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**A DIAGNOSTIC TOOL TO EVALUATE
CUSTOMER RELATIONSHIP
MANAGEMENT PERFORMANCE**

**BY
XU CHEN**

**DIRECTED BY
PROFESSOR DOMINIQUE FERRAND**

**A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree
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Abstract

As customer relationship management (CRM) becomes more complex and more strategic to the company it serves, CRM framework and CRM performance become more important concepts for companies. The better CRM performance measurement, the more effectively the CRM systems can serve the present and future needs of the organization.

During the 1990's, CRM frameworks and CRM performance measurement have been identified by numerous researchers as a major issue and topic for CRM. While there have been numerous related CRM framework and CRM performance measurement studies in the past years, none have focused on the customer-based framework and no CRM performance measurement tools covering whole aspects of CRM performance.

The purpose of this research was to define a customer-oriental CRM framework and develop a CRM performance measurement tool. Based on background regarding CRM framework, a new CRM framework was defined with five key components, customers, CRM systems, various customers touch points, strategy management departments and information technology supporting. This research identified measurement criteria of CRM performance in four aspects, service channels performance, strategy performance, IT performance and customer satisfaction performance. Three survey questionnaires were designed to investigate how CRM managers, IT managers and customers of companies understand the performance of CRM systems. According to the result collected from surveys, a dedicated analysis was operated to set up questionnaires' reliability and validity.

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Chapter 1: Introduction

Customer Relationship Management (CRM) has evolved over the years from a relatively simple centralized data processing function to a complex, integrated system of business strategies, telecommunications, networks, and computers. In the mid-twentieth century, mass production techniques and mass marketing changed the competitive landscape by increasing product availability for consumers [Anderson, 2001]. However, the purchasing process that allowed the shopkeeper and customer to spend quality time getting to know each other was also fundamentally changed. Customers lost their uniqueness, as they became an “account number” and shopkeepers lost track of their customers’ individual needs as the market became full of product and service options [Kalakota and Robinson, 2001]. Many companies try to race re-establishing their new connections as well as existing customers to boost long-term customer loyalty. Some companies are competing effectively and winning this race through the implementation of relationship marketing principles using strategic and technology-based customer relationship management (CRM) applications. Therefore, CRM becomes an important and interesting topic of academic research and practical marketing.

At the beginning of developing CRM, most companies recognized that customer relationship management is to record all customer information related to business procedures [Drucker, 1993]. They program lots for CRM application software to capture clients’ information for each specific organization, such as market, sales, service departments. As a result, eCRM has been defined since the 2000’s. The Meta Group’s reports show that the eCRM craze intensify, with the market growing from \$20.4 billion in 2001 to \$46 billion by 2003 [Patton, 2001] and to \$125 billion by 2004 [Iconocast, 2000].

Recently, organizations understand that business strategy and new organization structure are important and necessary for CRM implementation. A key question is: How to rebuild organization structure and make strategy decisions play serious roles

in CRM? Some research has been performed regarding CRM understanding, processes and its technology. The research in this area includes: Chen and Popovich (2003), Anderson (2001), Park and Kim (2003), and Bueren et al (2005). No research, however, is the evidence regarding the whole CRM architecture which impacts customer service, company strategy and technology supporting. Customer service, business strategy and information technology are three main parts of CRM performance.

At our knowledge, two books are major contributions on the subject of CRM performance. Kalakota and Robinson (2001) presented a discussion of the CRM service performance in new organization structure. They introduced the relationship between front office and back office which are integrated by information technology. Multi-channel integration increase opportunities for company and attract more clients from market. Zikmund, McLeod and Gilbert (2003) focused on the significant issue of CRM IT performance and strategy-making. They described CRM as a process to compile information that increases understanding of how to manage an organization's relationships with its customers.

Some research presented an issue on current measurement methodology of CRM. Reinartz, Krafft and Hoyer (2004) conceptualized a construct of the CRM process in their research paper. They also operationalize and validate the construct, then empirically investigate the organizational performance consequences of implementing CRM processes. The key outcome is a theoretically sound CRM process measure that outlines three key stages: initiation, maintenance, and termination. They measure economic performance within CRM conception. Kellen (2002) developed a CRM measurement framework to assess whole CRM systems. These frameworks range from the strategic to the operational. How companies build and deploy a CRM measurement framework depends on the planning horizon under consideration, the market volatility, the company's overall strategic posture and goals, and how much of the organization and customer base is impacted by CRM solutions considered. In addition, how customer knowledge is created and utilized for benefit is under continual debate with different points of view. Our research reviews the key issues in

CRM measurement, offers some attributes for describing and evaluating CRM measurement frameworks.

Several CRM measurement tools are used to evaluate business internal organization structure. Najmi, Rigas and Fan [2005] focus on assessing whole business performance. They operate their measurement tool by examining organization structures in company and how they work during in strategy-making procedure. Another generic measurement framework captures the various benefits of CRM [Sin, Tse and Yim, 2003]. Meanwhile, kinds of researches deal with customer satisfaction measuring. Reinartz, Krafft and Hoyer [2004] developed CRM measurement criteria based on customer lifecycle, initiation, maintenance, and termination. Hayes [1998] also introduced and offered some measurement tools to assess customer satisfaction in different field of e-business environment. In technologic performance, Khalifa and Shen [2005] developed a measurement model to figure out if eCRM fits customer lifecycle or not. While they used the customer lifecycle framework to test customer satisfaction; they relied on the transaction cycle to classify eCRM features. In addition to technologic performance, Chen and Ching [2004] examined the relationship of information technology intensity and organizational absorptive capacity to CRM practices and performance. In our thesis, we develop a reliable and valid measurement tool to evaluate companies' current CRM performance. Finally, result analysis is a need to validate our measurement tool.

1.1 Objectives of the Research

Due to the fast development of CRM, the global goal of this research is to aid in determining valid and reliable measures of CRM performance. To achieve this goal, our research has several sub-objectives which make research processes logical and systemic. Firstly, we figure out a CRM framework based on literature views including CRM performance. Secondly, we identify measurement criteria to evaluate CRM performance. Thirdly, we develop a CRM performance measurement tool based on performance measurement criteria. Fourth, we set up reliability and validity of this

measurement tool.

Based on the background of CRM and its framework for business, we define our CRM framework to describe CRM processes. In our framework, five key components are introduced, customers, CRM systems, customers touch points, strategy management departments and IT supporting.

According to our CRM framework, we define CRM performance and its criteria to evaluate CRM systems. Each criterion we will discuss is depending on two evaluation rules, CRM performance effectiveness and efficiency. Effectiveness means the feedback of customer is positive to CRM strategic objective or not. Efficiency means the CRM systems' output reflects on kinds of business resources, like customers' information, business strategies.

We develop a diagnostic tool to measure CRM performance based on our CRM performance criteria. To accomplish this objective, we review other existing measurement tools and integrate their criteria in our tool. An email-survey method was implemented to test our criteria and CRM framework. The results are analyzed and conclusion depicted.

1.2 Importance of the Topic

By the 2000's, related CRM topics become popular issue for management systems, as reported by Romano(2000), Payne and Ryals (2001), Anderson (2001), Kalakota and Robinson (2001), Castro (2002), Ocker and Mudambi (2002), Zikmund, McLeod and Gilbert (2003), Newell (2003), Reinartz, Krafft, and Hoyer (2004), Najmi, Rigas and Fan (2005).

Why is CRM such an important issue in the 2000's? Several possible explanations have been proposed. These include:

1. Rapid changing technology and a growing investment in CRM [Zikmund, McLeod and Gilbert, 2003; Fjermestad and Romano, 2003; Newell, 2003]. CRM performance can help avoid a blind investment on CRM systems, permit a long lead time for acquiring and updating technology, and manage the investment in

hardware and software.

2. Customer-centric process brings more value than product-centric process for companies [Kalakota and Robinson, 2001; Chattopadhyay, 2001; Meyer, 2005; Anderson, 2001]. CRM systems help company change their traditional organizational structure to customer-centric structure. What a client requires is more important for company's business goals and customer's value impacts company income. CRM system also can record each client's information of their behaviors and habits, hence relationship with company.
3. Need to align CRM system with the company's strategy business plan [Zikmund, McLeod and Gilbert, 2003; Bueren, Schierholz, Kolbe, and Brenner, 2004; Kalakota and Robinson, 2001; Drucker, 1993]. CRM is called upon to support the company's strategic business plan and the many programs throughout the organization that support the strategic business plan, like ERP, SCM, finance. CRM performance must be aligned to the business needs and programs of the organization so its alternatives and strategies can be planned, developed, and implemented.
4. There is a rapidly changing business environment [Anderson, 2001; Kalakota and Robinson, 2001; Reinartz, Werner J, and V. Kumar, 2000; Castro, 2002]. An effective CRM system requires the vision to foresee problems and opportunities within a changing business environment. As the environment changes which are caused by customer attitudes, CRM performance must plan for the strategies needed to support the organization.
5. There is an increasing requirement of customers for high quality of service and product [Johnson and Weinstein, 2004; Gebert, Geib, Kolbe, and Brenner, 2003]. Depending on mature market becoming and customer-centric process in last 20 years, customers' requirement and satisfaction are rigorous for every firm. CRM service channels performance can control their requirement, complaining, and relationship. Moreover, CRM strategy performance makes appropriate strategy for specific client to fulfill what they need.
6. Trend to database design and integrated system [Anderson, 2001; Parasuraman

and Grewal, 2000; Romano, 2000; Zikmund, McLeod and Gilbert, 2003; Newell, 2003]. An increasing percentage of the technology applications involve the design of database to support the needs of the organization and integrate other MIS's legacy database. CRM IT performance will allow a long-term view of the evolution of database and will ensure the availability of hardware, software, and personal resources to support the database and integrated systems needs of the organization.

CRM framework and CRM performance were recognized as a major issue after 1990's. The very nature of CRM is important to researchers in their quest for understanding of the CRM framework and to practitioners and their need for better tools to cope with the ever increasing complex nature of the CRM performance. For practitioners, better CRM performance and its measurement lead to better decision choices, more informed evaluation of alternatives, and eventually to better levels of information system and organizational performance.

1.3 Problem Statement

Upon the fast development of CRM as well as the increasing investment into CRM system, CRM performance can make companies successful. However, there is a lack of a systematic and integrated CRM performance measurement tool to make a diagnostic of CRM systems. That is why a report [Patton, 2001] indicating that more than one-half of all CRM projects do not expect to produce a measurable ROI.

In some organizations, CRM is simply a technology solution that extends separate databases and sales force automation tools to bridge sales and marketing functions in order to improve targeting efforts [Parasuraman and Grewal, 2000]. However, companies have to change their organization construction from manufacture-centre to customer-centre. CRM is not equal to automation system tools between customers and companies.

Moreover, according to the background of CRM measurement tools, they measured CRM systems in different aspects. Even though there are kinds of

measurement tools for evaluating CRM performance in business processes, they can not cover the range of CRM framework from four main aspects, service channels performance, strategy performance, IT performance and customer satisfaction performance.

Therefore, following factors are explaining what deficient points of CRM and why we need take a deep research on CRM.

1. CRM is a major concern of customer service managers as indicated by the numerous (2000's) studies that have shown the topic as the top or near top CRM issue. This consistency of concern clearly indicates its importance in the CRM and company environments.
2. Information systems become strategic to the success of many companies and they have a high dependence on CRM importance. They very success and failure of the company can hinge on the success of the CRM performance. CRM performance, therefore, becomes critical to the success of the CRM systems. If CRM and corporate management can better understand what customer need underlying CRM performance, they can better prepare the CRM strategies.
3. Relatively little research could be found that addressed what aspects or areas of CRM performance measurement. Differing styles of customer decision-making approaches and different digital channels to exchange information with customers make CRM performance measurement complex. Therefore, our research describes a new measurement tool according to the components of CRM framework.

Regarding on what we discussed above, the marketing need a valuable CRM performance measurement to evaluate current CRM systems. The measurement tool figures out the problems of CRM performance. It also will point out the misunderstanding and limitation of CRM in companies. Then companies can gain success via CRM systems in marketing.

1.4 Research Contributions

This study provides contributions to knowledge in both the areas of academic

research and practical knowledge. In the area of academic research, a new CRM framework is defined. We introduce the key components of CRM framework which focuses on how to enhance customer relationship. Moreover, four aspects of CRM performance are identified, CRM service channels performance, strategy performance, IT performance and customer satisfaction performance. We define measurement criteria for each performance aspect. A diagnostic tool is designed and tested in Canada's business companies related with CRM. Finally, according to the result collection, we provide reliability and validity assessments for this tool.

For practitioners, our research provides a CRM performance measurement tool to evaluate their CRM performance in their companies. This tool is composed of three questionnaires. As a result, practitioners should be better able to understand and manage CRM performance.

1.5 Thesis Outline

In this thesis, we have a new CRM framework including five key components, customers, various touch points, CRM systems, strategy and IT supporting. Based on framework, we define four aspects of CRM performance, service channels performance, strategy performance, IT performance and customer satisfaction performance. More, for each performance aspect, we also define measurement criteria and their variables. A diagnostic tool is composed of three questionnaires, CRM manager questionnaire (CRMMQ), CRM IT questionnaire (CRMITQ) and CRM customer satisfaction (CRMCSQ). After survey processes, we set up reliability and validity of all questionnaire and gain three new questionnaires as our analysis results.

This thesis is organized into 7 chapters. Chapter 2 covers CRM framework and its key components. CRM performance and its measurement criteria are discussed in chapter 3. In chapter 4, we review all related CRM performance measurement methodologies in current literature. Based on these methods and our CRM framework, we develop a new CRM performance measurement tool to evaluate whole CRM performance in four aspects, service channels, strategy, IT and customer satisfaction.

Chapter 5 explains the research methodology of CRM performance measurement tool by a website. The diagnostic tool is performed by three questionnaires. One questionnaire evaluates the CRM management performance. The second questionnaire evaluates the performance of IT systems related with CRM. The third one concerns the evaluation of customers' satisfaction of Canadian business companies that have been measured on the CRM management and IT systems. The analysis processes including setting up reliability and validity of all questionnaires and testing independence of questionnaires are presented in Chapter 6. In chapter 7, we discuss our research result.

Chapter 2: CRM Framework

In this chapter, we view current literatures about CRM and CRM frameworks background with objectives to define a new CRM framework. Regarding all the components of CRM frameworks mentioned in published papers, a customer-centric CRM framework is described. Five key components of CRM framework are considered as components of our framework, customers, CRM systems, various customers touch points, strategy management departments and information technology supporting.

2.1 Background of CRM

From now on, CRM concept and its problems become a more and more popular area for academic research and practical knowledge. Lots of published papers defined CRM as kinds of research fields, like CRM application, CRM implementation, and strategy, technology [Payne, A. and Ryals, 2001, Meyer, 2005, Anderson, 2001, Bueren, Schierholz, Kolbe, and Brenner, 2004].

In some organizations, CRM is a technology solution that extends separate databases and sales force automation tools to bridge sales and marketing functions in order to improve targeting efforts. For example, Anderson (2001), described CRM as “having the technology to provide an integrated view of all customer interactions and changing the corporate culture to leverage this information to maximize the benefits to the customer and the company”. He introduced CRM from the technology factors which already have affected current relationship between customers and companies.

