities.</li> </ul>
Bahari and Elayidom (2015)	<ul style="list-style-type: none"> <li>• Predicts the behavior of the customers</li> </ul>	<ul style="list-style-type: none"> <li>• Focus is only on the Neuro-fuzzy classifiers</li> </ul>

functional learning (data sharing). The advantage is the research on customer data quality provides a number of actions that can be taken by academics and practitioners. Also, it is empirical support for the qualitative findings of (Zahay & Peltier, 2008) and highlights the need to view data quality as a collaborative process stemming from a top-down commitment to customer-centricity. But, they focused their investigation on financial services and they conceptualized data sharing through a limited set of “data access” issues.

Chuang and Lin (2013b) have examined the antecedents and consequences of customer information quality in the CRM system. The study demonstrated that the resource-based and the strategic positioning perspectives could complement each other to model the relationships between infrastructure capability, customer orientation, and customer information quality. In order to effectively improved customer information quality in a CRM system, firms should develop their infrastructure capability and customer orientation strategy to support the implementation of the CRM system. Additionally, it is evident that customer relationship performance plays a mediating role in the relationship between customer information quality and overall firm performance. The results showed that customer information quality positively affects customer relationship performance, which consequently leads to improvements in overall firm performance. But, the research was conducted in Taiwan, the characteristics of the financial service industries observed in the study may not apply to other countries with different cultures. Although the theory proposes that the research model is causal, the study only adopts a cross-sectional approach in which cause and effect data are captured simultaneously. Thus, the ability to draw definitive causal implications from the study is limited. Although for some reasons the study used only subjective measures for firm performance, it is noted that both objective and subjective measures have pros and cons.

Chuang and Lin (2013a) have examined the factors that play a tangible role in enhancing customer information quality in CRM systems. The results suggested that the impact of customer information quality in CRM systems on organizational performance starts with infrastructure capability supporting for CRM systems and CRM systems supporting for customer orientation. Moreover, the results indicated that customer information quality positively affects customer relationship performance, which leads to improvements in overall organizational performance. The advantages of research are as follows: first, an existing infrastructure capability is critical to enhancing customer information quality. Thus, managers should devote to acquire such support and capability. Second, observed enhancements in customer information quality are an immediate indicator of effective CRM systems use. But, the research was conducted in Taiwan, the results of the study might not be

generalizable to other countries with different cultures. Although the research model is theorized to be causal, they study only adopts a cross-sectional approach in which cause and effect data are captured at the same time. Thus, the ability to draw definitive causal implications from the study is limited.

Table 10 shows side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed mechanisms.

### 5.5. Social CRM

Social media holds enormous potential for companies to get closer to customers and, by doing so, increase revenue, cost reduction, and efficiencies. Social CRM (S-CRM) is a new approach that recognizes consumers have strong opinions about relationships as customers being managed in a social media context (Heller Baird & Parasnis, 2011). Social media has become a domain for investment that has interested businesses, recognizing it as a method for maintaining durable relationships with their customers (Trainor, 2012). Firms are now investing in resources that integrate social data into their existing CRM systems making it possible to understand customers and simultaneously cater to their best interests (Choudhury & Harrigan, 2014; VanBoskirk, 2011). Social CRM also enables the identification of new markets and trends within them for new market entry, development, and orientation (Warfield, 2009). The S-CRM is a new paradigm that aims to create meaningful conversation and high-value relationships between an organization and its customers, partners and employees. Being customer centric can be considered as the main rule in S-CRM, which means organizations have to focus more on the customers and their relationships with them rather than on products or services (Askool & Nakata, 2011). In this section, some importance state of the art mechanisms in this scope are reviewed and analyzed.

Askool and Nakata (2011) have reported a scoping study to explore the current situation of CRM adoption in the banking industry in Saudi Arabia. The aim of the study is to identify the factors that may influence businesses and customers' adoption of social CRM. Based on the scoping study about the current situation of CRM adoption in Saudi banks, traditional CRM, social networking and Web 2.0 literature, a range of factors that may influence IS acceptance attitude and behavior were identified and integrated with TAM. A model for exploring and predicting the acceptance of S-CRM has been presented in the paper. The factors include features of Web 2.0 (ease of networking, ease of participation and ease of collaboration), familiarity, care, information sharing and perceived trustworthiness. The model will enable a system designed to improve the

**Table 10**

Side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed data quality in CRM mechanisms.

