

## **Investigating customer relationship management systems involvement towards customer knowledge creation processes**

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Muhammad Rifki Shihab\*, Imanuel Sukrisna  
and Achmad Nizar Hidayanto

Faculty of Computer Science,  
University of Indonesia,  
Kampus UI Depok, 16424, Indonesia  
Email: shihab@cs.ui.ac.id  
Email: immanuel.sukrisna@gmail.com  
Email: nizar@cs.ui.ac.id

\*Corresponding author

**Abstract:** This research aims to understand the nature of the interactions among CRM systems (operational, analytical and collaborative), knowledge creation processes (socialisation, externalisation, combination, and internalisation), and the variety of customer knowledge (knowledge to, from, and about the customer). Only by having a deep understanding of such three-way interactions, will organisations be able to maximise their CRM systems usage and identify areas of knowledge creation capabilities improvement. In this exploratory research, data was gathered qualitatively through a series of interview with key respondents in four different organisations in which CRM was used profoundly. The research findings were similar to the initial research propositions; operational CRM provided stronger support towards socialisation and externalisation processes. Analytical CRM showed support towards combination process, specifically in generating knowledge about customers. Finally, collaborative CRM showed the greatest variety in contributing towards knowledge creation process, for all three types of customer knowledge.

**Keywords:** CRM; customer relationship management; e-CRM; customer knowledge creation.

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**Biographical notes:** Muhammad Rifki Shihab is a faculty at the Faculty of Computer Science, Universitas Indonesia. He graduated from Temple University, PA. His interests include e-commerce, CRM, and information management.

Immanuel Sukrisna obtained his bachelors degree in Information Systems from the Faculty of Computer Science, Universitas Indonesia. He is now working in the private sector.

Achmad Nizar Hidayanto is the Head of Information System stream at the Faculty of Computer Science, Universitas Indonesia. His interests include information systems, e-learning, and information retrieval.

## **1 Introduction**

Knowledge is an important asset for any modern organisation and some even say that those who possess superior knowledge will gain a competitive advantage (Jun and Yinli, 2009). More specifically, customer knowledge is regarded as an important resource in today's modern competition (Bueren et al., 2004; Davenport and Prusak, 1998; Drucker, 1999). However it has received little attention within the domain of knowledge management. Customer knowledge consists of three categories, namely, knowledge about customers, knowledge for customers, and knowledge from customers. Such knowledge is obtained through the various interactions between an organisation and its customers (Khodakarami and Chan, 2014).

The processes of knowledge creation, also known as the SECI Model, helps explain the way an organisation obtains customer knowledge (Nonaka et al., 2000). The SECI Model consists of four processes: socialisation, externalisation, combination, and internalisation.

Many tools can support and catalyse knowledge creation. One such tool commonly used by organisations to better manage their customers is Customer Relationship Management (CRM) system (Khodakarami and Chan, 2014). Three types of CRM systems can help organisations manage their customers, i.e. operational, analytical, and collaborative CRM (Tohidi and Jabbari, 2012). Operational CRM tools increase the efficiency and the automation of business processes in sales activities, marketing, and services. Analytical CRM tools are utilised to analyse customers' information and to better comprehend their behaviours, while collaborative CRM tools manage and synchronise organisations' interactions with their customers through a variety of communicative means (Khodakarami and Chan, 2011).

Due to the increasing interactions between an organisation and its customers, it is now more crucial to understand customer behaviours enabling organisations to provide products/services that suit them (Bueren et al., 2004; Khodakarami and Chan, 2014). However, many organisations have yet to fully grasp the processes of creating suitable customer knowledge needed to improve organisational performance (Khodakarami and Chan, 2011; Nonaka et al., 2000). Conversely, organisations must first comprehend the methods and tools that will aid and optimise the processes of customer knowledge creation.

Numerous studies have been found that compares CRM and Knowledge Management (KM) concepts and practices (Liew, 2008; Plessis and Boon, 2004; Shang et al., 2011; Toriani and Angeloni, 2011). Some even aim to integrate the two to coin a novel concept called Customer Knowledge Management (CKM) (Chen and Su, 2006; Garcia-Murillo and Annabi, 2002; Gebert et al., 2003; Salomann et al., 2005). Although these previous studies provide us with valuable insights regarding CRM and KM and their common relationships, they lack depth in the discussion of the role of technology for such interactions.

Other studies focus on the interaction of technology, namely CRM and customer knowledge. These studies, however, failed to elaborate the knowledge creation processes. For example, Xu and Walton (2005) examine analytical CRM and its functions to acquire knowledge about existing and prospective customers. Karakostas et al. (2005) discuss how communication and business to customer interactions can be supported by applying CRM tools at the strategic and tactical levels. Hashemzadeh et al. (2011) show how

technological dimension of CRM in the context of customer value is influential on customer satisfaction. Nawaser et al. (2011) discuss the importance of e-CRM techniques in providing customers with better services to meet their expectations.

There are several other studies that highlight the interaction of technology towards knowledge creation processes. For example, a study by de Carvalho and Ferreira (2001) elaborates the role of KM systems towards the integration of tacit and explicit knowledge through socialisation, externalisation, combination and internalisation processes (de Carvalho and Ferreira, 2001; Nonaka, 1994).