Other organizations consider CRM as a tool specifically designed for one-to-one [Peppers and Rogers, 1999] customer communications, a sole responsibility of sales/service, call centers, or marketing departments. Moreover, Chen and Popovich (2003) believe that CRM is not merely technology applications for marketing, sales and service, but rather, when fully and successfully implemented, a cross-functional,

customer-driven, technology-integrated business process management strategy that maximizes relationships and encompasses the entire organization. A CRM business strategy leverages marketing, operations, sales, customer service, human resources, R&D and finance, as well as information technology and the Internet to maximize profitability of customer interactions. For customers, CRM offers customization, simplicity, and convenience for completing transactions, regardless of the channel used for interaction [Gulati and Garino, 2000].

According to Oracle [Stefanou et al., 2003], CRM “is about knowing your customers better and effectively using that knowledge to own their total experience with your business and to drive revenue growth and profitability”. CRM can also be defined as the management approach that involves identifying, attracting, developing and maintaining successful customer relationships over time in order to increase retention of profitable customers [Bradshaw and Brash, 2001; Massey et al., 2001].

In this chapter, we will define a new CRM framework and its key components. Even though more and more groups develop CRM software [AMR Research, 2002]; more and more corporations need CRM systems to attract and control long-term customers in the marketing , only a few companies have particularly realized the application of a CRM system aligned with company profitability and employing integrated information systems [Anderson, 2001]. Subsequently, companies have to focus more on organizational structure aspects than on how to use software. A mature CRM system is not a simple integration of information system or a software implement, but a management tool linked to structure of the organizations. This is the reason why we focus on framework development.

2.2 Background Regarding CRM Frameworks

A number of CRM frameworks exist. We observed that they were not based on a customer-oriented conceptualization of CRM. Sue and Morin [2001], outlined a framework for CRM based on initiatives, expected results, and contributions, but this was a process based, and many initiatives were not explicitly identified in the

framework. They described their CRM framework regarding on CRM processes in company and CRM systems integrated with IT. However, this framework was not based on customer's behaviors and attitude. They ignored the importance of customers for CRM.

Winer [2001] developed a "basic model, which contained a set of 7 basic components: a database of customer activity; analyses of the database; given the analyses, decisions about which customers to target; tools for targeting the customers; how to build relationships with the targeted customers; privacy issues; and metrics for measuring the success of the CRM program." This model was a cross functional conceptualization of CRM. It focused on the relationship between customers and IT. They described their CRM framework on how to use IT to control customers' activities. As a result, they did not present the reestablishment of organization structure in firms.

Payne and Frow [2005] described CRM framework into strategic perspective. Their framework focused on how to make business strategies to satisfy customers' requirements. With CRM system and IT supporting, companies need a high level of IT integration to deliver their strategies for customers. On the other hand, they did not get the important parts of customer roles and did not mention the touch points of customers and firms.

Plakoyiannaki and Saren [2006] developed a CRM framework depending on CRM processes in companies. This model offered insights into the CRM process as a dynamic organizational activity. They presented a systemic organization structure to fit requirement of CRM. But it is not a customer-oriented framework. They did not describe customers as a component in their framework.

Tamosiuniene and Jasilioniene [2007] provided an integral and managerially useful view of the CRM as business strategy. In this framework, CRM strategy was a core component to direct other business behaviors in company. CRM systems and IT were described as support tools for management departments. However, they ignored the role of customer for business strategies and the touch points of clients. Therefore, it is not a customer-based CRM framework.

This situation in the literature suggests that there is a need for a new systematic customer-based CRM framework. Synthesis of the diverse concepts in the literature on CRM and relationship marketing into a single, customer-based framework should provide practical insights to help companies achieve greater success with CRM systems development and implementation.

2.3 Key Components of CRM Framework

In this section, we discuss our CRM framework's global components. Customer relationship management has five components to hence relationships of customers and companies. Therefore "customers", as first component of CRM framework, is a basic component of a framework which can't operate without its tracking. Secondly, a CRM system initiative will enable a company to better utilize all available communication channels [Anderson, 2001]. Thirdly, customers touch points with companies' representatives are important ways to control each relationship for companies. Moreover, depending on Meyer's research [2005], CRM is defined as processes and technology that support the planning, execution and monitoring of coordinated customer, distributor and influencer interactions through all channels resulting in mutually rewarding relationships with customers. Strategy is the fourth component in CRM systems knowing customers and delivering company's decision to them [Kincaid, 2003]. The fifth component, information technology (IT), provides a steady supporting for CRM system.

2.3.1 Customers

As we start a discussion on CRM framework, it is important to recognize the understanding of customer in business environment. CRM is based on the customer-centric management which requires top management support and commitment to CRM for a company [Kalakota and Robinson, 2001]. The first issues are: to define what kind of customers they need; about whom they will collect the information; and which kind of customer has most value for company. From an

information management perspective, customer identification is a critical beginning point to elaborate a CRM framework. Therefore, we have to consider how to define customers and what types of customers describe must be included in a CRM framework.

2.3.2 CRM Systems

CRM systems deal with all aspects of satisfying customer needs from recording needs to fulfillment of requirements and customer service quality assurance [Romano, 2000]. The objective of CRM system is to obtain the most value from customers and increase customers' loyalty during business process [Gentle, 2002].

CRM systems are not a simple technology to store customer's information in company. Their goals are about identifying, retaining and increasing the profitability of customers for firms. Unfortunately, most companies operating CRM systems have only few chance of success by 2001 [Gentle, 2002]. Therefore practitioners need to know whether their company needs a CRM system or not, and what kind of CRM system is suitable for company.

Before a company wants to build a CRM system for business, it is necessary to investigate on outside market environment and inside company environment. Based on Gentle's [2002] research about CRM project in B2B and B2C marketing, they could build a CRM system if they can answer yes to as many of the following questions as possible.

- “Do you have a large number of people in sales and service contacting with the customers?
- Does your company sell complex products which require a high degree of configuration and customization?
- Is a typical customer relationship worth a lot to you from a profit standpoint?
- Do you have frequent contact with large groups of customers by multiple channels?
- Does your company have its own mature management information system

(MIS) to support all business?” [Gentle, 2002]

The managers of a company should prepare well to redesign inside organizational structure operating a CRM system. CRM system is an integration system that fits with the business strategy, not a product. The firms must remember that technology is only one aspect of successful CRM practice [Kalakota and Robinson, 2001]. In other words, CRM system is not only software for managers and employees or a simple part of MIS for company, but also a combination of business process to understand a company's customers from a multifaceted perspective.

2.3.3 Various Customers Touch Points

Customers contact with sales representatives if they are interested in company's production or service. All contacting ways seem as connections between customers and companies to understand what customers need and require. For example, you are undecided which house in the \$100,000-\$200,000 range you want to buy. You visit a house agency web page and browse many houses with their inside and outside environment. You click a button, and an agent calls you within a minute, answering your any questions and scheduling an interview two days later.

Integrated solutions can offer superior customer service at every contact points, the Internet, call centers, store fronts, ATMs, kiosks, and person-to-person selling [Kalakota and Robinson, 2001]. The technologies responsible for raising customer expectations can also be used to meet and exceed them. Therefore, customer touch points are used to contact with each client, to record their behaviors and easily to make a CRM strategy.

CRM framework has some solutions to deliver information to customers. Even more various touch points refer to more convenient service companies have, some communication problems exist among service channels. It is important to keep consistent information for clients in company's perspective [Kalakota and Robinson, 2001].

2.3.4 Strategy Management Departments

Inside of company organizations, strategy management departments, like marketing department, sales department, service department etc., settle up information of clients from contact points and determine a timely and exact strategy for each case [Garcia-Murillo, 2002 and Schulze, 2001]. The importance of customer relationship strategies is supported by the frequently quoted argument that it costs five times more to obtain a new customer than it does to keep an exiting one [Kalakota and Robinson, 2001]. Due to this, customers have shown to become increasingly profitable. The goal of strategy management departments is to make a correct CRM strategy for customers.

2.3.5 Information Technology Supporting

An indispensable information technology (IT) is a basic platform to support these CRM behaviors [Zikmund, Mcleod and Gilbert, 2003]. Touch points are used to satisfy customers' requirement in business procedure. The strategy is an important decision-making process to enhance customers' relationship. IT is not the goal of changing business process, however, is a means to supply an e-business environment to enhance CRM application.

Depending on all components of CRM framework, we consider the conceptions of key aspects of CRM framework, customers, CRM systems, service channels, strategy-making and IT supporting. We discussed global definition of these components and will describe them successively in our CRM framework.

2.4 CRM Framework

Based on the weakness of CRM and CRM frameworks background, we describe our CRM framework is a customer-oriented conceptualization of CRM.

The goal of CRM, according to customer lifecycle, is to acquire, grow, and retain the right customer relationships – those with the best long-term profit potential

[Johnson and Weinstein, 2004]. At the broadest level, the function of an enterprise's marketing activities is to bring buyers and sellers together, to create number of customers. While getting customers is fundamental to business success, keeping customers is also important. Successful firms work to build long-term relationships with their customers. Today, CRM, which could help company control the relationship with customers, is becoming more and more necessary [Drucker , 1993]. Regarding background of CRM framework and the discussion of its components, we define a customer-based CRM framework.

Depending on our synthesis, four primary functions achieve in CRM framework. They are wonderful service for customers, appropriate strategy-making output, steady IT supporting for whole CRM system and satisfying customers. Therefore, CRM framework directs companies to build CRM systems into their inside organization architecture. It also performs in these three aspects, 1) Companies contact with its customers closely. 2) Companies make successful decisions when they get customers' requirements and problems. 3) CRM systems work efficiently, effectively , successfully with other MIS systems.

We analyze CRM as an integration framework in four perspectives as service channel, strategy, technology and customer satisfaction. The whole CRM framework is to collect customers' information to understand managing relationship with customers and to maintain long-term value by CRM strategies.

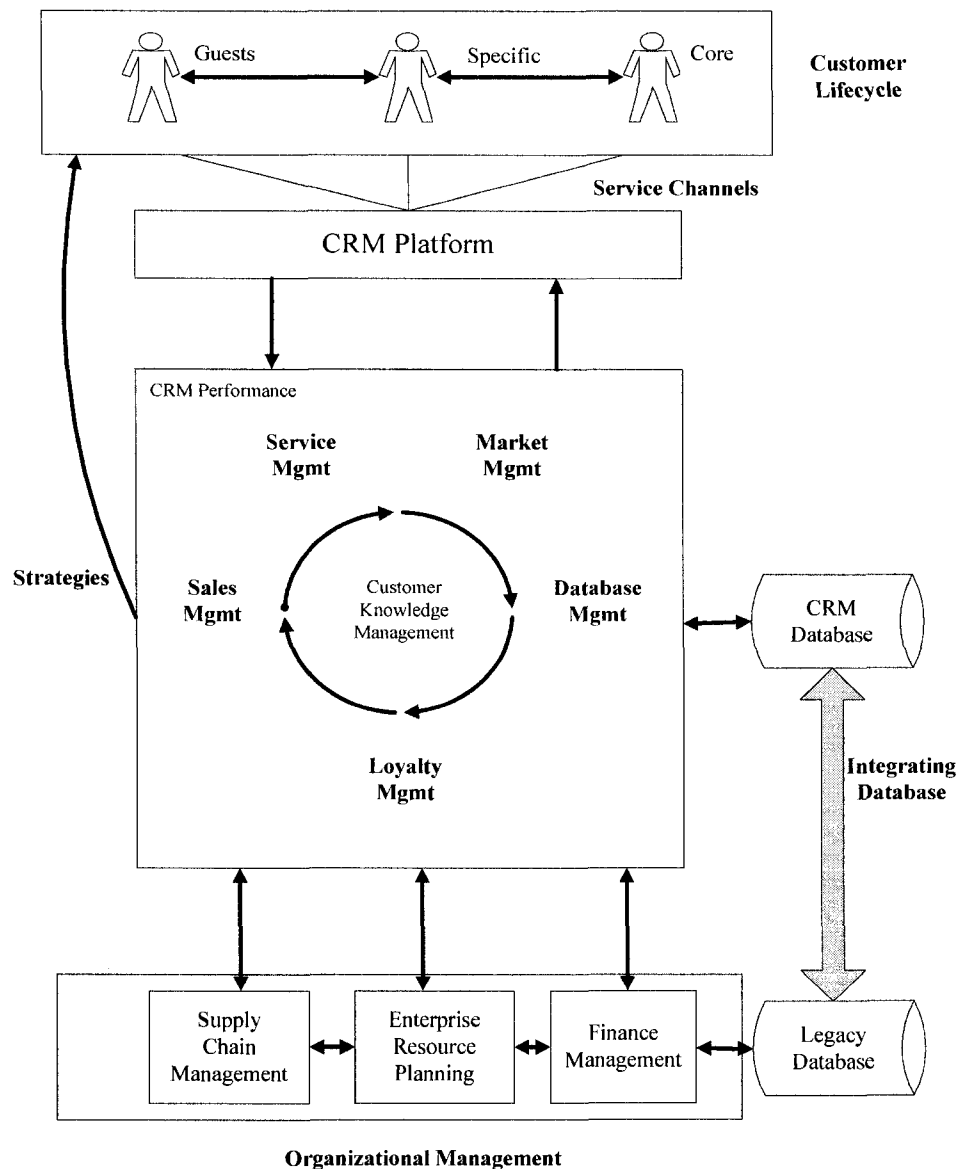


Figure 1 CRM Framework

2.4.1 Type of Customers: Organization View

Park and Kim (2003) defined kinds of customer types in CRM. They described customers of CRM from an information management perspective. When customers do not reveal their identity to the firm (like the cash-paying customers in retail stores or

airline passengers who are not enrolled in the mileage program), they are invisible to the firm, thus unmanageable.

They defined an identified customer as “a customer whose identification and contact information exists within the firm” [Park and Kim, 2003]. Once able to identify its customers, a firm can make its customer-base more loyal by collecting, processing, and applying customer profile and transaction data to create in-depth understanding of customer needs and provide fair value to all customers.

As the firms nurture their relationships with their identified customers, some of them will evolve to become core customers. Core customers are typically a small group of customers who are truly loyal to the firm and create high value for the firm. Despite their significant contribution to the firm, identifying these core customers is not always as easy as it sounds. In fact, defining core customers is regarded as one of the most critical strategic processes [Blattberg and Deighton, 1996].

2.4.1.1 Customer Types Description

Therefore, customer can be classified to three types based on the definition of customer types discussed in Park and Kim’s paper [2003],

- 1) Customer (Guest)
- 2) Specific customer
- 3) Core customer

Following the introduction of customer definition [Park and Kim, 2003], we define customer (guest) in extensive signification as “customer who is interesting within the production and service” in our CRM framework. Customers are invisible to the firm, of course unmanageable in this type. They gain product information via various ways and concern some kinds of productions or service. We define them as guests of firm. However, company does not know any information about this customer until these customers forwardly contact with sales representatives. In other words, company can not do anything on these guests but only thing that is organizing their touch point with customers. When customers start to contact with representatives,

they become another type of customer, specific customer.

Second, we can define an identified customer as someone whose identification and contact information exist within the firm. Once able to identify its customers, firm could make its customer-base more loyal by collecting, processing and applying customer profile, also transaction data to create in-depth understanding of customer needs and provide fair value. At this time, CRM systems can dominate customer's true value and increase loyal feedback as possible as they can.