Researcher	Advantages	Disadvantages
• Even et al. (2010)	• The monetary utility measurement used in the study is applicable to CRM • The inclusion of economic perspectives in managing the quality of data resources	• Of inaccuracy defects in data • The lack of a baseline that would permit assessing accuracy efficiently is a common issue • Many real-world data management environments
• Alshawi et al. (2011)	• It improves the support to decision makers associated with the evaluation and adoption of CRM. • Enhances the quality of the evaluation process	• The findings from the case studies confirmed and validated the identified factors when grounded within an SME environment.
• Peltier et al. (2013)	• It provides empirical support for the qualitative findings	• Findings are not generalizable to other countries with different cultures. • Data sharing a limited set of “data access”
• Chuang and Lin (2013b)	• Customer information quality positively affects customer relationship performance, leads to improvements in overall firm performance.	• Limits research in Taiwan • The inability to draw definitive causal implications • Uses only subjective measures for firm performance
• Chuang and Lin (2013a)	• It supports existing infrastructure leading to increased quality of customer information.	• Doing research in a country • The study only adopts a cross-sectional approach

traditional CRM system by understanding customer attitude towards SCRM. By incorporating the features of social networking into TAM, it intends to contribute to the investigation of the behavior of SCRM acceptance and usage by businesses, as well as customers. The advantages of research are the study identified the factors that influence customers in adopting SCRM, which can be useful for CRM practitioners to improve existing and future relationships with customers. In addition, the study can be considered as a contribution towards validating previous TAM results from different contexts. But, this model is focused only on individual level adoption, as well as research in the banking system of a country.

As another research, Choudhury and Harrigan (2014) have focused on social CRM by building on a previous CRM model proposed by Jayachandran, Sharma, Kaufman, and Raman (2005). The study presents a new model for social CRM, including a new construct of customer engagement initiatives and adaptations of other constructs, to take cognizance of the impact of social media technologies on CRM. The first implication derived from their study is the emphasis of the long-standing position that a marketing and customer orientation is vital to the successful integration of CRM technologies, even new social media technologies. The second key concept to take away for marketers is that engaging with customers must be part of a 360-degree cycle where each 'engagement' is viewed as an opportunity to learn more about customers. Thus, it is important to automatically and manually gather data with each customer interaction via social media, and feed these data into CRM software that enables an exponentially more effective and efficient series of 'engagement'. Another key implication is that, between customer engagement initiatives and relational information processes, marketers should look for possibilities for co-creation of products and services. Most businesses have key customers that have the potential to add value to an organization's product/service design, customer service and marketing strategies. To conclude, what is clear is that, for those organizations seeking to enter the social media playing field that is uncertain of what objectives to set and what approaches to take, CRM is certainly an appropriate strategy on which to hang social media tools and tactics. The advantages of research are as follows: first, the study contributes to an understanding of the change in communications between the customer and the marketer and focuses on interactive relationships with customers. Second, Businesses should utilize the rich customer information generated through every customer engagement using social media, to drive future marketing decisions. Study limitations include small sample size and the lack of consideration the size of the organization and the employee. Also, they study did not categorize organizations beyond the parameter of CRM implementation.

Trainor et al. (2014) have examined how social media technology usage and customer-centric management systems contribute to a firm-level capability of social CRM. Drawing from the literature on marketing, information systems, and strategic management, the first contribution of the study is the conceptualization and measurement of social CRM capability. The second key contribution is the examination of how social CRM capability is influenced by both customer-centric management systems and social media technologies. These two resources are found to have an interactive effect on the formation of a firm-level capability that is shown to positively relate to customer relationship performance. They study provides evidence that investment in social media technology can provide firms with substantial relationship management benefits. To the contrary, the results of the study suggest that social media technology use alone does not have a direct effect on these relationship performance outcomes. Instead, the results show that firms use these technologies to develop capabilities that allow them to better serve their customers. The study provides evidence that investment

in social media technology can provide firms with substantial relationship management benefits. The finding seems to support claims made by technology vendors that social media technology is a panacea for effectively managing customer relationships. To the contrary, the results of the study suggest that social media technology use alone does not have a direct effect on these relationship performance outcomes. Instead, the results show that firms use these technologies to develop capabilities that allow them to better serve their customers. Not only the social media technology investments enhance a firm's social CRM capabilities, but firms with customer-centric management systems are also well-positioned to take advantage of the rich information afforded through social media technologies. In this instance, when firms couple customer-centric management systems with nascent technologies, the impact on social CRM capabilities is magnified, which subsequently enhances customer relationship performance. While many firms might be able to implement a CRM system or create a social media presence, turning such resource investments into productive capabilities will likely necessitate that the technological investment supports and complements company strategies. According to the post hoc analyzes of the study, management support plays a role in enhancing social CRM capabilities for B2C firms. The advantage of the study to support claims made by technology vendors that social media technology is a panacea for effectively managing customer relationships. The limitations study is that capturing an effect that is only applicable to firms that have aggressively undertaken initiatives in support of their customer orientation strategy. Also, the study involves the only sample of top-management team executives.