There are even fewer studies that discuss the interactions between customer knowledge and knowledge creation processes (Belbaly et al., 2007; Chen and Su, 2006; Garcia-Murillo and Annabi, 2002). For example, Belbaly et al. (2007) show how knowledge from customers is captured through the knowledge creation processes.

As can be derived, there are numerous studies that have analysed the two-way interactions between CRM systems, customer knowledge, and knowledge creation processes. However three-way interactions between them are rarely inspected and are greatly limited. For example, Shaw et al. (2001) discuss such three-way interactions with limitations to only one type of customer knowledge. Khodakarami and Chan (2014) examine similar three-way interactions but are limited to only three organisations, a corporation, a health organisation and an educational organisation. Despite the restricted generalisability of their findings, their research acts as a starting point to further investigate the three-way interactions aforementioned.

By understanding such three-way interactions, an organisation is equipped with a more profound comprehension on how CRM systems are capable of providing specific customer knowledge through certain knowledge creation processes. Only through such detailed three-way interactions, will organisations be fully aware in the ways to maximise the uses of their existing systems, and identify areas where knowledge creation capabilities may be improved.

This research aims to understand the nature of the three-way interactions among CRM systems, the types of customer knowledge, and the knowledge creation processes. This study seeks to answer a specific problem, i.e. how each type of CRM systems (operational, analytical, and collaborative) supports the knowledge creation processes (socialisation, externalisation, combination, and internalisation) in order to create knowledge to, from, and about customers.

This study contributes in extending knowledge creation theories by empirically investigating the efficacy of CRM technologies in generating customer knowledge through various knowledge creation processes. The authors aspire that this research would substantiate to what type of CRM technology is most suitable to be utilised in a particular knowledge creation process to generate specific customer knowledge.

## **2 Theoretical background**

### *2.1 Customer relationship management*

CRM is a combination of strategy and information systems that focuses on an organisation's customer service (Chan, 2005; McKenzie, 2001). CRM systems consist of three categories: operational CRM, collaborative CRM and analytical CRM (Bose and Sugumaran, 2003; Gebert et al., 2003; Geib et al., 2006; Iriana and Buttle, 2007).

Operational CRM aims to automate CRM processes to improve efficiency and productivity by employing sales automation, marketing automation, call centre support, and customer database (Khodakarami and Chan, 2014).

Analytical CRM's goal is to provide an overview and analysis of customer needs and behavioural patterns. It consists of a wide range of analytical tools, such as data mining, data warehouse, and online analytical processing (OLAP) (Khodakarami and Chan, 2014).

Collaborative CRM allows organisations to interact with their customers (Edwards, 2007; Farquad et al., 2014) and involves a variety of communications media between organisations and their customers. It utilises internet chat and instant messaging, e-learning systems, webcast systems, broadcasting tools, Web Audio and Radio, Web Cams, Video and interactive sales support (Khodakarami and Chan, 2014; Tohidi and Jabbari, 2012).

## *2.2 Knowledge creation processes*

Knowledge is defined as justified beliefs that can increase the capacity of an organisation to perform an action (Nonaka and Takeuchi, 1995). Knowledge creation process is a model first proposed by Nonaka and Takeuchi (1995), which includes four processes, socialisation, externalisation, combination, and internalisation.

Converting tacit knowledge into tacit knowledge through shared experience is known as socialisation. Examples of socialisation activities include the sharing of experiences, spending time together, observation, imitation, and informal meetings. Externalisation transforms tacit knowledge into a clear and comprehensible explicit form. It is exemplified through the usage of diagrams, hypothesis, models, or prototypes to share knowledge. Combination is a process that transforms explicit knowledge into a more systematic and complex explicit knowledge (Nonaka et al., 2000). Knowledge can be obtained from within or outside an organisation, and then combined, altered, or processed to form new knowledge. Transforming explicit knowledge into tacit knowledge is part of the internalisation process. Knowledge is usually obtained in the form of training courses, simulations or experimentation, prototyping, and benchmarking (Popadiuk and Choo, 2006).

## *2.3 Customer knowledge*

Customer knowledge is typically divided into three categories, namely knowledge for customers, knowledge from customers, and knowledge about customers (Gebert et al., 2003; Jun and Yinli, 2009). Knowledge that is transmitted to customers so that they better understand an organisation's products or services is known as knowledge for customers (Jun and Yinli, 2009).

Knowledge from customers includes general perceptions, insights, as well as reactions, regarding an organisation's products or services. Such knowledge gives an organisation a perspective on how customers perceive their products or services (Daneshgar and Bosanquet, 2010). Knowledge from customers is realised through direct interactions with the customers, typically about complaint, needs, and suggestions (Chen and Su, 2006). Knowledge about customers allows organisations to conduct accurate analysis concerning customer needs, resources, and eventually build a personalised

service in line with each customer profile (Jun and Yinli, 2009). Some examples of knowledge about customers include demographic data, customer history, contact information, shopping patterns, etc. (Zahari et al., 2013).

### 3 Research model

This research investigated the three-way interactions between CRM technology, knowledge creation processes, and customer knowledge. These relationships were first introduced by Khodakarami and Chan (2014). The level of support provided by a CRM system will vary for each knowledge creation process and each type of customer knowledge. The assumptions of these relationships are elaborated in Table 1.