The third of type is "core customer". As the firms nurture their relationships with their specific customers, some of them will evolve to become core customers [Park and Kim, 2003]. Core customers are typically a small group of customers who request truly loyal to firms and create amount of value for firms. Even though they can not bring amount direct benefit in business marketing immediately, their significant contribution to the firm is a potential and important merit.

2.4.1.2 Comparing Types of Customers

CRM is to increase number of core customers in business for companies. Among three types of customers, core customers are most important one compared with other two [Reinartz, Werner and Kumar, 2000]. In customer-centric business processes, many customers are interested in firm's product at the beginning. The guests, who are invisible guest for companies, become specific customers at the second stage. The value of this type of customer is more than guests. Likewise, after companies make CRM strategies for specific customers, customers group continues becoming smaller than before and has the most value for companies. Companies must pay more attention on the specific and core customers whose relationship could be handled by CRM systems [Reinartz, Werner and Kumar, 2000]. Meanwhile, companies satisfy core customers in the third stage and also gain value from them. We summarize the relationship between kinds of customer types and companies in following **Table 1**.

Relationship Type of Customers	Customer Characteristic	Company Characteristic
Customers (Guests)	Largest number of customers in procedure of business; Have the least or value for the company; At the relationship initiation stage; They are invisible for the company.	Provide the exhaustive details of its production information in the different public medium.
Specific Customers	Smaller group than guests; Have specific requirements and purposes.	Collect customers' personal data; Satisfy the requirement as possible as they can; Manage and organize the feedback and relationship between customers and company.
Core Customers	The terminal customer group which is come from specific customers; Have the most value for the firm.	Control the customers' loyalty, complaints, propositions, claim, etc; Build customer relationship data profile; Analyzing customers' relationship and making personal strategy.

Table 1 Characteristic of Customers

In CRM framework, customer categories direct company take different strategies

for each customer. If companies want to get most value from customers, they need provide better service to customers rather than build a new store branch.

2.4.2 Customers Lifecycle in CRM

In customer relationship management process, all business activities of company are based on the customer lifecycle, not the product lifecycle. Kellen [2002] described customer lifecycle into four phases, attracting, transacting, servicing and supporting. Park and Kim (2003) concluded that CRM consists of three stages: first, a customer acquisition stage, where the organization recognizes unidentified consumers as customers who are identifiable by collecting the information about them through diverse communication channels; second, a customer retention stage, where the organization builds equitable relationships through relationship value analysis so that ordinary customers turn into core customers who are committed to the relationship with high equity; finally, a customer expansion stage, in that core customers play the role of expanding the company's customer base through word of mouth marketing and active interactions with the company.

Moreover, Kalakota and Robinson (2001) defined customer lifecycle is in three phases, acquiring, enhancing and retaining. Each CRM phase supports increased intimacy and understanding between a company and its customers, each impacts the customer relationship differently and each ties company more closely to customer's life. They said, in their book [Kalakota and Robinson, 2001], "the level of understanding and intimacy grows over time, as long as both parties are committed to making the relationship work".

Based on what we reviewed, we conclude that CRM evolution follows the three phases of customer lifecycle. The customer lifecycle has three phases in our CRM framework.

- 1) Attraction phase
- 2) Maintenance phase
- 3) Retention phase

We describe each of these phases,

2.4.2.1 Attraction Phase

In the attraction phase, a customer becomes aware of product or service, develops interest and tries to understand product or service. At the same time, company acquires new customers based on promoting their product and service leadership. The value proposition to the customer is the offer of a superior product backed by excellent service. For example, a customer is surfing a website, looking for a new laptop computer. Then he finds that the XYZ product looks like just what he need. So he goes to the product information page, fills out the online request form, clicks the submit button. From now on, this customer belongs into attraction phase. XYZ service department specialist will create a new relationship profile depending on customer's information he provided. Then CRM system analyzes customer's information and make an appropriate strategy for this customer in order to transfer him to next phase.

2.4.2.2 Maintenance Phase

In the maintenance phase, the customer has moved to the nest level of commitment and decided to procure a product or service. They will require the company's assistance installing, using or servicing what was procured. Company does their best to satisfy all requirements of customers by service channels in CRM system. For instance, the customer who is interested in the laptop receives a confirm call that tells him that service center starts to deal with his form and asks for him some special requirement about product shipping. The result of this connection is a richer, more solid relationship with this customer [Kalakota and Robinson, 2001]. Similarly, company proves their commitment on a daily basis when they take time to hear a customer's concerns and developing a service focus. When companies ensure that customer satisfies with their service, customers can be moved to next phase.

2.4.2.3 Retention Phase

In the retention phase, the customer may be thinking about purchasing additional products or services. Much potential business exists between the customers and the firm after a trade is over. It will take a lot of time and work to keep a relationship, but the rewards are usually worth the effort [Kalakota and Robinson, 2001]. In the same example, the customer of laptop could buy some additional stuff like mouse, web camera, headphone based on the recommendation of sales representative by a call. Then he will talk with his friend that he gets a perfect service during business processes. His friend may become a guest of company.

As this example shows, the work of growing a company can focus on getting customers and keeping them. Customer retention is increasingly the strategy for companies operating in competitive environments and likely to become a core strategy for companies everywhere as customer buying options increase and the cost of switching vendors lowers [Kalakota and Robinson, 2001]. The CRM customer lifecycle definition is described as the ability to seamlessly interact with or market to the customer across this lifecycle.

Furthermore, the goal of CRM systems is to keep more customers in retention phase for company that gains long-term value from core customers. We have discussed three types of customers and customer lifecycle in business processes that are important for company to achieve their business goals. How CRM framework works to force customer lifecycle and turn more guests to core customers in business processes is a key point to catch customer loyalty. When guests enter in business processes, CRM systems record their information and transfer them to strategy-making departments to lead guests move to next phase. As **Figure 2** shows, CRM system provides information and strategies to each type of customer.

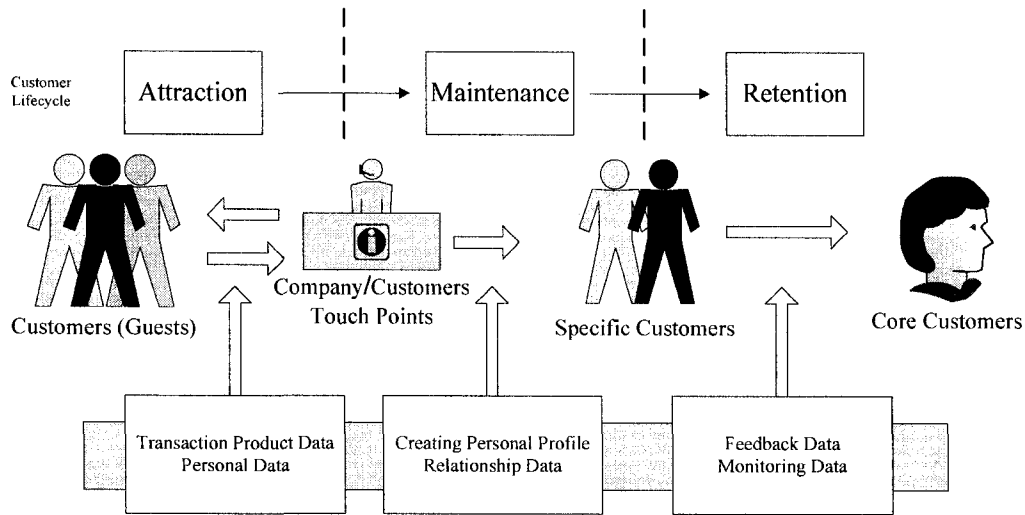


Figure 2 Customer Lifecycle

In attraction phases of customer lifecycle, customers who are interested into a production start contact with company public service by kinds of ways including the Internet, E-mail, call center, fax, direct sales force (DSF) and direct mail. Meanwhile, company provides amount information and satisfies customers' requirement. As a result, customers turning into maintenance phase, service specialists create customer profile stored in database depending on the connection procedures. Finally, CRM strategy-making management attempts to deliver strategies to customers who will turn to core customers in retention phase.

In a conclusion, CRM system is used to fulfill customers' requirement in business procedure and retain long-term customer loyalty in customer lifecycle. It organizes and captures customer satisfaction to gain a win-win situation in marketing between customers and companies. Customer satisfaction, which is the underlying notion of relationship marketing, is a critical point in achieving and retaining competitive advantage. Organizations have discovered and research studies have shown that retaining current customers is much less expensive than attempting to attract new ones [Desatnick, 1988]. The best means to accomplish customer retention is to keep customers satisfied. In fact, a number of studies have shown that customer satisfaction can lead to brand loyalty, repurchase intention and repeat sales [Parasuraman and Grewal, 2000].

2.4.3 CRM Service Channels

Based on the customer lifecycle, we recognize that integrated service channels of CRM system can satisfy customers' entire requirements and keep touch with customer in a long period. The purposes of CRM service channels are to enhance customer service, to improve customer satisfaction, and to ensure customer retention by adjusting business strategies. Primary service channels include the Internet, call center, Email, direct mail, sales force automation (SFA), point of sale (POS) and wireless [Anderson, 2001]. CRM should provide an integrated view of customer interactions starting by service channels that captures those interactions.

For the buyers, CRM is performed as a business process to satisfy customers' request. CRM system can collect, store and transfer their information to strategy departments by service channels. Service channels appear as a bridge connecting customers and company's organizational managements. When a strategy is made by inside organizations, service channels deliver it to clients. Therefore, more customer touch points, more information collected for company. As **Figure 1** shown, a blended multiple "Service Channels" approach to customer relationship management enables a business to be responsive to the needs and desires of its customers. These communication channels established on the "CRM Platform" are available for customers at anytime.

2.4.4 CRM Software Application

CRM application is performed as IT software usage. A number of CRM software is developed by some software venders in marketing. Based on our research, two software applications are major and successful cases for most of companies. They are Oracle (www.oracle.com) and Microsoft (www.microsoft.com) company.

Oracle, the world leader in CRM, with five million live end users and more than 100 million registered self-service users, offers four comprehensive Customer Relationship management product lines that leverage enterprise data to drive

profitable customer interactions [www.oracle.com]. Oracle's products cover the breadth of CRM functionality—from sales, marketing, and e-commerce, to customer service and analytics.

CRM software provided by Oracle has lots of sub-system CRM software which has their own function. In service channels level, some application deal with channels management and relationship control, like Oracle's integrated CRM solution. In strategy level, Oracle delivers some market solutions which have been tailored to fit company's industry business processes, as “PeopleSoft enterprise CRM”. In technology aspect, Oracle's CRM technology application architecture is planned as the incremental adoption of a powerful, flexible, service-oriented IT infrastructure without the disruptions of wholesale platform upgrades. The design principles are being created to standardize the priorities and practices of computing strategy and save time and money, such as “Seibel CRM on Demand”.

Meanwhile, Microsoft Co. [www.microsoft.com] is developing their classic CRM software, CRM 1.2 and CRM 3.0. These two systems can create a centralized repository of customer data that sits neatly alongside Microsoft Office and Microsoft Office Outlook - the applications for employees probably use every day. From Outlook, employees access Microsoft CRM sales, marketing, and customer service modules to make sales decisions, market products, solve problems, and get strategic views of the business [www. microsoft.com].

As we discussed, Oracle Company develops appropriate software for each kinds of CRM framework component. They have kinds of CRM software from simple ones to integrated ones for companies choosing. Microsoft teams concentrate to develop a multifunctional system which includes all CRM framework parts. Whatever kind of CRM software is developed in marketing, it has to agree with CRM framework criteria: service channels, strategy and information technology.

2.4.5 CRM Strategy

For the sellers, compared with buyers, CRM is a process to compile information

that increases understanding of how to manage an organization's relationships with its customers. In this process, CRM strategy is an outcome from CRM systems. It promotes company enhancing relationship with customers based on their information collection.

CRM strategy is made by "closed knowledge loop" and CRM database. They are two absolutely necessary parts in CRM systems. After collect and storage the information of customers, CRM system requires a strong integration of business processes that analyze customers' activities. These CRM processes can be considered as a "closed knowledge loop". While service specialist finishes the connection with customers, customers' information is stored into the "CRM Database".

In the strategy perspective, knowledge management has been considered as the process of capturing the collective expertise and intelligence in a company and using them to integrate some organizational departments [Zikmund, McLeod and Gilbert, 2003]. We introduce a closed knowledge loop in some organizational managements, service management, market management, database management, loyalty management and sales management. Knowledge, unlike data or information, is embedded in customers not in IT. Customers capture, share and accumulate knowledge when they contact with customers in CRM process. Also, this way is very important in operational and strategic business activities and actions aiming at retaining competitive advantage.

Another primary component is CRM system database also called relationship database. CRM database need have an ability to integrate knowledge management data and legacy data. CRM database collects and stores customers' information like name, address, Email address, service time, etc. In today's competitive business environment where real-time customer information must be met with real-time response, organizational data quality and data integration are critical concerns [Missi, Alshawi and Fitzgerald, 2005]. How to store real-time data from different ways such like voice message in call center, text message from Email and conversation in direct sales force, is a challenge for current database technology.

2.4.6 CRM Technology

According to the service channels and strategy-making requirements, IT is a basic component in CRM framework. CRM applications take full advantage of technology innovations with their abilities to collect and analyze customers information data on customer patterns, interpret customer behaviors, develop predictive models, respond with timely and effective customized communications, and deliver product and service value to individual customers [Chen and Popovich, 2003].

Using certain technology to optimize interactions with customers, companies can create a 360 degree view of customers to learn from past interactions to optimize future ones [Eckerson and Watson, 2000]. For example, a typical widely used digital platform for multiple service channels in front-office which is a necessary window for customers who can obtain product information. Strategy department managers make a good strategy for customers depending on result of CRM analysis software or report. CRM database stores data from lots of sources while customers contact with representatives. Therefore, we summarize that CRM can not work well unless it has a highly integrated information technology that can record all customers' activities in the customer lifecycle.

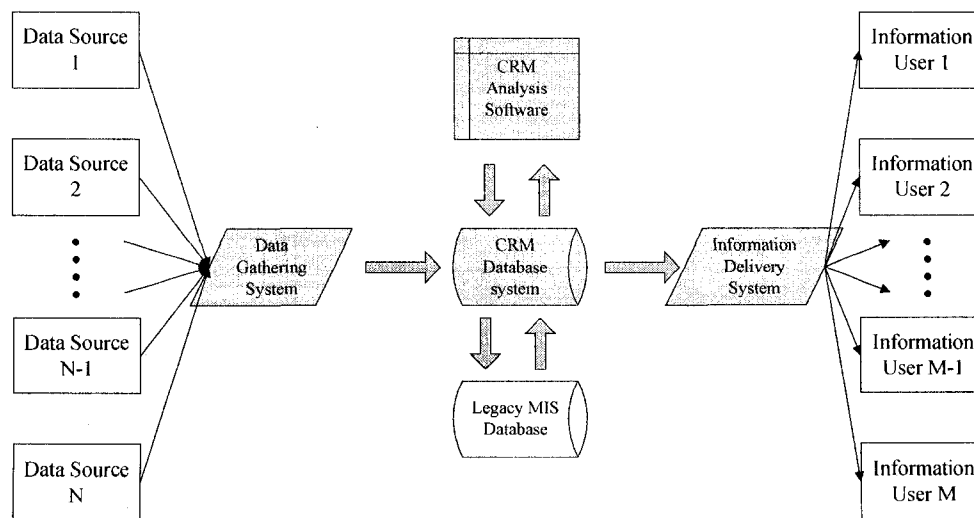


Figure 3 Basic CRM IT Model [Zikmund, Mcleod and Gilbert, 2003]

The CRM database is central element in CRM system, which is pictured in

Figure 3. CRM system collects data from various data sources during business procedures, then data is stored into CRM database which impacts with CRM analysis software and legacy MIS database. Meanwhile, CRM data is also shared with other MIS database, like ERP, SCM financial management. Finally, data will be transformed to business information which is presented to users.