Finally, Ballings and Van den Poel (2015) have assessed the feasibility of predicting increases in Facebook usage frequency, evaluate which algorithms perform best, and determine which predictors are most important. They benchmark the performance of Logistic Regression, Random Forest, Stochastic Adaptive Boosting, Kernel Factory, Neural Networks and Support Vector Machines using five times twofold cross-validation. The results indicated that it is feasible to create models with high predictive performance. The most important predictors include deviation from regular usage patterns, frequencies of likes of specific categories and group memberships, average photo album privacy settings, and recency of comments. Facebook and other social networks alike could use predictions of increases in usage frequency to customize its services such as pacing the rate of advertisements and friend recommendations, or adapting News Feed content altogether. The main advantage of their study is that it is the first to assess the prediction of increases in usage frequency in a social network. The first limitation is that access to the full network is not possible. The second limitation is selection effects. It might well be possible that the users that are unwilling to share their data may be different from the users in our recruited sample. The third limitation of the study is that some of the variables are limited in the number of values. The fifth limitation is that there might be some bias by not taking seasonality into account. The sixth limitation is that website model visits or login events are not investigated. As such their disregard passive users who visit the social network leaving valuable opportunities for advertising untapped. In this section, some important state of the art mechanisms in this scope are reviewed and analyzed.

Table 11 shows the side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed mechanisms.

## 6. Results and comparisons

The CRM referred to the managerial process that most of the organizations have applied to create competitive advantage. Having customer profitability, it is focused on building the long-term



**Table 11**

The side-by-side summarization and comparison of the most important advantages and disadvantages of the discussed social CRM mechanisms.

Researcher	Advantages	Disadvantages
Askool and Nakata (2011)	<ul style="list-style-type: none"> <li>It identifies the factors that influence customers in adopting S-CRM</li> </ul>	<ul style="list-style-type: none"> <li>Only focuses on individual level adoption</li> </ul>
Choudhury and Harrigan (2014)	<ul style="list-style-type: none"> <li>It contributes to an understanding of the change in communications between the customer and the marketer.</li> </ul>	<ul style="list-style-type: none"> <li>Small sample size</li> <li>The lack of consideration the size of the organization and the employee</li> <li>It did not categories organizations beyond the parameter of CRM implementation</li> </ul>
Trainor et al. (2014)	<ul style="list-style-type: none"> <li>Supports the claims made by technology vendors that social media technology is a panacea for effectively managing customer relationships.</li> </ul>	<ul style="list-style-type: none"> <li>It is only applicable to firms that have aggressively undertaken initiatives in support of their customer orientation strategy</li> <li>It involves the survey only sample of top-management team executives</li> </ul>
Ballings and Van den Poel (2015)	<ul style="list-style-type: none"> <li>Assesses the prediction of increases in usage frequency in a social network</li> </ul>	<ul style="list-style-type: none"> <li>Do not have access to full network data,</li> <li>Some of the variables are limited in the number of values,</li> <li>Might be some bias by not taking seasonality into account.</li> </ul>

relationship with the customers (Mekkamol et al., 2013). It is a new management system. It integrates the database and the data warehouse technology, the data mining technology, on-line analysis processing, the Internet technology, object-oriented technology, client/server system, sales automation and other related technical achievements, can provide a business automation solutions for enterprises' sale, customers' service and decision support and so on, make enterprises to have a platform to customers. In the management system, customer information is collected, classified, stored, then converts into useful knowledge (Xu, 2014).

In the previous section, we described most popular CRM techniques in five main categories including E-CRM, knowledge management, data mining, data quality and social CRM. Here, comparison of the mentioned techniques of CRM is discussed. In general, the most important advantages of these techniques are: first, the customer information quality positively affects customer relationship performance, which consequently leads to improve it on overall firm performance. Second, CRM based on DM can understand customer's need as much as possible, improve customer satisfaction, gain more quotes in the market and promote the profitability, thus enhance enterprise's competitive advantage. Third, highlighting the importance of 3-way interactions among customer knowledge types, knowledge creation processes, and CRM systems. Fourth, the new and interesting role of multidimensional trust beliefs in the successful implementation of E-CRM. The most important weakness of these techniques is: a first limitation is that they conceptualized data sharing through a limited set of "data access" issues. Second, the lack of clear information. Third, there are limitations of when and where the research was conducted.