**Table 1** Research underlying assumptions

<i>CRM types</i>	<i>Knowledge creation process</i>	<i>For</i>	<i>From</i>	<i>About</i>
Operational	Socialisation	✓	✓	✓
	Externalisation	✓	✓	✓
	Combination	×	×	×
	Internalisation	×	×	×
Analytical	Socialisation	×	×	×
	Externalisation	×	×	×
	Combination	×	×	✓
	Internalisation	✓	×	✓
Collaborative	Socialisation	✓	✓	✓
	Externalisation	✓	✓	✓
	Combination	×	×	✓
	Internalisation	✓	×	✓

Socialisation within organisations occurs largely through social interactions. Collaborative CRM facilitates meetings in forms of a web conference or forums, for individuals to share their experiences and discuss new ideas. In addition, organisations may utilise operational CRM tools such as call centre systems to enable real-time communication with their customers, enabling socialisation between customers and the organisation. Through the socialisation process, organisations are able to provide products information and services to customers, collect information from them, and learn about their specific needs and expectations. Thus, the authors assumed that collaborative and operational CRM play important roles in supporting knowledge creation, for from and about customers, within the process of socialisation.

The externalisation processes is supported by collaborative CRM by allowing individuals to construct knowledge through sharing documents and other sources of knowledge. Intranet, online discussion forums, news groups and e-mail are examples of collaborative CRM that facilitates externalisation. The externalisation process creates knowledge for customers through the use of tutorials and explanation of product information on a website. In addition, knowledge from customers can also be created by using online forums, customer surveys and feedback. Operational CRM will also be able

to capture knowledge about customers; however, the creation of knowledge through operational CRM is usually not very high. Thus, the authors assumed that collaborative and operational CRM play important roles in supporting knowledge creation, for and about customers, within the process of externalisation.

Combination process involves the conversion of explicit knowledge into more explicit knowledge in a more complex and comprehensive manner. Customer information and knowledge are gathered from multiple sources and stored in a database repository. Analytical CRM supports the combination of various sources of knowledge, yielding a more complete analysis to create a new form of explicit knowledge. Data mining, web mining, data warehouse and OLAP are examples of analytical tools that facilitate the combination process by allowing employees to categorise, structure and analyse large amounts of data and gain useful understanding about customers. Furthermore, collaborative CRM system, such as intranets and search tools, facilitates collaboration by allowing employees to organise and combine knowledge resources across many departments. Operational CRM, conversely, collects customer information that can later be utilised as data source. Thus the authors assumed that analytical and collaborative CRM play important roles in supporting knowledge creation, specifically knowledge about customers, within the process of combination.

Lastly, internalisation converts explicit knowledge into tacit knowledge, stored within an individual. It requires individuals to identify relevant explicit knowledge and create their own tacit knowledge. Collaborative CRM, such as intranet, supports internalisation process by providing accesses to various documents in the organisation. Customers' familiarity and knowledge of organisation's products and services can be enhanced through the corporate website, blogs, forums and online communities. Analytical CRM reports also aid in the process of internalisation when such reports are studied by employees to augment their customer-base knowledge. Thus it is fair to assume that collaborative and analytical CRM play important roles in supporting knowledge creation, for and about customers, within the process of internalisation.

Knowledge for customers, such as product and service information, organisational data, product reviews, is made available to customers through collaborative CRM. This is exemplified in corporate websites, online discussion forums, online communities, blogs and e-mail. Furthermore, some knowledge can be distributed to customers through operational CRM call centres. Analytical CRM lacks knowledge creation for customers due to its focus of internal organisation utilisation.

Analytical CRM's strength is in the creation of knowledge about customers. Data warehouse, data mining, and OLAP are analytical CRM tools, which are capable of creating a wide array of knowledge about customer behaviours, purchasing trends as well as their preferences. Operational CRM, such as call centres, and databases can also collect information about customers' contact details, demographics, and purchase history. Reports and analysis generated by the system can be considered as knowledge about customers.

Knowledge from customers is mostly obtained through collaborative CRM and operational CRM. Call centres are an example of operational CRM that help organisations gain knowledge from their customers. In addition, online customer surveys, comments on blogs and forums, as well as e-mail are examples of collaborative CRM attaining customer knowledge.

#### **4 Research method**

This research was conducted using a qualitative approach in the form of a case study to produce a narrative or description of real practice (Denzin, 1970; Denzin and Lincoln, 2005; Parkinson and Drislane, 2011). Qualitative research was deemed as the best approach because it features desirable flexibility, as it does not require a large sample, yet still provides a holistic view of the context (Sinkovics et al., 2008).

The nature of this research was exploratory, and its main goal was to investigate and gain a deeper comprehension while discovering the interactions of CRM systems towards customer knowledge creating processes. Exploratory studies, such as this, are usually done when a new discipline of science is initiated (Heyink and Tymstra, 1993; Mo, 1978).