In this model, data sources, including internal and external, provide data that describes relationships with customers. For examples, internal data sources are like product quality, customers' payment habits, customer responses to product and prices. External data sources, which mean outside information from firm, consist of customers, suppliers, the government, and even competitors' basic information [Zikmund, Mcleod and Gilbert, 2003]. CRM gathering system converts all incoming data to an electronic medium.

CRM database system has its special function to integrate with other MIS database, supply chain management (SCM), enterprise resource planning (ERP), finance management, and transfer and store analysis data with CRM analysis software which increases customer knowledge and make a CRM strategy efficient. Organizations can build an infrastructure that enables streamlined business processes, which in turn will lead to operational effectiveness enhancement by linking front office, CRM with back-office systems (ERP, HRM, SCM, Finance) [Castro, 2002]. Therefore, CRM database which is shared with other ones decides a uniform database structure impacting others.

2.4.7 Benefit of CRM System

Firms and customers obtain lots of benefit from CRM system contribution. For companies, keeping customers in retention phase and establishing customer loyalty are major approaches in CRM. So there are no costs on retaining current customers who tend to buy same items again and who may attract other related people who become potential customers of firms. Since it is less costly to retain a customer than to attract a new customer, CRM system could reduce expenses [Zikmund, McLeod and

Gilbert, 2003]. It also offers a valuable way for company organization to capture customer behavior and retain customer loyalty and satisfaction. After that, company improves the long-term profit from core customers and their attracted potential customers. As sales of related products and services increase, revenues rise [Zikmund, McLeod and Gilbert, 2003].

Besides for sellers, there are also some benefits for customers. Based on the introduction from Zikmund, McLeod and Gilbert [2003], firstly, the continuity derived from the relationship with the same sales representative simplifies the trading process. All customers who want their buying process to be easier and more convenience do not like waste time on messy information. If firm can consistently meet customers' needs over time, CRM system service can simplify business process and reduce the risk of dealing with a new supplier.

Secondly, CRM system provides a number of service channels where customers can communicate with organizations to explain their worries, thus enabling the company to realize more about each customer's requirements. Customers become specific customers even core customers because they want to complete business with company that provides a high level of product and service quality.

Compared with traditional business process, CRM system offers personalized service to every customer [Payne and Frow, 2005]. The organization knows the customer by name, normal purchasing routine and forecasts the customer's need for variety as well. Based on information technology supporting, customers can attain increasingly benefit from personalized service.

2.4.8 Cost of CRM System

We also pay attention to the accessional cost of CRM system which could be vital problem soon for companies. First, in Zikmund, McLeod and Gilbert's research [2003], a major benefit from gathering customers' information through CRM system requires a significant investment in the organization's information technology. Whether CRM system could be integrated with other MIS systems or not seems

important to gain final benefit, otherwise, could fail in marketing competition condition.

Secondly, building a CRM system has to ensure the service is available in 24 hours each day for 7 days of each week for 365 days of each and every year all over the world. If the organization's service intermits under some special condition, like failure of backup database or emergency power off, it may lead to lose credibility and satisfaction of customers.

Another significant cost in developing an effective CRM is the price of process changing which implies a big transformation in habitual pattern. If customers can not appreciate the change of trading process, it is a void cost for company. Therefore, despite the best efforts of organizations to design effective CRM system, it has to hold the promise of growth and benefits, carrying its other limits, costs and risks for companies who want to implement.

Similarly, as obviously inevitable cost of the CRM system by organizations, there are some costs for customers. As we know, companies want to track customers' activities and collect all information during the buying process such as phone number, bank account even credit card number. Usually, the company admitted that its technical support staff tied personal information and purchase histories to the user's sign-in history and retained that data for months at a time. However, customers realize that there is a risk to provide their personal information to companies. It is a conflict problem between company who has to increase system security to protect these important information and its clients.

Another cost to the customers is ignoring other offers from competitive sources. Even though clients satisfy the service and product during the buying process supplied by CRM system, they may buy the product in a high price. If customers take time on searching other companies' websites, they could find a better price of same features. Yet, once a habit is formed, most customers always refrain from exerting the effort to assess other options. They will just focus on one or two companies who often send "reward" as loyalty with a high price so that they can gain most value from customers – a goal of CRM system [Zikmund, McLeod and Gilbert, 2003].

Table 2 presents the benefits and costs of CRM systems regarding companies and customers.

	Benefit of CRM system	Cost of CRM system
Companies	Reduce expenses to keep a specific customer.	Take on a high risk of integration with other MIS systems.
	Prompt company to understand customers' behavior easier.	Uncertain risky factors will destroy CRM systems, even whole company's working.
	Improves long-term profit from core customers and their attracted potential customers.	There is a cost for training customers to adapt new trading processes.
Customers	Simplify trading process and reduce the risk of dealing with a new supplier.	Can not avoid publishing clients' privacy on Internet.
	Provide more convenient contact points with service representatives.	Restrict customers' eyes put on production provided by other companies.
	Offer personalized service to each customer.	

Table 2 Benefit and Cost of CRM System [Zikmund, McLeod and Gilbert, 2003]

We have discussed our CRM framework which includes various key CRM components, customers, CRM systems, various customer touch points, strategy management departments, IT supporting. In our CRM framework, we also explain how these components work and what relationships they have between them. In next chapter, we define what CRM performance is and specify measurement criteria to evaluate CRM performance.

Chapter 3: CRM Performance Criteria

The objective of this chapter is to define measurement criteria to evaluate CRM systems performance. In the first part, we will examine past studies on CRM performance on the four aspects, service channels performance, strategy performance, IT performance and customer satisfaction performance in CRM systems. In the second part, our work will focus on the assessment of each component of CRM framework and the evaluation of performance of these aspects. Then we will expose for each aspect the conditions of their contribution to the success of CRM systems in order to specify a list of criteria based on our framework. Each criterion we will discuss is light of their potential effectiveness and efficiency. Effectiveness means the feedback of customer is positive to CRM strategic objective. Efficiency means the CRM systems' output reflects on kinds of business resources, like customers' information, business strategies.

3.1 Background of CRM Performance

Since the 1990's, more and more discussions on CRM are focused on how to implement CRM in current companies and how much benefit companies can attain via CRM. Some studies have centralized on components of a CRM strategy such as the link between satisfaction and business performance [Kamakura et al. 2002], the link between customer loyalty and profitability [Reinartz and Kumar 2000], customer profitability heterogeneity [Niraj, Gupta, and Narasimhan 2001], and customer loyalty programs [Verhoef 2003].

There are some prior researches on kinds of CRM performance factors, like CRM in E-business environment [Anderson, 2001], new CRM architecture for company organization [Kalakota and Robinson, 2001], improvement of performance with knowledge management [Bueren, Ragnar, Kolbe and Brenner, 2005], and technology levels in CRM [Stefanou et al., 2003]. Based on our CRM framework, we divide these

papers into four primary performance factors that are service channels, strategy, IT and customer satisfaction.

Regarding service channels performance, Anderson [2001] described CRM as the technology to provide an integrated view of all customer interactions and change the corporate culture to leverage this information to maximize the benefits to the customer and the company. CRM provides an integrated view of customer interactions starting with software applications that capture these interactions [Anderson, 2001]. Anderson listed all kinds of service channels which help firms keep touch with customers conveniently. Similarly, Kalakota and Robinson, in 2001, explained how multipurpose customer contact points work in CRM systems.

In strategy performance, Customer Relationship Management is an enterprise-wide customer-centric business model that must be built around the customers. It is a continuous effort that requires redesigning core business processes starting from the customer perspective and involving customer feedback [Chen and Popovich, 2003]. The philosophical bases of CRM are relationship marketing, customer profitability, lifetime value, retention and satisfaction created through business process management. Anton (1996) characterized CRM as an integrated approach to managing customer relationships with re-engineering of customer value through better service recovery and competitive positioning of the offer. Meyer (2005) who pictured integration of CRM as strategy perspective described CRM processes among three categories, delivery processes, support processes and analysis processes.

Moreover, customer knowledge management (CKM) is a core and important part for CRM making strategies. Obtaining customer-related knowledge is specified as the means to attain CRM objectives. Since a major part of that expertise and intelligence refers to customers, it is concluded that CRM is strongly related to knowledge management and especially to customer KM [Romano, 2000; Massey et al., 2001].

In IT performance, CRM software systems should not only be operational but also highly integrated into the IT architecture of the organization. Stefanou et al. (2003) summarized IT architecture of the organization in CRM development stages. The stages are determined by the level of IT employed and the

sophistication/integration of the information system used in the organization. The higher the level of IT the higher the integration of CRM into the organization's IT/IS architecture and more effective/efficient is the management of customer relationships leading to customers' expanded profiles and personalization.

We will now turn on our framework to identify precisely all the potential criteria to assess performance on CRM systems. We will examine successively service channels performance, strategy performance, IT performance and customer satisfaction performance.

3.2 Service Channels Performance Criteria

In this part, we will describe what CRM service channels performance is. Then we define specific measurement criteria for service channels performance. Our performance criteria include communication connection, variety of service channels, convenience of channels, coordination among channels and protection of customer's privacy.

3.2.1 Definition of Service Channels Performance

As we have discussed on CRM service channels in last chapter, CRM is described having the technology to provide an integrated view of the customer interactions and satisfy customers' request in business process as possible as they can. Whichever kind of customer exists for company, CRM system has its own software to collect, store and transfer their information to strategy departments. Service channels appear as a bridge connecting customers and CRM platform. At same time, after a strategy came out from inside organizations, service channels deliver it to clients. Therefore, more customer touch points, more comprehensive information collected for company. As CRM framework shown, a blended multiple "Service Channels" approach to customer relationship management enables a business to be responsive to the needs and desires of its customers. These communication channels which are established on

the “CRM Platform” will be available for customers at anytime.

“CRM service channels” performs as a connection way to control relationships between customers and companies. Based on customer lifecycle, company transfers CRM strategy to customers by service channels. The goals of service channels are to build fixed contacting ways and make communication easily. Moreover, for company staffs, CRM service channels are major tools for communicating with customers so that they have to be used conveniently and exactly. For customers, channels will record and transform customers’ information to firms so that they need have high equality of communication and good security protection.

3.2.2 Performance Criteria for CRM Service Channels

According to definition of CRM service channels performance, we make some criteria that measure its operational processes. These criteria focus on service channels’ goal which is to build connections for communication and how they work effectively and efficiently.

- 1 Communication connection. The criteria measures if CRM service channels primary function between customers and companies.
- 2 Variety of service channels. The criteria measures if service channels have comprehensive touch-points to satisfy customers.
- 3 Convenient service channels. For customers, service channels have to be comfortable for using as their familiar ways. And IT has to supply convenient skills to make each component of framework well.
- 4 Coordination among channels. The criteria measures if multi-channels cooperate with each other. Likewise, it is used among organization departments. And we can assess CKM how to be operated with customers and other systems.
- 5 Protection of customers’ privacy. Service channels have to be evaluated the ability of security during communication with customers.

3.2.3 Communication Connection

Touch points between companies and customers are basic components of CRM framework. A CRM initiative will enable a company to better utilize all available communication channels [Zikmund, McLeod and Gilbert, 2003]. Therefore, “Communication Connection” is a reasonable performance criterion in CRM performance.

For companies to get customers’ requirements and information following marketing approach, used some contact points between customers and firms. If these communications are connected, CRM will be available for both trading sides. CRM systems receive and fulfill all the requirements that the customers have when they are attention on companies’ productions in pre-sale and post-sale period via touch points. Customers do not need come into company to take an order what they need personally. If they are interested in or want to buy some service or product, people can accomplish business successfully in store or online, even by a call. At same time, the sales and service department of corporation should know all the information on customers by these connections, which help them make an appropriate strategy back to customers in CRM processes. The growth of the CRM market is also occurring at customer contact points, such as call centers and the Web, and managers should pay close attention to the customer dynamics at these contact points.

In service channels architecture as **Figure 4**, communication connection appears effective and efficient between customers and companies’ organizations under IT supporting. Channels are only touch points contacting with customers in CRM. Each type of customers keeps touch and switch information with service representatives of firms. Then they will gain CRM strategy during communication processes to get next phase in customer lifecycle effectively. Meanwhile, in back-office, many management departments gain and supply information by data stream which records the communicating processes with customers’ and deals information during trade processes. Therefore, they make CRM strategy in time based on customers’ requirements which are transferred by each channels. Communication connection

completes business effectively and efficiently.

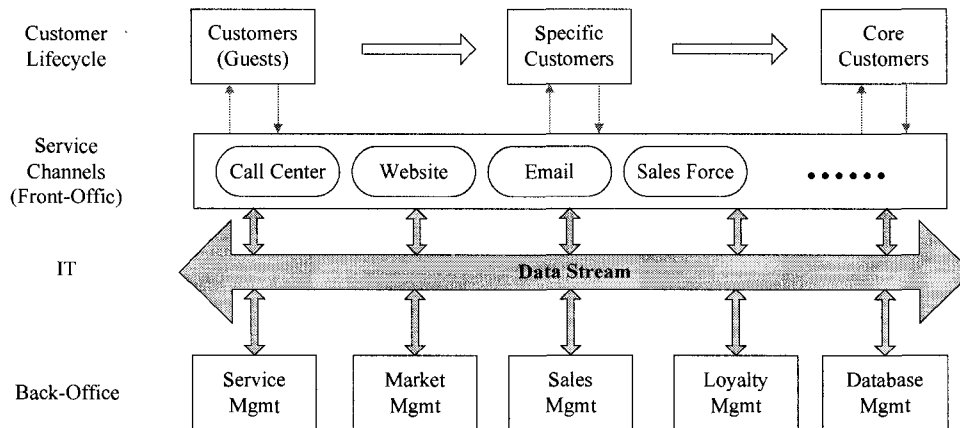


Figure 4 Service Channels Architecture [Kalakota and Robinson, 2001]

“Communication Connection” is a criterion to evaluate the touch points existing between customers and companies. Depending on these connections, firms collect and deliver business information for customers. This criterion, which promotes the efficiency of integration of the information system, is a basic part of CRM service channels performance measurement.

3.2.4 Variety of Service Channels

“Variety of Service Channels”, constitutes another criterion in CRM service channels performance, have impacted on effectiveness and efficiency parts of performance. More service channels company have, more information collected by CRM systems.

As Anderson [2001] introduced in his research, variety of service channels can be describe in following ways,

- “Web, customers can verify service availability; browse the relevant product descriptions via the web channel. The web could support a number of customer service and customer account management activities.
- Call Center is one of the main growth areas of customer contact. A call center is a group of agents and voice response units (VRUs) that assist customers with support, inquiry, and transaction functions.
- Email, customers can utilize the email channel to submit service requests,

check status and update service requests.