In a highly competitive global environment, the pressures to reduce costs and improve customer service while distinguishing themselves through their actions is very important. As we saw, the CRM systems increase the productivity, customer satisfaction and ultimately achieve better performance in comparison with its competitors. It also should be considered in any organizational strategy. Therefore, after the systematization of desired objectives in the CRM, strategies offering about how to build a relationship with valuable customers and their loyalty is a very vital step. Moreover, the organizational culture is one of the important factors in determining the preparation of organization for implementing the CRM projects. In addition, the social dimension as another factor considers the virtual interactions between customers and the company. Furthermore, customer loyalty is another important factor that impact on CRM. It can be concluded that the four perils of CRM that should be avoided: 1) implementing CRM before designing a customer strategy, 2) rolling out CRM before changing the organization to match, 3) supposing that the CRM technology is the best, 4) CRM software alone can increase performance.

Furthermore, we compared and evaluated the factors that effect on CRM (for each group) to find which factor is more important in any group. Besides, we identify the most important and least important factors that have an effect on CRM strategies. According to the performed SLR of CRM mechanisms from 2009 to June 2015, we determined the number of published articles have very high 2012 and low in 2011. In addition, the greatest number of articles published in infamous journals. Elsevier with 18% and IEEE with 44% of published articles (among 115 articles) have the highest published articles in journals and conferences respectably. However, Wiley with 2% has the minimum number of published articles among selected publishers.

## 7. Open issues

This section offers several important issues until now as research directions in the CRM that have not been comprehensively and thoroughly studied. By discussing and analyzing the mentioned state of the art techniques, there has been observed that there is no independent technique that addresses all issues involved in CRM. For example, some techniques consider providing trust, knowledge management, and data quality while some totally ignore these issues. Furthermore, most of the discussed techniques have been used with simulation to evaluate and test the proposed techniques. However, some others techniques can be tested in real-world scenarios to provide a very realistic result. In addition, formal verification and behavioral modeling of some techniques seem very interesting direction for future research.

Security and privacy are other challenging research areas that are not considered in many of CRM techniques. Another important matter in security issue is the case of malicious peers that is not considered in many of the techniques. In addition, retention, trust, and validity can be considered for enhancing the security of CRM technique. Moreover, online trust and reputation can be considered for enhancing the security of CRM technique. Designing a caching mechanism to improve the performance of CRM technique will become a challenging problem. Choosing some surrogate peers to redirect the customer's requests to, which the request should be cached and how long the request should be considered are very challenging.

Another interesting line for future researchers can be the investigation of the role of uncertainty avoidance and social norms on actual purchase behavior to enhance the E-CRM effectively. Further investigation of this new understanding of trust, such as its relationship to commitment in online transactions, should be followed in future research. It should examine the impact of E-CRM 2.0 practices on performance metrics such as the level of customer loyalty, customer profitability, sales data, quality levels and company

reputation. In addition, it could be directed towards the following topics. An increasing amount of research is looking into the application of social network analysis and intellectual capital theory for describing and measuring the value of online social networks. Human intellectual capital theories can also be used in it for investigating the value and the mechanisms motivating customers to contribute, synthesize, and produce social intelligence and UGC.

Also, we invite the researchers to investigate the patterns of CRM systems and their uses across industries and countries to see how the characteristics of the business environment (national culture, the level of competitiveness, industry turbulence, etc.) affect the application and support CRM systems for customer knowledge creation processes. Given the importance of data sharing as a link between organizational learning and data quality, data quality mediates the sharing to performance relationship, therefore, future work is needed to expand the domain of data sharing, as this capability continues to challenge even the most sophisticated organizations. Lastly, customer data quality is multidimensional; more work is thus needed on the conceptual boundaries of customer data quality and its relevance in multiple contexts.

Investigating cross-cultural differences in organizational mechanisms designed for coping with customer information quality in CRM systems is a valuable research topic. Also, it is noted that both objective and subjective measures have pros and cons. Therefore, both measures should be used to evaluate firm performance in the future research. It is encouraged to adopt a longitudinal approach for better causality testing. It can also extend the proposed integrated model of CRM also by including other potential variables such as service and system quality, the analyzed mechanisms can be improved. Furthermore, it must clarify the impact of organizational incentives and top management support for customer information quality in CRM systems. Finally, the investigation on mobile CRM is still an interesting line of future research.