Interviews were done as the main data procurement method because it offers the most benefits for this research type (Denzin, 1970; Jaeger and Halliday, 1998; Mo, 1978; Silverman, 1985). Researchers carried out semi-structured interviews where pre-determined questions were to be responded by the interviewees. The questions were categorised by each knowledge creation process. During the interview, interviewees described how the CRM system was used in each knowledge creation process. Additionally, the particular CRM system used in each of the knowledge creation process was explored. For example, questions were posed regarding socialisation processes, and an interviewee stated call centres were used to interact with customers during that particular process, to provide information and answer questions from customers regarding a complaint. It was later classified as operational CRM (call centre) being used to support the socialisation knowledge creation process by providing knowledge to and from customers.

Data gathered from interviews were then codified accordingly. During codification process, the researchers noted the number of times a CRM system was mentioned during the interview and its relationship to a knowledge creation process. The amount was expressed in quantitative form to determine the level of support each CRM system for each customer knowledge creation process.

Five organisations were initially invited to take part in this research due to their assumed substantial use of CRM and accessible communication channels via the university. By the time data collection process started, only four organisations participated. One organisation, an insurance company, decided not to take part in this research due to undisclosed reasons.

Numerous interviews were conducted consisting of ten interviewees from four different organisations, as summarised in Table 2. The interview duration for each interviewee was roughly one hour long. Data collection was conducted during an eight-week period, starting in April 2014. The interview process asked each organisation to suggest as to who is the best candidate for the interview process. To ensure consistency, this study interviewed at least two individuals per organisation. Furthermore, the process required that each individual from the same organisation came from different business units relating to CRM, aspiring to capture a more holistic breadth on the way CRM tools were used within each organisation.

Each interviewee had different backgrounds that can be roughly categorised into three groups. Four interviewees had a marketing or CRM experience, another four interviewees were power users of their various CRM tools, and two interviewees had IT credentials.

**Table 2** Summary of reviewee

<i>Categories</i>	<i>Interviewee</i>	<i>Position</i>	<i>Organisation</i>
Marketing/ CRM	A	Product and Marketing Intelligence Supervisor	1
	B	Head of Consumer Relations	2
	C	Digital Corporate Executive	2
	D	Digital Marketing Specialist	3
System Users	E	General Manager Sales Eastern Regional	1
	F	Marketing Brand	2
	G	Digital Marketing Executive	2
	H	Corporate Secretary	4
Information Technology	I	IT Manager	3
	J	Head of IT	4

## 5 Organisational profile and usage of CRM

The research conducted covered four types of organisations employed with comprehensive CRM systems. Organisation 1 engages in the telecommunications industry in Indonesia for over 20 years, with more than 4000 employees. By 2012, organisation 1 became the largest telecommunication organisation in Indonesia and the sixth largest in the world by reaching over 125 million subscribers. Organisation 1 has customer service offices spread throughout Indonesia.

**Table 3** Summary of CRM tools utilised by each organisation

<i>CRM Types</i>	<i>CRM Tools</i>	<i>Organisation</i>			
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Operational	Customer service (e.g., call centre)	✓	✓	✓	✓
	Sales force automation	✓	✓	✓	✓
	Marketing automation (e.g., email campaign)	✓	✓	✓	✓
	Database management system (DBMS)	✓	✓	✓	✓
Analytical	Data warehouse	✓	✓	✓	✓
	Data/web mining	✓	✓	✓	✓
	Spreadsheets	✓	✓	✓	✓
Collaborative	Internal Portal	✓	✓	✓	✓
	Social Media (e.g., website, virtual communities, Facebook fan page)	✓	✓	✓	✓
	Communication support (e.g., e-mail, text messaging)	✓	✓	✓	✓
	Tele/video/web conferencing	✓	✓	✓	✓

Operating in Indonesia since 1971, organisation 2 is a leader in the consumer goods industry, a subsidiary of an international consumer goods organisation and currently employs more than 2600 workers to produce a variety of products at three plants. The organisation also has numerous brands for coffee, milk, chocolate, candy, and cereal products.



Organisation 3 operates in electronic goods industry, and is a subsidiary of a parent organisation located in South Korea. Currently, the organisation has thousands of employees and has been operating in Indonesia for more than 20 years with 21 branches spread all over Indonesia.

Organisation 4 is a bank that has been listed in Indonesia Stock Exchange since 2001. By the end of 2012, their office has grown to a total of 207 branch offices in almost all major cities in Indonesia and currently employs 8,200 employees.

A complete overview of CRM tools utilised by each organisation studied is presented in Table 3. The variety of CRM tools are derived from a list gathered from different literatures (Chan, 2005; Khodakarami and Chan, 2014; Tohidi and Jabbari, 2012).

## 6 Results and discussions

### 6.1 Results

The results of this study were expressed quantitatively and presented in tabular format to clearly illustrate the three-way interactions between CRM technology, knowledge creation process and types of customer knowledge. The numbers in Table 4 indicate the number of times an interviewee discussed a particular three-way interaction between CRM technology, knowledge creation process and types of customer knowledge.