- Direct Mail, will be used primarily for outbound communications to customers.
- Direct Sales Force, will be remote users of the CRM platform. These agents will require handheld or laptop access to back-end systems to complete sales, order entry and customer service activities.
- Direct Retail, includes all storefronts and shops where products and services are sold.
- Indirect Retail (Agent), includes all non-company storefronts where a company's products and services are sold.
- Fax, customers can utilize the fax channel to submit service requests, check status and update service requests."

A blended multi-channel approach to customer relationship management enables a business to be responsive to the needs and desires of its customers, as well as facilitates the direction of its less valued customers to lower cost channels for service and fulfillment. "Variety of service channels" is to measure how many kinds of channels companies have in CRM performance. More channels they have will get more chances to gain customers in marketing. Moreover, companies' representatives can contact with customers efficiently by multi-channels.

Variety of service channels helps company keep touch with customers effectively and communicate efficiently. If a company has all of these channels, they have more power to attract customers' attention in marketing. So firms can find customers via different ways of which one gains their goals. Variety of channels also improves service representatives' working efficiency. They have more chance to contact with client in order to decrease their waiting time in business process.

We define "Variety of Service Channels" criteria as companies having lots of service channels including kinds of touch points to connect with their customers. And its goal focuses on improving effectiveness and efficiency of CRM service channels performance. This criterion is to measure firm's ability of comprehension for customers during CRM processes.

3.2.5 Convenience

“Convenience” of CRM service channels is another criteria reflecting CRM performance efficiency. It is more convenience for company to communicate with customer by CRM service channels [Zikmund, McLeod and Gilbert, 2003].

CRM service channels’ goal is to make companies and customers get information quickly and easily. Convenient service channels tools usage is important for CRM performance. For both buyers and sellers, convenient communication channels are key fact to improve their efficient operation [Meyer, 2005].

CRM service channels promote business processes conveniently and efficiently because they integrate all touch points in a virtual platform which is performed by CRM software [Meyer, 2005]. Therefore, integrated touch points and virtual platform are two aspects of “Convenience” criteria. Channels have to assemble all the touch ways that customers could use in the business procedure if the CRM application works well between the customers and companies. A customer may go to a certain shop looking for what he needs and ask for the assistant the price and the discount. Then he may buy it using his credit card. Moreover, he heard his friend talking about the certain product that is pretty good and he wants to buy a same one. So he calls to the customer service and tells the representative what he likes. At this time, CRM channels help company get the product data from the database and collect the customer information. Therefore, the more channels integrated into the CRM system, the more chances companies get from the market.

The CRM service channels compose a virtual platform that stores different format information data. Company’s representatives can collect and store customers’ data via service channels to support strategy-making. Marketing department can get these data from platform, define every client into which type and phase, forecast how much value they could gain. For example [Parasuraman and Grewal, 2000], CRM software which plays this platform’s role can help route and track customer email messages and online forms to appropriate agents. These applications generate reports about the efficiency of agents in answering email messages and live text chat requests. These

remarks are customized with the customer's name and other relevant information and then sent out electronically, permitting the representative to move on to the next problem to be dealt with. Such real-time web interaction is becoming an important and popular component in service channels [Newell, 2003]. Virtual platform is to unify all channels that have their own information technology to support all the service behaviors.

Therefore, "Convenience" criterion is defined to reflect CRM service channels performance working efficiently. Its goal is to measure service channels being used conveniently or not so that they make integrated CRM systems simpler and easier.

3.2.6 Coordination among Channels

"Coordination among Channels" is also an important criterion to service channels performance. We usually see that company lost some customers because representatives offer wrong information to clients. These misunderstanding are come from lots of reasons like data quality, information transformation [Missi, Alshawi and Fitzgerald, 2005]. For example, a customer receive a coupon from Internet so he goes to store to buy clothes which he eager to have for a long time. However, store sales can't give him a discount because they didn't get any related information from company. Customers will decrease trust level of clothes' brand, and company will lose this kind of clients. This is one of typical samples of communication conflicts that are caused by lingering information transformation, messy integrated CRM systems, and low service quality. At this time, channels representative need coordinate as soon as possible when they meet similar situation. Therefore, to measure coordination among channels is a necessary criterion in CRM service channels performance.

Coordination among channels makes customers get same information from company so that increase effectiveness of business processes. If some conflicts exist in channels, customers will be confused to this unclear information. They have to spend time to check correct information out with representatives. Meanwhile, companies also need more time to clarify their mistake among service channels. A

good coordination among channels is a necessary means to avoid these misunderstand and offers an effective circumstance for customers.

“Coordination among Channels” is to keep clients get same information by any service channels in a period. Service channels have to cooperate successfully with each other to avoid channels conflicts happen.

3.2.7 Protection of Customer’s Data

“Protection of Customers’ Data” is a performance criterion to keep customer satisfaction. Companies have an obligation to protect customers’ privacy and inform them security policy during business processes.

Service representatives must know what business information can be told to customers and what customers’ personal record can not be wised up to others. Information security becomes a popular subject in academic literature [Helokunnas and Kuusisto, 2003]. Customers do not like their data to be posted on Internet or be searched by other people. Meanwhile, CRM systems need to protect against information stealing from competitors. Service channels have a high security level through IT supporting.

The Personal Information Protection and Electronic Documents Act (PIPEDA) is a law that protects personal information in the hands of private sector organizations and provides guidelines for the collection, use and disclosure of that information in the course of commercial activity [Canada Government, 2000]. PIPEDA defines personal information as "information about an identifiable individual" that includes any factual or subjective information, recorded or not, in any form. For example, the following would be considered personal information: name, address, telephone number, gender; identification numbers, income or blood type; credit records, loan records, existence of a dispute between a consumer and a merchant. Moreover, personal information must be collected with consent and for a reasonable purpose and used for the limited purpose for which it was collected. It also must accurate and accessible for inspection and correction and stored securely [Canada Government,

2000]. Therefore, based on these policies of government, company can not record and publicize other customers' privacy. At same time, companies need inform customers what information they will record during business processes.

If CRM service channels have high level of protection of customers' trust, they will lead to increase customers' loyalty. As a result, this criterion impacts effectiveness of CRM service channels. If customers believe that channels can protect their privacy and avoid publicizing personal information, they satisfy company's service and introduce service or product to their friends. It is possible to enhance current customers and attract potential ones for companies.

Therefore, "Protection of Customers' Privacy" criterion requires service representatives to keep customers' privacy personally and to defend attacking from Internet. This work will satisfy customers' requirements and increase their trust.

3.3 Strategy Performance Criteria

In this part, we will describe what CRM strategy performance is. Then we define measurement criteria for strategy performance. Our performance criteria include organization structure reestablish, cooperation among organization, customer knowledge management (CKM) focus and expertise of CKM.

3.3.1 Definition of CRM Strategy Performance

We defined CRM special decision as a CRM strategy which can enhance customer relationship during customer lifecycle. Moreover, strategy, which will impact whole organization in business processes and other management information systems like enterprise resource planning (ERP), is a CRM outcome through the integrated analysis of knowledge and CRM database [Bueren, Schierholz, Kolbe, and Brenner, 2004]. After collection and storage the information of customers by CRM service channels, CRM requires a strong integration of business processes that control and record customers' activities. While service representatives finish the conversations with customers, customers' information is stored into the "CRM

Database”. Then market specialists analyze customers’ behavior and the trend of whole market. The goal of CRM strategy performance is to make a best strategy for the customer who could bring more benefit in the future business [Payne and Ryals, 2001].

“CRM strategy” performs a business decision based on customers’ personal situation and their requirements. This decision is made from customer-centric organizational structure that fits on CRM processes. At same time, customer knowledge management (CKM) plays an important part in strategy performance. It has been defined as the process of capturing collective expertise and intelligence in an organization and using them to foster innovation through continued organizational learning [Nonaka, 1991; Quinn et al., 1996].

3.3.2 Performance Criteria for CRM Strategy

Depending on appropriate organizational structure and precise customer knowledge, we gain CRM strategies. Therefore, we develop following criteria to evaluate CRM strategy performance. If measurement results are good for CRM strategy-making, this strategy performance has an effective and efficient operation.

- 1 Organization structure reestablishment. The criterion is going to assess whether the organizations structure is customer-centric or not.
- 2 Cooperation among organizational managements. Organizational managements related with CRM have to cooperate well during strategy-making procedure.
- 3 CKM focus. CKM is necessary for strategy performance because it directs organizational managements to make CRM strategies.
- 4 Expertise of CKM. This criterion is to evaluate CKM power in CRM systems.

3.3.3 Organization Structure Reestablishment

CRM organization structure has to suit customer-centric processes development

and fulfill CRM processes requirement. Company's inside organization structure need to change from product-centric processes to customer-centric processes in developing marketing environment [Stefanou et al., 2003]. Even though we know that lots of CRM integrated service channels in front-office promote company communicate with their clients, they can not make a CRM strategy. CRM processes are predominantly influenced by the underlying supply of knowledge on products, markets and customers [Garcia-Murillo, 2002 and Schulze, 2001]. Therefore, it is important to measure "Organization Structure Reestablishment" in CRM strategy performance.

An important aspect of CRM strategy is its orientation in customer lifecycle. The sequence of activities that a customer has to perform to satisfy a need or solve a specific problem present within the organizations defined as service management, sales management, marketing management, loyalty management and CRM information technology. We also define three categories of CRM strategic processes: CRM delivery process, CRM support process and CRM analysis process (as the **Figure 5** shows).

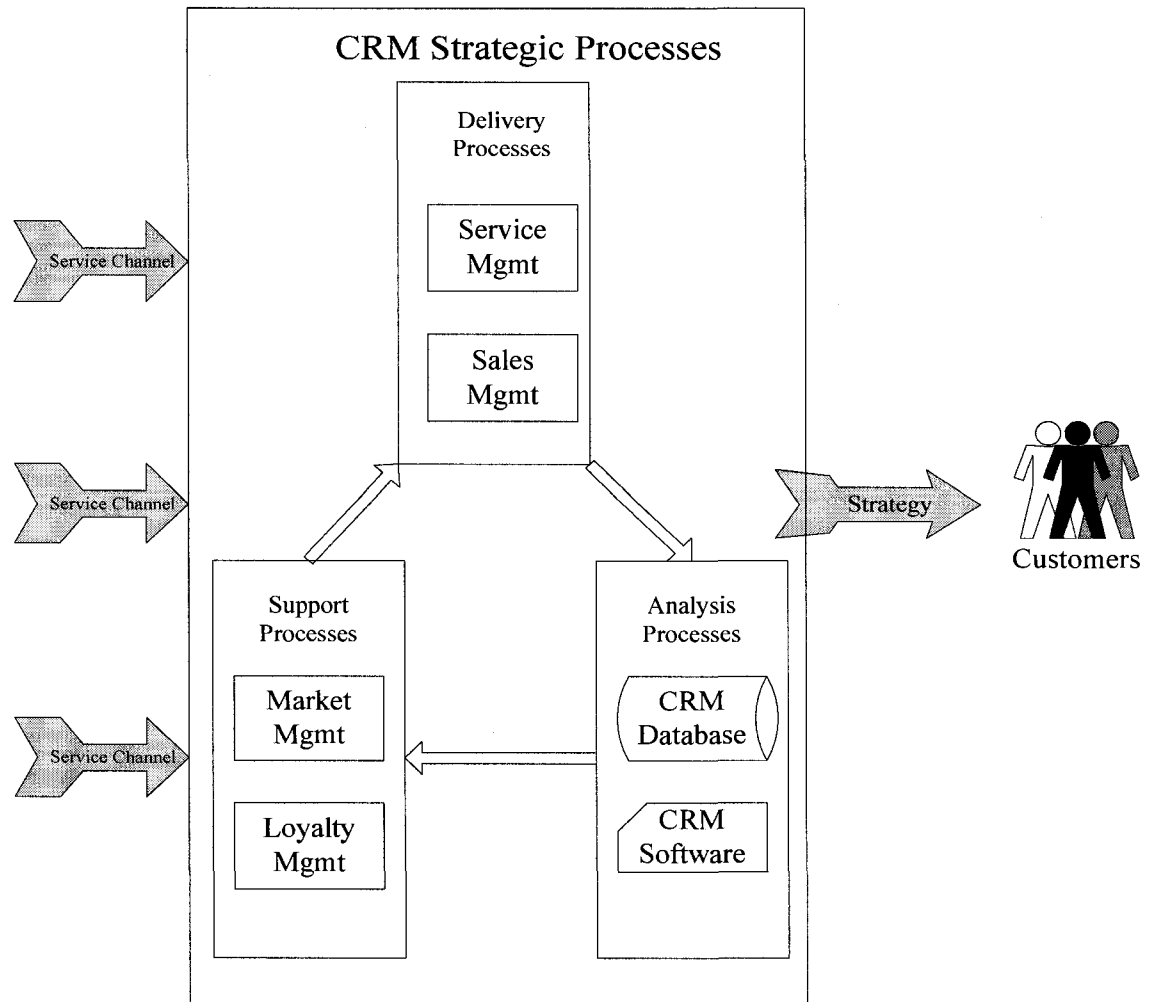


Figure 5 CRM Strategic Processes Structure [Meyer, 2003]

CRM delivery processes mainly consist of processes with direct customer contact to cover part of the customer process [Meyer, 2003]. In these processes, service department and sale department have to take charge to service clients by channels. In order to satisfy and fulfill customers' requirements, they communicate with customers and deliver their requirements to CRM analysis processes. Delivery processes attempt to transfer CRM strategy back quickly so that representatives satisfy clients in time during business procedures. Their work prompts CRM strategy performance efficiently.

In analysis processes, CRM database and software supported by IT analyze customers' information effectively and efficiently. CRM analysis processes consolidate and analyze customer knowledge that has been collected in other CRM

processes [Meyer, 2003]. Market specialists who receive customer's requirements from service representatives use CRM software, like Siebel CRM [Oracle Co.], Microsoft CRM 3.0 [Microsoft Co.], to analyze customer's behavior and search similar successful cases from CRM software database. As a result, they build an analysis report for CRM support processes which will make final strategy to client. The analysis results are passed on to the CRM delivery and support processes as well as to improve their effectiveness and efficiency.

In support processes, an appropriate CRM strategy is made for certain customers to improve effectiveness of CRM strategy performance. CRM support processes include processes with direct customer contact that are designed to fulfill supporting functions within the CRM context [Meyer, 2003]. Market management and loyalty management take charge of these processes. For example, based on a specific case, market specialists research marketing in order to make other departments understand whole marketing developing trend. Then loyalty management, which tracks customer activities and accounts, builds customer's loyalty politics. Finally, they pass this strategy back in delivery processes where service representatives contact with customers and operate strategy.

Therefore, "Organization Structure Reestablishment" criterion is to evaluate whether company's organization structure is changed to adapt CRM processes. CRM organization structure has to contain six parts as we mentioned in three CRM progresses, service management, sales management, CRM software, CRM database, marketing management and loyalty management. The criterion presents all organizational departments' functions which improve CRM strategy-making effectively.

3.3.4 Cooperation among Organizational Management

"Cooperation among Organizational Management" is a criterion to measure efficiency of CRM strategy performance. In last criterion, we focus on evaluating organization structure containing managements related with CRM. This criterion will

put eyes on how they cooperate fluently and quickly in strategy-making processes.