## 8. Conclusion

In this paper, the past and the state of the art mechanisms are systematically surveyed in the field of CRM. According to the performed SLR in CRM mechanisms from 2009 to June 2015, we determined the number of published articles have very high in 2011 and low in 2012. In addition, the greatest number of articles published in infamous journals. Elsevier with 18% and IEEE with 44% of published articles (among 99 articles) have the highest published articles in journals and conferences respectably. However, Wiley with 2% has the minimum number of articles among selected publishers. Furthermore, the taxonomy of CRM mechanisms as well as providing some interesting lines for future research are introduced. The 27 selected CRM articles in five main categories including E-CRM, knowledge management, data mining, data quality and social CRM are examined. For each of these classes, several past and the state of the art techniques are reviewed and compared. The E-CRM mechanisms revealed that strategy has the most importance and priority among major factors of preparation for implementing of E-CRM system. The results showed that E-CRM implementation to be a viable means of increasing the bank–customer relationship quality and outcome, which comprises overall relationship quality, trust, satisfaction, commitment, loyalty, retention, and willingness to recommend. The knowledge management mechanisms revealed that customer knowledge is an important issue for CRM implementation. Having knowledge management capabilities is not sufficient for the success of CRM, but there are other factors to consider. In particular organizational factors indeed, an impact CRM success and they appear to be intermediaries of the impact of other factors (KM capabilities/technological/customer orientation factors) in the success of CRM (in

financial and marketing terms). The data mining mechanisms revealed that integration of CRM with data warehousing could provide the following corporate renaissance; reduction in cost to acquire customers, reduction in cost to sell, reduction in cost to serve and reduction in time to serve. The data quality mechanisms revealed that in order to effectively improve customer information quality in a CRM system, firms should develop their infrastructure capability and customer orientation strategy to support the implementation of the CRM system. The results indicated that customer information quality positively affects customer relationship performance, which consequently leads to improvements in overall firm performance. The social CRM mechanisms revealed for those organizations seeking to enter the social media playing field that is uncertain of what objectives to set and what approaches to take, CRM is certainly an appropriate strategy on which to hang social media tools and tactics.

This study has some limitations. Firstly, it only surveyed articles published between 2009 and June 2015, which were extracted based on a keyword search of “electronic customer relationship management (E-CRM)”, “customer relationship management (CRM)” and “knowledge management”, “customer relationship management” and “data mining”, “customer relationship management (CRM)” and “data quality”, “social customer relationship management (CRM)”. Secondly, this study limited to only 7 publishers. There might be other academic publishers which may be able to provide a more comprehensive picture of the articles related to the CRM mechanisms. Lastly, non-English publications were excluded in this study. We believe research regarding the CRM mechanisms have also been discussed and published in other languages.

## Appendices

### Abbreviations Table

**Table 12**  
The common used abbreviations in the paper.

Abbreviations	State	Abbreviations	State
<b>API</b>	Application Programming Interface	<b>PIIT</b>	Personal Innovativeness In IT
<b>AHP</b>	Analytical Hierarchy Process	<b>MLPNN</b>	Multilayer Perception Neural Network
<b>B2C</b>	Business To Customer	<b>KBV</b>	Knowledge-Based View
<b>CRM</b>	Customer Relationship Management	<b>KM</b>	Knowledge Management
<b>CKM</b>	Customer Knowledge Management	<b>OLAP</b>	On-Line Analytical Process
<b>DM</b>	Data Mining	<b>R &amp; D</b>	Research and Development
<b>DQ</b>	Data Quality	<b>RBV</b>	Resource-Based View
<b>DQM</b>	Data Quality Management	<b>RFM</b>	Recency, Frequency, Monetary
<b>E-CRM</b>	Electronic Customer Relationship Management	<b>SCRM</b>	Social Customer Relationship Management
<b>ICT</b>	Information and Communication Technologies	<b>SEM</b>	Structural Equation Modeling
<b>IP</b>	Intellectual Property	<b>SMEs</b>	Small and Medium-sized Enterprises
<b>IT</b>	Information Technology	<b>SOM</b>	Self-Organizing Maps
<b>IS</b>	Information System	<b>SLR</b>	Systematic Literature Review
<b>GIS</b>	Geographic Information System	<b>TAM</b>	Technology Acceptance Model
<b>PEOU</b>	Perceived Ease Of Use	<b>UGC</b>	User-Generated Content

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