**Table 4** Summary of findings

<i>CRM Types</i>	<i>Knowledge Creation Processes</i>	<i>Knowledge For</i>	<i>Knowledge From</i>	<i>Knowledge About</i>
Operational	Socialisation	44	27	2
	Externalisation	5	0	0
	Combination	2	1	1
	Internalisation	0	0	0
	Total	51	28	3
Analytical	Socialisation	1	0	1
	Externalisation	0	0	0
	Combination	0	1	37
	Internalisation	0	0	0
	Total	1	1	38
Collaborative	Socialisation	15	11	4
	Externalisation	25	3	10
	Combination	10	2	4
	Internalisation	20	1	8
	Total	70	17	26
<i>Grand Total</i>		<i>122</i>	<i>46</i>	<i>67</i>

**Table 4** Summary of findings (continued)

<i>CRM Types</i>	<i>Knowledge Creation Processes</i>	<i>Knowledge For</i>	<i>Knowledge From</i>	<i>Knowledge About</i>
Collaborative	Socialisation	15	11	4
	Externalisation	25	3	10
	Combination	10	2	4
	Internalisation	20	1	8
	Total	70	17	26
<i>Grand Total</i>		<i>122</i>	<i>46</i>	<i>67</i>

The research's findings showed that all three types of CRM helped organisations create all three types of customer knowledge, by using all four variety of knowledge creation process. Collaborative CRM shows the strongest support towards knowledge creation, followed by operational CRM, and trailed by analytical CRM.

## 6.2 Discussion

By inspecting the results closer, however, this research indicated that operational CRM and collaborative CRM supported the creation of knowledge for customers. Through contact centres, companies were able to create and distribute knowledge to customers. As explained by interviewee B and C, contact centres were used to “answer customer questions”. In addition, the creation of knowledge for customers could also be done with any operational CRM applications, such as marketing automation via e-mail campaign and text-message blasts. This was exemplified by interviewee D in which its organisation “used email campaigns in addition to [their] social media campaigns”. In collaborative CRM, companies more often used social media to generate knowledge for customers. Websites and social media were examples of collaborative CRM used by the four companies in this study.

Knowledge created from customers was also supported by operational CRM systems. Customer service was the utmost tool that exhibited such support. Through customer service, organisations gained knowledge from customers directly. Interviewee B explained how its organisation employed a multi channel approach and utilised “their call centres to take and handle customer requests and complaints”. Collaborative CRM also supported the creation of knowledge from customers, more specifically through the use of social media. Many suggestions, complaints, and information were obtained from customers through the organisation's corporate social media accounts, such as Facebook and Twitter. Interviewee C added that often times “customers post their complaints via social media”, which was gathered and used as valuable information from its customers.

Analytical CRM led in creating knowledge about customers. Through data warehousing and data mining, organisations analysed their customers in accordance to organisational requirements. For example, organisation 2 maximised analytical tools to monitor its customers and to analyse their behaviours. Sentiment analysis tools as well as OLAP were popularly employed by the organisations in this research. Interviewee E added that “data mining from [their] data warehouse were typically used to perform customer profiling”.

The process of knowledge creation through socialisation (tacit to tacit) was highly supported by operational CRM, such as customer service, because it allowed customers to interact directly with an organisation's representative. Perhaps an explanation of operational CRM's eminence of being widely used, more specifically within socialisation processes, is the fact that the enablement of organisation to customer interactions is deemed to be one of the main reasons for CRM implementations (Ko et al., 2008). In addition, socialisation was also conducted through collaborative CRM applications such as video conferencing tools. For example, organisation 1 and 4's employees conducted conference calls with their fellow employees every week. Thus, the process of knowledge creation came directly from the tacit knowledge of an individual and distributed to other individuals. Within socialisation process, the types of customer knowledge created were mostly for and from customers. This notion was based on the idea that an organisation delivers knowledge to and from their customers when interacting with them. Interviewee E added that video conference session was conducted "to talk about general organisational and customer issues".

Collaborative CRM supported knowledge creation through externalisation (tacit to explicit) by utilising a variety of tools, such as an organisations internal portal or other facilitated corporate communications channels, such as e-mail. In an internal portal, employees disseminated their ideas and suggestions to the organisation or fellow employees. In addition, employees wrote about their experiences, and recorded it on the internal portal. E-mail was utilised by employees to pour their ideas into documents that could later be distributed to appropriate parties. Within externalisation process, the types of knowledge created were mostly for and about customers. Such knowledge was recorded in explicit forms such as documents. Interviewee A explained that its organisation "usually disseminate information to [their] teams via weekly meetings, emails, mailing lists, etc." This strengthens the arguments of Chen and Su (2006), which states that within knowledge management domain, an important task is the conversion of tacit knowledge into explicit knowledge.

Knowledge creation through combination process (explicit to explicit) was supported largely by analytical CRM systems. Organisations used analytical tools in order to gain knowledge about customers. These tools aided organisations in analysing patterns of customer behaviours and their characteristics. Employees took advantage of analytical tools by documenting research results into reports that may be used for decision making. For example, organisations created a specific marketing strategy that was derived from previously conducted analysis. Such combination process highly supported knowledge creation about customers. In addition, collaborative CRM also generated knowledge through combination process. Interviewee C explained that its organisation "use Google or Facebook keywords to bid, and use their information to target which consumers fit the requirements". The organisations who participated in this study realised that knowing more about customers will lead to the generation of competitive advantage (Karakostas et al., 2005)

This study also proved that collaborative CRM system provided steady support on knowledge creation through internalisation (explicit to tacit). It was illustrated by the active usage of internal portals and e-mails in capturing knowledge about customers from a priorly explicit form such as documents, videos, reports into new knowledge disseminated to employees. Interviewee F and G exemplified that "online tutorials were made available in forms of video recordings and PowerPoint presentations". Employees shared explicit information such as documents or reports through internal portals, discussion forums and e-mails. Conversely, internalisation of knowledge for customers

was also aided through collaborative CRM. Customers were given “information about products on the web, as well as organisational activities that can increase [an organisation’s] brand equity”. Documents such as best practices, product information, and corporate social activities were used to internalise organisational knowledge for customers. Knowledge sharing between an employee and a customer has a much different purpose and takes on different characteristics than knowledge management within the organisation (Garcia-Murillo and Annabi, 2002).