We have known that six parts are related with CRM strategic processes, service management, sales management, market management, loyalty management, CRM database and CRM software. They have their own functions during strategy-making procedure. However, how they cooperate with others affect strategy-making period and its exactitude [Ocker and Mudambi, 2002]. It is very important to cooperate with those relative managements when some problems of attitude for customers occur. Some activities help them make a solution or pass away conflicts, such as regular meeting with other managers or consulting with experts. Therefore, this criterion is appropriate to measure CRM strategy-making processes efficiency.

To make strategy quickly, excellent cooperation must exist among managements during CRM processes. It is normal that many different views on one case. However for customers, they get only one strategy from company. Therefore, good cooperation work which is necessary in CRM processes shortens period of strategy-making processes. Company accomplishes a CRM strategy efficiently by organization management cooperation.

As a result, “Cooperation among Organizational Departments” is to measure CRM processes managements working efficiently. CRM strategies have to be made and delivered exactly and quickly. In strategy-making related departments, they need cooperate together and ensure that CRM strategies are passed to customers quickly.

3.3.5 CKM Focus

Obtaining customer-related knowledge is specified as the means to attain CRM objectives [Gebert, Geib, Kolbe, and Brenner, 2003]. “CKM Focus” is a criterion to measure the relationship of CKM and CRM in strategy performance.

Customer knowledge management (CKM) has been defined as the process of capturing the collective expertise and intelligence in an organization and using them to foster innovation through continued organizational learning [Nonaka, 1991; Quinn et al., 1996]. Since a major part of that expertise and intelligence refers to customers,

it is concluded that CRM is strongly related to CKM [Romano, 2000; Massey et al., 2001]. If CRM systems have no relationship with CKM, it is hard to learn customers' habits and forecast their behaviors. Therefore, "CKM Focus" is a measurement criterion to evaluate CKM function in CRM systems.

CKM, unlike data or information, is embedded for major part in people and for some point in IT [Garcia-Murillo and Annabi, 2002]. CRM plays more and more important roles in the company organization structure. CKM becomes necessary for company and even the core part of the CRM. If management departments want to make a perfect strategy which can hence customers' satisfaction and fulfill companies development requirement effectively and efficiently, they have to base on customer knowledge which accumulates customers' information about their behaviors and habits in a long period [Bueren, Schierholz, Kolbe, and Brenner, 2004]. Therefore, companies need to determine how CKM can support business goals and processes and use these as guidelines for designing the CKM processes and performance indicators [Bueren, Schierholz, Kolbe, and Brenner, 2004].

CRM and CKM both focus on customers' research. CRM deals with satisfying and fulfill customers' requirements to gain more and more clients from market. CKM gathers information within customers' behaviors and provide support to CRM application. A loop exists between CRM and CKM. With CKM assisting, service representatives get customers' information and business habits in advance. It is easy to make strategy for clients. So CRM performance becomes more effective and efficient. At same time, CKM collects each client's information of account activities, trading time and interest in business procedure.

"CKM Focus" is a criterion to measure whether CRM strategy-making within CKM supporting. CRM decisions directed by CKM make CRM processes effectively and efficiently.

3.3.6 Expertise of CKM

CKM existence is important for strategy-making in CRM processes. So it

contains a wide and powerful competence to support organizational department operation. CKM has kinds of customers' information in its database. It records clients' basic information, like name, address, phone number, business interaction information, trade amount, trade time and their habits. Therefore, more support CRM gets from more details CKM has. "Expertise CKM" criterion measures that CKM has comprehensive and forceful content to support CRM strategy performance.

To achieve its goal of providing an appropriate strategy for customers, enterprises need to focus on three sorts of knowledge in CRM processes. According to knowledge management performance [Bueren, Schierholz, Kolbe and Brenner, 2005], we consider customer knowledge as following categories,

- 1) They need to understand the requirements of customers in order to address them. This is referred to as "knowledge about customers".
- 2) The information needs of the customers in their interaction with the company require "knowledge for customers".
- 3) Third, customers possess knowledge about the products and services they use as well as about how they perceive the offerings they purchased. This "knowledge from customers" is valuable as it feeds into measures to improve products and services. Efforts need to be made to channel this knowledge back into the enterprise.

CKM offers a process perspective to illustrate which KM tools can be applied to the CRM strategy processes to achieve effective CKM [Gebert, 2003]. Based on these three categories of customer knowledge, CKM provide an effective and precise strategy for CRM. Moreover, CKM analyzes information of clients and provides a logical and efficient result for organizational management.

The CKM process model is based on two types of knowledge, implicit and explicit [Bueren, Schierholz, Kolbe and Brenner, 2005]. Each individual possesses is an amount of implicit knowledge that influences the ability to articulate and therefore explicate and create knowledge. However, explicit and implicit knowledge as such are not separable from the particular individual possessing it. Therefore, we term it the knowledge aspect "competence" [Bueren, Schierholz, Kolbe and Brenner, 2005]. The

organization can only directly manage explicated knowledge in the form of media such as text or images which we term the knowledge aspect “content”. Collaboration aspect deals with the creation and dissemination of knowledge among few individuals, like in project teams. The knowledge aspect composition deals with the dissemination and usage of knowledge among a large number of individuals. An important issue for composition is helping people find explicated knowledge, for example, in enterprise portals [Bueren, Schierholz, Kolbe and Brenner, 2005].

Therefore, “Expertise of CKM” is a criterion to measure what kind of information need be included in CKM. Meanwhile, CKM systems should provide comprehensive and logical information for CRM strategy-making.

3.4 IT Performance Criteria

In this part, we will describe what CRM IT performance is. Then we define measurement criteria for IT performance. Our performance criteria include information collection, information storage, information quality, IT integration, IT convenience, Software usage, IT security protection and CRM/IT development stage.

3.4.1 Definition of CRM IT Performance

Based on the service channels and strategy-making requirements, IT has its own signification in CRM framework. CRM applications take full advantage of technology innovations with their ability to collect and analyze customers information data on customer patterns, interpret customer behaviors, develop predictive models, respond with timely and effective customized communications, and deliver product and service value to individual customers [Chen and Popovich, 2003]. CRM system collects data from various data sources during business procedure. Then data is stored into CRM database that works with CRM analysis software and legacy MIS database. Finally, data is delivered as information that will be presented to users by information delivery systems.

“CRM Technology” performs a technology supporting for CRM business processes. It takes charge collection, storage and transfer information during trading procedures. At same time, IT integration and software usage affect CRM service channels performance and CRM strategy performance. IT is a means to build an integrated e-business environment for CRM.

3.4.2 Performance Criteria for CRM Technology

Depending on CRM IT performance definition, we have some measurement criteria to assess IT performance. We will focus on information collection, storage quality, IT integration, convenience, software usage, security protection and CRM/IT development stage. These criteria are related with effectiveness and efficiency of IT performance.

- 1 Information collection. The criterion is to evaluate if current collection approach is fit to gather data from actual business procedure or not.
- 2 Information storage. This criterion is to measure if information transforms from a database to another database easily and logically.
- 3 Information quality. Information quality is to measure CRM systems provide exact and real-time data to users.
- 4 IT integration. This criterion is to evaluate collaboration of IT in different information systems.
- 5 IT convenience. The criterion is to measure if IT application is easy for CRM systems users.
- 6 Software usage. The powerful and successful software provides technological support for CRM.
- 7 IT security protection. CRM systems have a function to deal with security problems against competitors.
- 8 CRM/IT development stage. This model is to determine CRM IT levels that have different power in each stage.

3.4.3 Information Collection

“Information Collection” is a criterion to measure that information sources are logically gathered by CRM systems. All customers’ information is useful for CRM strategy-making.

CRM information technology collects and updates customers’ information continually to understand each particular customer habits. Therefore, the collection of data is come from all possible sources – internal and external resources, like organizations and individuals within the firm as well as outside [Zikmund, McLeod and Gilbert, 2003]. The data is stored in a computer-readable format and can easily be transformed to the database. For example, one way to collect CRM data is by using point of sale. When a product is prepared well to sell for a customer, its bar codes could be scanned into CRM system. And this product relates with a certain customer and his or her account information. Sales representatives could address customer’s phone number, email address by credit cards. CRM process is recorded by these two types of data.

A good information collection method improves effectiveness of CRM performance. If CRM systems gather data from two types of sources, they can record whole business processes and easily deliver information to other organizational managements. When market specialists get data, they can make an appropriate CRM strategy. For customers, they can search any product’s information posted by the Internet or newspapers, particular details help them accomplish their requirements.

“Information Collection” criterion is to evaluate CRM systems data collected from internal and external sources. It makes information comprehensive and easy for CRM strategy-making.

3.4.4 Information Storage

“Information Storage” criterion is used to view business data being stored in logical database which an accumulation of computer-based data that is arranged in a

format to facilitate retrieval [Khalifa and Shen, 2005].

Business data has been stored in traditionally form of record and file. The record includes all the data relating to a particular subject and the file consists of all the records. However, recently, technicians found that files could be designed as tables, and the contents of the tables could be integrated with logical linkages [Zikmund, McLeod and Gilbert, 2003]. A database is a corporate resource, and a firm can have more than one. For example, service department has two database, customer database and sales person database. Database technology makes CRM data storage systemic and logical.

Information storage technology improves efficiency of CRM processes in IT performance. It forces data delivering in CRM systems and shortens integration time on different data formats. Therefore, “Information Storage” is also one of CRM IT performance criteria. Its goal is to evaluate CRM system data storing into database that provides logical information for firms and customers.

3.4.5 Information Quality

“Information Quality” is another criterion for keeping all data real-time in CRM systems. Information quality is a term to describe the quality of the content of information systems. Data quality which is related closely with information quality has been an issue of interest to practitioners and researchers for many years. Significant effort has gone into defining what is meant by data quality [Ballou and Tayi, 1998]. Over time techniques and procedures have evolved, designed to leverage and to make sure that the level of customer data required by transactions processing systems is of appropriate level of quality [Wang, Storey, and Firth, 1995].

“Information quality” is a measure of value that the information provides to user of that information. Quality is a somewhat subjective measure of the utility, objective, and integrity of gathered information [Turban et al., 2006]. In CRM framework, it is defined as CRM systems provide accurate and real-time information. Gartner Group reported in 2002 that at least 70 percent of organizations undertaking a CRM strategy

are unaware of information quality problems [Gartner Group, 2002]. A review of literature pertaining to organizations that have already implemented CRM strategies indicates that more than half of CRM projects have failed because of the complex data quality and data integration processes [Duke, Kiras, and Makey, 1999]. Organizations support their CRM systems with data quality and data integration processes. It is necessary to measure data quality positively sustain CRM systems operating. Many factors (such as managerial, operational, strategic, IT infrastructure, organizational) are related with the above data quality problems when implementing CRM [Newel, 2003]. IT administrators have to avoid data quality damage and remind each CRM strategy departments update their own database.

“Information Quality” criterion has a relation with effectiveness and efficiency of CRM performance. If CRM data has high quality in systems, customers’ and company’s organizations both have real-time and exact information in order to complete business effectively. It also avoids wasting time to explain inaccurate information appeared to clients because of high information quality. Therefore, “Information Quality” forces efficiency of CRM performance.

As a result, “Information Quality” criterion is to prove real-time data in database and there is no problem with data quality. This criterion affects effectiveness and efficiency of CRM IT performance. Companies can gain customer information exactly and quickly depending on high information quality.

3.4.6 IT Integration

An important performance criterion, “IT integration”, gathers similar kinds of application of CRM integrated. For example, an integrated virtual platform controls all of CRM service channels digitally and all departments’ representatives can view clients’ information on it. At same time, a unique data warehouse that includes all mayor entities of database in different departments is set up for firm.

In order to achieve CRM service channels performance, companies use IT to integrate many kinds of channels in front-office. Compared with traditional business

trading means, customers buy some stuff by the Internet and phone calls instead of going to store. IT integrates multi-channels in a whole platform to collect and transfer data. It is a challenge to translate kinds of data forms into a union format [Newell, 2003]. For instance, call center representatives have to change voice message into text data. Similarly, sale assistants input customers' information as readable data which describe customers' activities and relationship in a local store. The key task of CRM IT specialists is to keep and renew the most current data in database that could make out exact analysis report and decision-makers can generate appropriate strategies for customers.

The ERP and SCM databases are core databases in a companies' management information systems. Nevertheless, as CRM developing in organizations revolution, customer-centric product processes become primary companies' manufacture approach. CRM database which turns to core one have to transact data with other legacy database. While market management analyzes customers' data and the trends of marketing development, they consider current information systems, such as ERP, SCM, finance database, are fit for customers' need or not and they whether absolutely support companies' inside production processes. Therefore, an integrated information system is very important for firms. CRM users engage in analysis of not only relationship data but also other systems data.

Either integrated platform or database technology in CRM applications can increase efficiency of CRM systems. They provide a convenient way to gain data from different sources, such as variety of service channels and kinds of database. It is possible to save searching time within many management information systems so that they improve efficiency of CRM systems.

Based on what we discussed above, "IT Integration" is a criterion to assess CRM integration in service channels performance and strategy performance by IT supporting. Simple systems, which make CRM service and processes easy to control, can force CRM IT performance effectively and efficiently.

3.4.7 IT Convenience

“IT Convenience” is to measure if IT usage easy or not for users. IT has close relation with other CRM performances. So it has to be convenient for users of CRM systems.

Practically, two basic ways a CRM system can be employed and interacted with a customer [Stefanou et al., 2003]: first, an IT-assisted CRM, emphasizing traditional channels, such as traditional telephone centers, communication by fax and/or direct mail as well as field personnel. Second, it is an IT-automated CRM, emphasizing customer interaction through technologies such as the Web, wireless devices and automated call center systems [Wells et al., 1999; Bradshaw and Brash, 2001; Bose, 2002]. The system enables customers to interact directly with CRM. According to the lifecycle of the customers which includes three phases, attraction, maintenance, and retention, IT performance provides a strong information platform to ensure customers receive the appropriate service. If firm has both types of IT integrated CRM, IT can provide a convenient means for customers. For sellers, besides convenient service channels, advanced CRM systems are helpful for making strategies quickly.

The goal of “IT Convenience” criterion is to measure efficiency of CRM. Both customers and employees get benefit in business procedure because of a convenient technology working within CRM systems. Therefore, “IT Convenience” is defined to offer a convenient IT environment for CRM service and strategy-making processes. Depending on this criterion, CRM IT performance provides an efficient service to CRM service channels performance and strategy performance.

3.4.8 Software Usage

“Software Usage” is one to view current CRM software used in company. More powerful software used in company, less problems appeared in CRM application.

Every company has their own CRM application software whose functions direct CRM processes running. Lots of database software and information management

tools exist to develop CRM systems. For example, Oracle database tools, Siebel management tools, SQL server and Microsoft CRM 3.0. These kinds of powerful software can definitely provide technological support for CRM systems. Moreover, the powerful CRM software is accepted by most of firms because it has much practical experience from CRM application. Oracle CRM software and Microsoft CRM 3.0 even provide appropriate business solution for specific firm and help company receive exactly what they need in CRM systems.

Excellent CRM software can provide an effective and efficient support to CRM performance. CRM software vendors develop software to server companies and customers. More business knowledge they have brings out more appropriate CRM strategies and solutions for companies. Therefore, CRM systems perform effectively through powerful CRM software. Meanwhile, big software vendors have enough money and labor to research on CRM cases and enlarge their marketing experience. Then they develop software products and update them for companies. These activities force companies to get perfect strategies for clients and customers gain an efficient service from firms.

Therefore, “Software Usage” is defined as what kind of CRM software using in IT performance. If the software is powerful, companies have high level of CRM system efficiency and effectiveness.

3.4.9 IT Security Protection

“IT Security Protection” is a necessary criterion to measure IT security situation of CRM systems in open marketing environment. More and more CRM software vendors recognize security system is important for CRM systems [Helokunnas and Kuusisto, 2003].

IT has obligations to protect information against theft by competitors. CRM database, unlike ERP or finance databases, is open for both customers and companies' staff. In other words, lots of information even customers' privacy should be shown to customers. They can check out their private information and company product data by

their own computers at home. Likewise, the competitors also search the information of product online. IT permits companies to share the particular open data to customers and at same time keeps some private information safely. In a conclusion, CRM IT makes sure specific data can be explored by customers and also increases the data security against attack on the Internet. IT security and customers' privacy are criteria for IT performance.

Security protection systems in information technology supply a safety situation for customers and companies. Their goals focus on increasing customers' loyalty and improving CRM systems operating effectively. For examples, "PIPEDA" deals with specific information which are had clients' permission record in systems. Oracle's and Microsoft's software has their own policies to filtrate information for customers so that avoid exposing privacy. If CRM systems have strong security protection support, companies will attract more customers from market effectively.

Therefore, "IT Security Protection" is defined as a criterion to ensure CRM systems have a certain system to keep systems safety on the Internet. Otherwise, company will lose customers' information and their loyalty on firm's brand.

3.4.10 CRM/IT Development Stage

Based on the paper of Stefanou et al. (2003), "CRM/IT Development Stage" is an entire criterion for whole IT environment. We can have a general conception of IT level with CRM performance by this criterion. Companies have more efficient and effective CRM performance in higher stage.

As the rapidly developing step of IT, we have to accept that IT is necessary in CRM systems. Moreover, effective customer personalization management requires that CRM software systems should not only be operational but also highly integrated into the IT architecture of the organization. Therefore, we describe IT level in CRM systems in order to understand how IT can support CRM working and how big capacity CRM involves in company organizations. The higher the level of IT the higher the integration of CRM into the organization's architecture and more effective

is the management of customer relationships leading to customers' expanded profiles and personalization [Stefanou et al., 2003].

CRM Development Stages, in **Figure 6**, depict a conceptual model of the CRM development stages. The stages are determined by the level of IT employed and the integration of the information system used in the organization [Stefanou et al., 2003].

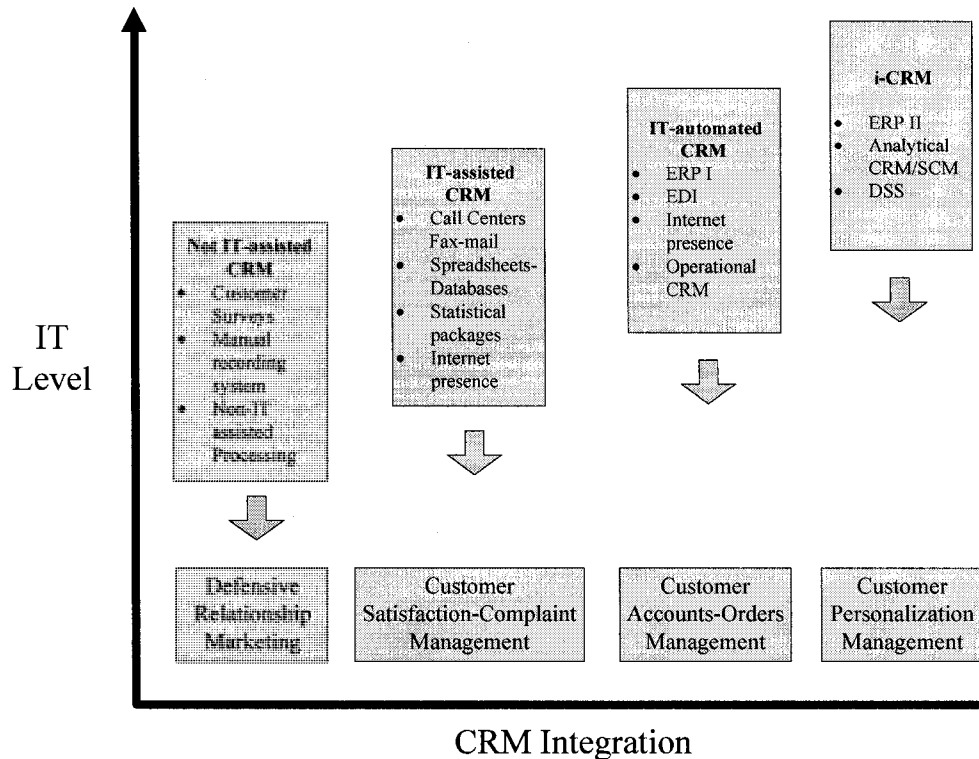


Figure 6 CRM Development Stages [Stefanou et al., 2003]

The first CRM development stage is the preliminary, non IT-assisted stage. Organizations belonging to this stage have a very limited or not at all use of IT as far as the management of customer relationships is concerned. However, these organizations use customer related knowledge management instruments and have some type of a mostly manual customer satisfaction or complaining data recording system, their positive attitude and orientation towards defensive relationship marketing.

The second CRM development stage is the IT-assisted CRM, predominately a manual process that uses IT to enhance the company-customer relationship [Wells, Fuerst and Choobineth, 1999] and to analyze customer-related data. Customer data is

mainly collected manually but recorded and analyzed by using spreadsheets, database systems and statistical packages. Organizations belonging to this stage are expected today to have some Internet presence and manage effectively and efficiently customer satisfaction or complaint behaviors.

The third CRM development stage is the IT-automated CRM, which emphasizes customer interaction by using a number of technologies, such as the Internet and call centers technology. Creating of customer profiles, tracking of customer purchase patterns and interactive service provision have been made possible by the advances in IT [Chattopadhyay, 2001]. Companies belonging to this stage have active Web presence, use Electronic Data Interchange (EDI) systems, engage in e-commerce and have implemented ERP and operational CRM systems aimed at business processes optimization and sales force automation.

The fourth CRM development stage is the integrated CRM (i-CRM), leading to customer personalization and high level of service and customer satisfaction. At this stage, companies employ sophisticated CRM information systems providing highly integrated front-office, back-office and Internet functions. These integrated CRM software systems should be flexible enough to adapt to changing customer needs [Chattopadhyay, 2001] and analytical in order to dynamically monitor consumer preferences. Supply chain optimization and analytic functions are also expected at this stage through the use of Web-enabled decision support software systems. This will probably require enterprise-wide sharing of information so that customer-centric knowledge could be available to every decision maker of firm's organizations.

Therefore, CRM/IT development stage is another criterion for IT performance. CRM/IT development stage is an existing model from Stefanou et al.'s research [2003]. Based on their methodology, we could understand different CRM objectives in different development stages. When CRM is in first stage, not it-assisted CRM, CRM is used to defense customers' relationship. And IT just works as collection customers' information. While CRM is in second stage, IT-assisted CRM, companies understand to operate CRM system to handle satisfaction or complaint from customers. Then in the third stage, IT-automated CRM, some automatic service

channels are in this stage. IT enlarges its activities in kinds of business behaviors which lead some change in organization structure. Finally, in the fourth stage, i-CRM, IT affects whole business progresses in a higher level. While, CRM objective is considered to analyze customers' behaviors and to impact other management systems. According to these general stages, higher level leads to CRM systems' effectiveness and efficiency.

3.5 Criteria Related to Customer Satisfaction Performance

In customer satisfaction performance, measuring consumer satisfaction is a means of determining how well a production or service is meeting customer expectations and organizational objectives [Zikmund, McLeod and Gilbert, 2003]. Customer satisfaction is a direct factor to evaluate whole CRM performance from customer perspective.

Based on our CRM performance, four measurement criteria is identified for customer satisfaction, service channels satisfaction, strategy satisfaction, IT satisfaction and brand loyalty. For customers, they really do not care, even do not know, what CRM is. They just focus on production information companies provide and whether business processes are convenient or not. So they only have cognizance of service channels usage, software application and business result.

Firstly, we know CRM is a customer-centric business progress which operates in marketing depending on customer attitude. Customers keep touch with company's representatives by kinds of channels. They choose any CRM touch points that company provides for clients, like the Call Center, Website and Email. Therefore, customer satisfaction is a good way to measure service channels quality which includes information transforming and representatives' tone during service processes.

Secondly, according to customers' feedback of CRM strategies, we know whether the strategies are suitable for customers' requirements or not. Customer satisfaction is a direct measurement criterion to view efficiency of CRM strategy [Zikmund, McLeod and Gilbert, 2003].

Thirdly, clients have their own minds on some IT applications, such as website and payment ways. They focus on some interactions of IT applications between customers and companies [Turban et al., 2006]. Therefore, IT satisfaction is an important criterion to measure customer satisfaction regarding IT application. Results of customers' satisfaction on this field offer guidelines for progressing IT performance.

The "Brand Loyalty" takes the view that customers will repeat purchase. That is an important criterion to measure customer satisfaction for brand. And it is also a factor to review the relationship between company and its clients [Hayes, 1998].

For customer satisfaction performance, four criteria measure customers' attitude, service channels satisfaction, strategy satisfaction, IT satisfaction and brand loyalty. They bring us a whole view of efficiency and effectiveness of CRM performance.

In a conclusion, we present CRM performance criteria that we define as following **Table 3**.

Performance Aspects	Criteria
CRM Service Channels Performance	Communication Connection
	Variety of Service Channels
	Convenience
	Coordination among Channels
	Protection of Customer's Privacy
CRM Strategy Performance	Organization Structure Reestablish
	Cooperation among Organization
	CKM Focus
	Expertise of CKM
CRM IT Performance	Information Collection
	Information Storage
	Information Quality
	IT Integration
	IT Convenience
	Software Usage
	IT Security Protection
	CRM/IT Development Stage
Customer Satisfaction Performance	Service Channel Satisfaction
	Strategy Satisfaction
	IT Satisfaction
	Brand Loyalty

Table 3 CRM Performance Criteria

Chapter 4: CRM Performance Measurement

In this chapter, we will review all related CRM performance measurement methodologies in current literature. Based on these methods and our own CRM framework, we develop a diagnostic CRM measurement tool to evaluate the performance in four aspects, service channels, strategy, information technology and customer satisfaction.

4.1 CRM Performance Measurement Background

Companies use CRM measurements for different purposes, digital channels provide for realizing their product and service or connect with their customers conveniently etc. However, many people said that “Can’t Really Measure.” Why they feel the measurement and CRM don’t get along? Most of recent performance measurement systems (PMS) are based on the product-process procedure to evaluate organizations points or based on the financial perspective [Najmi, Rigas and Fan 2005]. We will introduce following different measurement approaches to assess CRM performance.

Najmi, Rigas and Fan [2005] introduced PMS in business environment. There are two main measurement categories for each information management systems, business performance and PMS performance. Business performance which can have an impact on PMS design and implementation assesses the performance of the business through the PMS. PMS performance deals with the assessment of how efficient and effective the PMS is in actually measuring the company’s performance [Najmi, Rigas and Fan, 2005]. They provide a PMS framework to be followed to measure CRM performance in our research architecture.

Reichold, Kolbe and Brenner [2004] measure CRM in financial perspective. They made four perspectives to assess CRM, the customer value perspective that measures the financial benefits gained from customers, the customer satisfaction perspective

that measures the level of satisfaction achieved by products and services, the customer interaction perspective that measures the operational excellence of internal processes and multi-channel management and the customer knowledge perspective that measures the quality of customer knowledge and data analysis [Reichold, Kolbe and Brenner, 2004].

Khalifa and Shen [2005] developed, operationalized and empirically tested a temporal model explaining the relationship between three categories of eCRM (i.e., prepurchase, at-purchase and post-purchase eCRM) and online customer satisfaction at two phases of the customer lifecycle, i.e., attraction and retention. The results of a longitudinal survey of the online customers of hardware retailers provided strong support for the model and revealed the dominant role of pre-purchase eCRM in satisfaction formation at the attraction phase and the prevalence of post-purchase eCRM at the retention phase. Specific eCRM features are identified as satisfaction drivers, providing insights for important paradigm shifts [Khalifa and Shen, 2005].

Reinartz, Krafft and Hoyer [2004] conceptualize a construct of the CRM process and its aspects in their research paper. They also operationalize and validate the construct, then empirically investigate the organizational performance consequences of implementing CRM processes. The key outcome is a theoretically sound CRM process measure that outlines three key stages: initiation, maintenance, and termination. They measure economic performance within CRM conception [Reinartz, Werner J, and V. Kumar, 2000].

Kellen [2002] developed CRM measurement frameworks to assess whole CRM systems. These frameworks range from the strategic to the operational. How companies build and deploy a CRM measurement framework depends on the planning horizon under consideration, the market volatility, the company's overall strategic posture and goals, and how much of the organization and customer base is impacted by CRM solutions considered. In addition, how customer knowledge is created and utilized for benefit is under continual debate with different points of view. The paper reviews the key issues in CRM measurement, offers some attributes for describing and evaluating CRM measurement frameworks [Kellen, 2002].

Hayes [1998] introduces and offers various measurement tools to assess customer satisfaction. Knowledge of customers' perceptions and attitudes about an organization's business will greatly enhance its opportunity to make better business decisions. These organizations will know their customers' requirements or expectations and will be able to determine if they are meeting those requirements. To use customers' perceptions and attitudes to assess the quality of products and services, customer satisfaction instruments must be developed and accurately represent customers' opinions; decisions based on this information can be detrimental to the success of the organization [Hayes, 1998]. He listed some samples of measurement methods and questionnaires to evaluate customers' satisfaction and attitudes for the quality of companies' service and product.

Horn, Feinberg and Salvendy [2005], who made a research to measure relationship between customers and e-business, investigated the composition of customer relationship management in e-business by examining the possible elements that determine different aspects of the relationship. Results of a factor analysis indicated three main customer relationship attributes of e-business, which are: general CRM; personalization; and privacy. They measure CRM server into these aspects, tangibles (physical facilities and appearance), reliability (providing dependable and accurate service), responsiveness (providing prompt and helpful service), assurance (knowledge and courtesy of employees) and empathy (caring, individualized attention) [Horn, Feinberg and Salvendy, 2005].

In Sin, Tse and Yim's [2003] paper, they addressed the conceptual and measurement issues related to the study of CRM and its impact on business performance [Sin, Tse and Yim, 2003]. They described CRM into four parts which are key customer focus, CRM organization, KM and technology-based CRM.

Xu and Walton [2005] examine how customer relationship management (CRM) systems are implemented in practice with a focus on the strategic application, i.e. how analytical CRM systems are used to support customer knowledge acquisition and how such a system can be developed. They evaluated CRM performance regarding on reasons for implementing CRM. In their research, it is important to indicate

knowledge management supporting strategy-making which improves customer satisfaction level [Xu and Walton, 2005].

Chen and Ching [2004] examine the relationship of information technology intensity and organizational absorptive capacity to CRM practices and performance. Their survey data collected through Taiwanese financial service companies generally suggest that CRM practices mediate the effects of IT intensity and organizational absorptive capacity on CRM performance.