**Table 5** Interview excerpts of specific interactions

<i>CRM Types</i>	<i>Knowledge creation process</i>	<i>Customer knowledge</i>	<i>Evidence</i>
Operational	Socialisation	For	“We use our contact centre for our nutritionists to answer customer questions” (B&C)
		From	“There are many channels, such as customer calls, walk-ins to customer service centres, call in via our call centres, call outs, etc, for us to take handle customer requests and complains.” (B)
Analytical	Combination	About	“Data mining from our data warehouse are typically used to perform customer profiling and increase data usage” (E)
Collaborative	Socialisation	For	“We have conference calls once a week and also video conferencing with BOD to talk about general organisational and customer issues.” (E)
		From	“Complaints can come from social media...” “Each of our brands has social media: Facebook, twitter and some even instagram and of course websites. Usually customers post their complaints via social media.” (C)
	Externalisation	For	“We also have e-mail campaigns, usually in the form of newsletters in addition to social media campaigns. More recently we integrate with our activities on the ground by using SMS blast” (D)
	Externalisation	About	“We usually disseminate information to our teams via weekly meeting, email, mailing lists, etc.” (A)
	Combination	For	“We use Google keywords to bid, as well as Facebook’s. We use their information to target which consumers fit the requirements.” (C)
	Internalisation	For	“Information about products on the web, and our organisational activities can increase our brand equity.” (E)
	Internalisation	About	“Online tutorials are made available in forms of video recordings and PowerPoint presentations. Information within varies largely, for example how to maintain data privacy, how to perform advertisement targeting using Facebook, etc.” (F&G)

### 6.3 *Evidences of various instances of three-way interactions*

Direct quotes from the text of the interview are typically used to determine the relationship between the results of interviews and the goals to be achieved in this research. Interviews with formalised scripts can increase transparency in the process of analysing qualitative data (Sinkovics et al., 2008). Therefore, a variety of instances are provided where such three-way interactions took place in the four organisations studied. To strengthen the accuracy of the results, evidences of such specific interactions are provided in Table 5.

## 7 **Implications**

This study has significant research implications, most importantly in systematically analysing the three-way relationships between CRM technology, knowledge creation process and types of customer knowledge. It has been argued that such three-way analysis is one of the earlier in its kind, and have unrestrained the theories of customer knowledge creation.

The research findings were similar to the initial research propositions; however there are a few key findings worth noting. For example, operational CRM provided stronger support towards socialisation process when compared to that of externalisation. Analytical CRM showed support towards combination process, specifically in generating knowledge about the customer. Finally, collaborative CRM showed the greatest variety in contributing towards knowledge creation process, for all three types of customer knowledge.

Comparable to the arguments of de Carvalho and Ferreira (2001) regarding KM software, the findings in this research clarified that CRM tools need to continue to evolve in order to fully offer an integrated platform for customer knowledge creation and knowledge conversion processes. This research has delineated and intertwined CRM technologies with Nonaka and Takeuchi's (1995) knowledge conversion model, as well as customer knowledge types. With all being well contemplated, it is quite assuring to say that the three can all be related, despite unequal representations among their relationships. The tools however need to continue evolve to facilitate the adaptations and changes that are needed to enhance customer knowledge creation processes (Belbaly et al., 2007).

This study also showed that CRM tools are yet to be fully exploited by those organisations who have implemented it. Operational CRM was underutilised, especially in externalisation process, to generate knowledge for, from and about customers. Analytical CRM was underutilised in internalisation process to generate knowledge about customers. Furthermore, collaborative CRM was underutilised in externalisation, combination and internalisation processes to generate knowledge from customers. Perhaps, the lack of understanding as argued by Ko et al. (2008) is one of the leading reasons for not maximising CRM tools to generate customer knowledge. Nevertheless, this should be a loud alarm for CRM managers to further exploit the ways CRM technology could be used for customer knowledge creation.

## **8 Conclusion**

This study was aimed to determine the three-way relationships between CRM systems, knowledge creation process and customer knowledge. The results of the study were found to be similar, with a few differences, to the model proposed in this research.

CRM system in general was shown to facilitate an organisation's knowledge creation process. By understanding the three-way relationship, namely how a specific CRM system plays a role in the customer knowledge creation process, an organisation would be able to optimise and exploit the potential uses of its CRM system.

Operational CRM showed the strongest support towards knowledge creation process of socialisation, more specifically in knowledge for and from customers. Externalisation and combination processes were also enabled by operational CRM, however at much weaker measure than that of socialisation. In this study, operational CRM did not contribute towards the process of internalisation of any types of customer knowledge.

Analytical CRM showed the strongest support towards knowledge creation process of combination, more specifically in knowledge about customers. Socialisation process was also enabled by analytical CRM, however at a much weaker measure than that of combination. This study did not find any example of analytical CRM showing contribution towards the processes of externalisation and internalisation of any customer knowledge.

Collaborative CRM showed the strongest support towards knowledge creation process of externalisation, more specifically in knowledge for and about customers. It also showed support towards knowledge creation process of socialisation and internalisation, in knowledge for and from customers, and for and about customers consecutively. Furthermore knowledge creation process of combination was also supported, specifically in knowledge for customers.

Unequal representation of the three-way relationships found in this study suggests that CRM tools need to continue to evolve in order to fully offer an integrated platform for customer knowledge creation processes.

## **9 Limitation and suggestion**

Like any research study, this study has several limitations that should be considered when interpreting the results. Among the limitations of this research was the lack of generalisability due to the limited number of organisations studied. The research's findings have contributed to the understanding of the three-way relationship as highlighted, but it may be useful to replicate this study with different subjects across different industries. Therefore, other researchers are invited to investigate such three-way relationships to a broader population across different industries, localities, environments to see the various ways CRM systems may support customer knowledge creation.

Furthermore, a qualitative study in the form of case studies such as this is prone to data analysts' misjudgement. Interpretations of such research were somewhat affected by the researchers characteristics, background, experience, etc. The researchers attempted to minimise such effects as explicated in the research methods section. However, formulating a quantitative study to investigate similar research question would be very useful as it can be tested statistically and serves as a way to triangulate and validate the results of this study.

## References

- Belbaly, N., Benbya, H. and Meissonier, R. (2007) 'An empirical investigation of the customer knowledge creation impact on NPD Performance', *HICSS 2007: 40th Hawaii International Conference on System Sciences*, IEEE, Hawaii, p.193a.
- Bose, R. and Sugumaran, V. (2003) 'Application of knowledge management technology in customer relationship management', *Knowledge and Process Management*, Vol. 10, No. 1, pp.3–17.
- Bueren, A., Schierholz, R., Kolbe, L. and Brenner, W. (2004) 'Customer knowledge management – improving performance of customer relationship management with knowledge management', *HICSS 2013: 46th Hawaii International Conference on System Sciences*, IEEE, Hawaii, p.70172b.
- Chan, J.O. (2005) 'Toward a unified view of customer relationship management', *The Journal of American Academy of Business*, Vol. 6, No. 1, pp.32–38.
- Chen, Y.H. and Su, C.T. (2006) 'A Kano CKM model for customer knowledge discovery', *Total Quality Management & Business Excellence*, Vol. 17, No. 5, pp.589–608.
- Daneshgar, F. and Bosanquet, L. (2010) 'Organizing customer knowledge in academic libraries', *Electronic Journal of Knowledge Management*, Vol. 8, No. 1, pp.21–32.
- Davenport, T.H. and Prusak, L. (1998) *Working Knowledge: How Organizations Manage What They Know*, Harvard Business School Press, Boston, MA.
- de Carvalho, R.B. and Ferreira, M.A.T. (2001) 'Using information technology to support knowledge conversion processes', *Information Research*, Vol. 7, No. 1.
- Denzin, N.K. (1970) *The Research Act in Sociology*, Aldine, Chicago, IL.
- Denzin, N.K. and Lincoln, Y.S. (2005) *The SAGE Handbook of Qualitative Research*, Sage Publications, Thousand Oaks, CA.
- Drucker, P.F. (1999) 'Knowledge worker productivity – the biggest challenge', *California Management Review*, Vol. 41, No. 2, pp.79–94.
- Edwards, J. (2007) *Get it together with collaborative CRM*, Inside CRM. Available online at: <http://it.toolbox.com/blogs/insidecrm/get-it-together-with-collaborative-crm-53559> (accessed on 29 November 2014).
- Farquard, M.A.H., Ravi, V. and Raju, S.B. (2014) 'Churn prediction using comprehensible support vector machine: an analytical CRM application', *Applied Soft Computing*, Vol. 19, pp.31–40.
- Garcia-Murillo, M. and Annabi, H. (2002) 'Customer knowledge management', *Journal of the Operational Research Society*, Vol. 53, pp.875–884.
- Gebert, H., Geib, M., Kolbe, L. and Brenner, W. (2003) 'Knowledge-enabled customer relationship management: integrating customer relationship management and knowledge management concepts[1]', *Journal of Knowledge Management*, Vol. 7, No. 5, pp.107–123.
- Geib, M., Kolbe, L.M. and Brenner, W. (2006) 'CRM collaboration in financial services networks: a multi case analysis', *Journal of Enterprise Information Management*, Vol. 19, No. 6, pp.591–607.
- Hashemzadeh, G.R., Khaksar, S.M.S., Nawaser, K. and Jahanshahi, A.A. (2011) 'Technological dimension of customer relationship management', *Indian Journal of Science and Technology*, Vol. 4, No. 11, pp.1565–1572.
- Heyink, J.W. and Tymstra, T.J. (1993) 'The function of qualitative research', *Social Indicators Research*, Vol. 29, No. 3, pp.291–305.
- Iriana, R. and Buttle, F. (2007) 'Strategic, operational and analytical customer relationship management: attributes and measures', *Journal of Relationship Marketing*, Vol. 5, No. 4, pp.23–42.
- Jaeger, R.G. and Halliday, T.R. (1998) 'On confirmatory versus exploratory research', *Herpetologica*, Vol. 54, pp.S64–S66.

- Jun, F. and Yinli, R. (2009) 'Research of building the customer knowledge acquisition model: based on social capital', *MASS 2009: International Conference on Management Science and Service Science*, IEEE, Wuhan, pp.1–5.
- Karakostas, B., Kardaras, D. and Papatthanassiou, E. (2005) 'The state of CRM adoption by the financial services in the UK: an empirical investigation', *Information and Management*, Vol. 42, No. 6, pp.853–863.
- Khodakarami, F. and Chan, Y. (2011) 'Evaluating the success of Customer Relationship Management (CRM) systems', *Proceedings of the European Conference on Information Management & Evaluation*, Toronto, pp.253–262.
- Khodakarami, F. and Chan, Y.E. (2014) 'Exploring the role of Customer Relationship Management (CRM) systems in customer knowledge creation', *Information and Management*, Vol. 51, No. 1, pp.27–42.
- Ko, E., Kim, S.H., Kim, M. and Woo, J.Y. (2008) 'Organizational characteristics and the CRM adoption process', *Journal of Business Research*, Vol. 61, No. 1, pp.65–74.
- Liew, C.A. (2008) 'Strategic integration of knowledge management and customer relationship management', *Journal of Knowledge Management*, Vol.12, No. 4, pp.131–146.
- McKenzie, J. (2001) 'Serving suggestions', *Financial Management*, Vol. 13, No. 1, pp.26–31.
- Mo, L. (1978) 'An adventure in exploratory research', *Acta Sociologica*, Vol. 21, No. 4, pp.165–177.
- Nawaser, K., Jahanshahi, A.A., Mirdamadi, S.A., Khaksar, S.M.S. and Zieaeshahabi, S. (2011) 'E-CRM toward customer satisfaction: current status and future trends', *Asia Pacific Journal of Research in Business Management*, Vol. 2, No. 10, pp.128–135.
- Nonaka, I. (1994) 'A dynamic theory of organizational knowledge creation', *Organization Science*, Vol. 5, No. 1, pp.14–37.
- Nonaka, I. and Takeuchi, H. (1995) *The Knowledge-Creating Organization: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.
- Nonaka, I., Toyama, R. and Konno, N. (2000) 'Seci, Ba and leadership: a unified model of dynamic knowledge creation', *International Journal of Strategic Management*, Vol. 33, No. 1, pp.5–34.
- Parkinson, G. and Drislane, R. (2011) 'Qualitative Research', *Online Dictionary of the Social Sciences*. Available online at: <http://bitbucket.icaap.org/> (accessed on 29 November 2014).
- Plessis, M.D. and Boon, J.A. (2004) 'Knowledge management in eBusiness and customer relationship management: South African case study findings', *International Journal of Information Management*, No. 24, pp.73–86.
- Popadiuk, S. and Choo, C.W. (2006) 'Innovation and knowledge creation: how are these concepts related?', *International Journal of Information Management*, Vol. 26, No. 4, pp.302–312.
- Salomann, H., Dous, M., Kolbe, L. and Brenner, W. (2005) 'Rejuvenating customer management: how to make knowledge for from and about customers work', *European Management Journal*, Vol. 23, No. 4, pp.392–403.
- Shang, S.S.C., Li, E.Y., Wu, Y. and Hou, O.C.L. (2011) 'Understanding Web 2.0 service models: a knowledge-creating perspective', *Information and Management*, Vol. 48, No. 4, pp.178–184.
- Shaw, M.J., Subramaniam, C., Tan, G.W. and Welge, M.E. (2001) 'Knowledge management and data mining for marketing', *Journal of the Operational Research Society*, Vol. 31, No. 1, pp.127–137.
- Silverman, D. (1985) *Qualitative Methodology and Sociology: Describing the Social World*, Gower, Aldershot, UK.
- Sinkovics, R.R., Penz, E. and Ghauri, P.N. (2008) 'Enhancing the trustworthiness of qualitative research in international business', *Management International Review*, Vol. 48, No. 6, pp.689–714.
- Tohidi, H. and Jabbari, M. (2012) 'CRM as a marketing attitude based on customer's information', *Procedia Technology*, Vol. 1, pp.565–569.



- Toriani, S. and Angeloni, M.T. (2011) 'CRM as a support for knowledge management and customer relationship', *JISTEM – Journal of Information Systems and Technology Management*, Vol. 8, No. 1, pp.87–108.
- Xu, M. and Walton, J. (2005) 'Gaining customer knowledge through analytical CRM', *Industrial Management and Data Systems*, Vol. 105, No. 7, pp.955–971.
- Zahari, A.S.M, Abdulrahman, B., Othman, A.K. and Wahab, S. (2013) 'Investigating the relationship between customer knowledge management and knowledge sharing among insurance companies in Malaysia', *Asian Social Science*, Vol. 9, No. 10, pp.60–70.