4.2 Analysis of Existing CRM Measurement Tools

According to our criteria of CRM performance, above measurement methods relate with one or two components of CRM framework. However, they are not comprehensive measurement tools for CRM performance. Therefore, we will develop a systemic measurement tool involving all four aspects. Firstly, it is necessary to summarize each tool based on our criteria. Secondly, our measurement tool will be built based on criteria that have been partially considered in previous studies. Meanwhile, it will include some aspects of criteria that were not mentioned in any measurement tools.

4.2.1 Detailed Analyses of Previous Measurement Tools

Even though kinds of measurement tools exist for evaluating CRM performance, they do not get out the range of our CRM framework from four aspects, service channels performance, strategy performance, IT performance and customer satisfaction performance. In this part, we will analyze current measurement tools in light of our framework.

Some measurement tools are used to evaluate business internal organization structure for CRM.

Najmi, Rigas and Fan [2005] focus on assessing whole business performance. They operate their measurement tool by examining organization structures in company and how they work during in strategy-making procedure. This tool measures

whether organization structure is reestablished or not and it is suit for making appropriate strategy to customers.

Another generic measurement framework captures the various benefits of CRM [Sin, Tse and Yim, 2003]. This tool focuses on customer requirement and CRM organization in management structure.

Other researches deal with customer satisfaction measuring. Reinartz, Krafft and Hoyer [2004] develop CRM measurement criteria based on customer lifecycle, initiation, maintenance, and termination. During the customer lifecycle, an effective and efficient CRM performance promotes customers into next phase. Hayes [1998] also introduced and offered some measurement tools to assess customer satisfaction in different field of e-business environment.

In Xu and Walton's [2005] research, the CRM systems that have been implemented by many companies are dominated by operational applications – contact centers, sales and marketing solutions with limited customer knowledge gained from the current CRM application. CRM systems should enhance not only an organization's ability to interact, attract and build one-to-one relationships with customers but also the ability to gain customer knowledge. Such a system should enable functionality for both internal (existing) and external (prospects) customer knowledge provision [Xu and Walton, 2005].

Other measurement tools concern IT performance. Khalifa and Shen [2005] develop measurement model to figure out if eCRM fits customer lifecycle or not. While they use the customer lifecycle framework to conceptualize satisfaction, they rely on the transaction cycle to classify eCRM features. As a result, they investigate the relationship between eCRM and an important surrogate of eCRM success: online customer satisfaction. More specifically, they also develop, practice and empirically test a temporal model explaining the relationship between three categories of eCRM (i.e., pre-purchase, at-purchase and post-purchase eCRM) and online customer satisfaction at two phases of the customer lifecycle, i.e., attraction and retention [Khalifa and Shen, 2005].

Chen and Ching [2004] examine the relationship of information technology

intensity and organizational absorptive capacity to CRM practices and performance. There is a general assessment view to CRM IT performance. IT intensity refers to the IT infrastructure and applications that allow the organization to benefit from its IT investments and apply them toward its best interests [Chen and Ching, 2004]. Therefore, we can describe this tool focuses on IT integration.

There are only a few mentioned measurement tools about service channels performance: Reichold, Kolbe and Brenner's [2004] paper. They introduced multi-channels management to keep contacting with customers. However, they didn't describe any details of measurement criteria in this performance. Moreover, Reichold, Kolbe and Brenner [2004] measure customer knowledge management with other CRM performance, service channels and technology.

Additional, Horn, Feinberg and Salvendy's [2005] research and Kellen's [2002] paper basically introduce two frameworks to assess CRM performance. However, they only mention some criteria to point key measurement parts of CRM system followed by customer-centric business processes as mentioned in our chapter 3. There is no detail and any certain questionnaires with their criteria.

4.2.2 Criteria of Current Measurement Tools

Depending on the background of CRM performance measurement and its analysis, we identify all previous measurement tools in four aspects of CRM performance, service channels, strategy, IT and customer satisfaction. According to the criteria we have defined in chapter 3, these tools can be labeled as specific criteria. Therefore, we understand that how many criteria have been measured in past studies and others will be evaluated in our tool. The following **Table 4** is a synthesis to summarize all CRM performance measurement based on our criteria.

Measurement Performance Aspects	Criteria	Measurement Tools
Service Channels Performance	Communication Connection	Reinartz, Krafft and Hoyer [2004] Kellen [2002] Chen and Ching [2004]

Service Channels Performance	Variety of Service Channels	Kellen [2002]
	Convenient Service Channels	Reichold, Kolbe and Brenner [2004]
Strategy Performance	Organization Structure Reestablishment	Najmi, Rigas and Fan [2005] Reichold, Kolbe and Brenner [2004] Kellen [2002] Hayes [1998] Horn, Feinberg and Salvendy [2005]
	Cooperation among Organizational Managements	Najmi, Rigas and Fan [2005] Reichold, Kolbe and Brenner [2004] Khalifa and Shen [2005] Reinartz, Krafft and Hoyer [2004] Horn, Feinberg and Salvendy [2005]
	CKM Focus	Reichold, Kolbe and Brenner [2004] Reinartz, Krafft and Hoyer [2004] Kellen [2002] Hayes [1998] Sin, Tse and Yim [2003]
	Expertise of CKM	Sin, Tse and Yim [2003]
IT Performance	Information Collection	Xu and Walton [2005]
	IT Integration	Khalifa and Shen [2005] Kellen [2002] Xu and Walton [2005]
	IT Convenience	Xu and Walton [2005] Chen and Ching [2004]
	IT Security Protection	Xu and Walton [2005] Chen and Ching [2004]

IT Performance	CRM/IT Development Stage	Khalifa and Shen [2005]
Customer Satisfaction	Service Channels Satisfaction	Reinartz, Krafft and Hoyer [2004]
	Strategy Satisfaction	Horn, Feinberg and Salvendy [2005]
	IT Satisfaction	Chen and Ching [2004]

Table 4 Summary of CRM Measurement Tools

As a result, a number of criteria have been used in previous measurement tools, as effectiveness, efficiency, customer satisfaction, organization structure reestablishment, CKM existence and communication connection. These criteria are not major parts or do not need to appear in our own measurement tool. However, other criteria are not evaluated in current practical marketing, such as coordination of among service channels, CRM software usage, security and privacy and data quality. Therefore, they are the key criteria to develop our CRM performance measurement tool.

In next section, we will discuss an appropriate CRM performance measurement tool, which include specific criteria based on CRM framework.

4.3 Identifying Variables of Criteria

Each criterion is defined and analyzed. Based on these definitions, we are able to identify variables regarding different aspects of criteria. For each performance criteria, we systematically define variables that are used for designing questions in survey.

In service channels performance, channels touch points' efficiency and security are central criteria. They serve real-time communication between customers and sales representatives to handle their relationship by CRM strategies. There are five criteria in this performance measurement, multiple channels, and IT platform as **Table 5** shown.

Criteria	Definition	Variables
Communication Connection	“Communication connection” is to collect and deliver business information, used to evaluate touch points exist or not in CRM performances.	Communication connection
Variety of Service Channels	“Variety of service channels” criterion is defined as companies having more service channels including kinds of touch points to connect with more customers.	Various service channels
Convenient Service Channels	“Convenience service channels” criterion is defined as one reflects CRM service channels performance working efficiently for clients and staff.	Convenience
		Service for all related staff
Coordination among Channels	“Coordination among channels” is keep clients get same information by any service channels in a period.	Coordination
		Same information
Protection of Customers’ Privacy	“Protection of customers’ Privacy” requires service representatives keep customers’ privacy personally and get IT support to defend attacking from Internet.	Protect customers’ privacy

Table 5 Variables for Measuring Service Channels Performance

In strategy performance, the measurement methodology has to track how a strategy is made in CRM processes. As a result, this strategy which is suitable for

certain case or not interrelates CRM effect in market. Similarly, it is also necessary to assess knowledge management in this performance because strategy-making is based on knowledge-cycle among organizational departments. We list strategy performance measurement criteria as **Table 6** below.

Criteria	Definition	Variables
Organization Structure Reestablishment	“Organization structure reestablishment” criteria is to view company’s organization structure be changed to adapt CRM processes.	Organization structure reestablishment
		CRM processes
Cooperation among Organizational Managements	“Cooperation among organizational departments” is defined as one criterion to measure CRM processes departments working efficiently.	Cooperation
		CRM processes departments working
CKM Focus	“CKM focus” is a criteria to measure whether CRM strategy-making within CKM supporting.	CKM supporting
		Strategy-making
Expertise of CKM	“Expertise of CKM” is a criterion to measure what kind of information and strategies need be included in CKM.	CKM information and strategies
		Customers behaviors

Table 6 Variables for Measuring Strategy Performance

In IT performance, criteria are defined as **Table 7** shown.

Criteria	Definition	Variables
Information Collection	“Information collection” is defined as one criterion to check out all CRM systems data coming from internal and external sources.	Collection
		Sources
Information Storage	“Information storage” is used to view business data being stored in logical database which an accumulation of computer-based data that is arranged in a format to facilitate retrieval.	Storage
		Logical database
Information Quality	“Information quality” is to prove if CRM systems provide accurate and real-time information.	Accurate data
		Real-time information
IT Integration	“IT integration” is a criterion to assess CRM integration in service channels performance and strategy performance by IT supporting.	Integration
		IT supporting

IT Convenience	“IT convenience” is to check out IT usage easy or not for staff.	Convenience
Software Usage	“Software usage” is defined as which kind of CRM software used in IT performance.	Software usage
		Software vendor
IT Security Protection	“IT security protection” is defined as a criterion to ensure CRM systems have a certain system to keep systems safety in public Internet.	Security systems
		Protection

Table 7 Variables for Measuring IT Performance

Our search lists four measurement variables to consider customer satisfaction in CRM as **Table 8**.

Criteria	Description	Variables
Service Channels Satisfaction	Clients care about contact ways are convenient and good service from company. They hope they can keep touch with company informant center at anywhere and anytime by email, cell phone and so on if clients have any problems.	Good service from company

Strategy Satisfaction	Clients' attitude and trust will be improved by positive strategies when they are in trade processes. Moreover, company staff can enhance their relationship by some compensation strategy and award strategy when customers are complaining.	Good strategy from company.
IT Satisfaction	Clients have their own opinions on some IT application, such as website and payment ways. They feel safely during business processes.	IT application
		Security
Brand Loyalty	The brand loyalty takes the view that customers will repeat purchase. That is an important criterion to measure customer satisfaction for brand. And it is also factor to review the relationship between company and its clients.	Compare with other companies' brand loyalty

Table 8 Variables for Measuring Customer Satisfaction Performance

In a conclusion, compared with previous studies on CRM measurement, a diagnostic measurement tool is built on four aspects, service channels, strategy, IT and customer satisfaction. Based on the variables we defined above, we are able to develop questionnaires to evaluate each CRM performance aspect.

Chapter 5: Research Methodology

This chapter describes our research methodology to develop a reliable and valid measure of CRM performance. The research tool for this study is a questionnaire-based survey carried out in related CRM systems companies. The questionnaires are designed to investigate how Canadian business companies perceive the benefits of using CRM systems with their customers. Three questionnaires are presented to evaluate CRM performance, CRM manager questionnaire (CRMMQ), CRM IT questionnaire (CRMIT), and CRM customer satisfaction questionnaire (CRMCSQ).

5.1 Three Questionnaires Building

Our measurement objectives are all based on components of CRM framework. We focus on these key components, customers, CRM systems, customer touch-points, strategy management and information technology supporting.

Depending on four performance aspects, CRM service channels, strategy, IT and customer satisfaction, we develop measurement questionnaires to evaluate CRM performance. Two questionnaires of CRM performance are developed for companies. CRM manager questionnaire (CRMMQ) is focused on CRM service channels and strategy performance (**Appendix 2**). All questions in this questionnaire are related with CRM system performance for CRM managers or marketing managers. Another questionnaire is focused on IT division of companies that support CRM systems. The CRM IT questionnaire (CRMITQ) contains a series of statements that relate to the IT in companies or divisions (**Appendix 3**).

CRM customer satisfaction questionnaire (CRMCSQ) focuses on customers of companies that we send survey to. We will understand the customer satisfaction of relationship and any gaps between customers and company (**Appendix 4**).

To understand individual's information and companies' current situation of CRM

systems performance, some questions are designed based on control variables (**Appendix 1**). We send them to companies with CRMMQ and CRMITQ. Depending on collection of this part of survey results, we have a general view of specific firm CRM environment.

5.2 Designing Questions

A six-point Likert-type scale anchored by “strongly agree” (=1) and “don’t apply” (=5) was used in measuring the constructs. A number of questions regarding the CRM service channels performance in the company, the CRM strategy made and the technology used to support CRM application were also parts of the questionnaire. A section with questions concerning customer satisfaction towards CRM was included. These items were also measured by Likert-type scales (=5 don’t apply, =1 strongly agree). In addition, the questionnaire included questions regarding the particular CRM system used and whether additional specialized CRM systems were used.

As we discussed in chapter 4, three questionnaires constitute our survey. First of two are sent to companies and divisions of government. They focus on CRM service channels performance and CRM IT performance. Based on measurement criteria, results of questions from companies make us understand that CRM performance in companies’ business environment (**Table 9, 10**).

Performance Aspects	Variables	CRMMQ Questions*
CRM Service Channels Performance	Communication Connection	10, 17, 19, 23
	Variety of Service Channels	5, 8
	Convenience	14
	Service for all related staff	18
	Coordination	7, 24
	Same information	16
	Protection of Customers' Privacy	4
CRM Strategy Performance	Organization Structure Reestablishment	3, 9
	CRM processes	6, 21
	Cooperation	2, 13
	CRM processes departments working	12, 22
	CKM supporting	20
	Strategy-making	11
	CKM information and strategies	1
	Customers behaviors	15

Table 9 CRM Service Channels/Strategy Performance Measurement

* CRMMQ Questions are presented in **Appendix 2**.

Performance Aspect	Variables	CRMITQ Questions*
CRM IT Performance	Collection	1, 7
	Sources	11
	Storage	13
	Logical database	15
	Accurate data	9
	Real-time information	4
	Integration	2, 12
	IT supporting	14
	Convenience	5, 6, 8
	Software Usage	17
	Software vendor	10
	Security systems	3, 18
	Protection	16

Table 10 CRM IT Performance Measurement

Another part of survey was sent to customers of companies that we took survey. According to customers' attitudes, we have a clear view of CRM performance for customers (**Table 11**).

Performance Aspect	Variables	CRMCSQ Questions**
CRM Customer Satisfaction Performance	Service Channels Satisfaction	1, 9
	Strategy Satisfaction	3, 12, 13
	IT Satisfaction	2, 7, 11, 14
	Brand Loyalty	4, 5, 6, 8, 10

Table 11 Customer Satisfaction Measurement

To get control variables, all participants were asked to provide demographic data, such as gender, age, education level and experience with the company, level in the

*CRMITQ Questions are presented in **Appendix 3**.

CRMCSQ Questions are presented in **Appendix 4.

organization, years CRM systems experience. In addition, data were collected regarding which individuals are on the steering committee (if there is one), number of CRM personnel, technical details and his/her perceptions of user attitudes/satisfaction with CRM processes.

5.3 Experts Review

All questionnaires were reviewed and examined by experts before they were sent to respondents. Three experts in University of Ottawa reviewed whole survey parts, including cover letter and all of questionnaires. Major examination criteria to evaluate the questions were related to clarity of question, understanding unique meaning and good English writing. Depending on their suggestions, we rewrote some questions and adjusted others before we sent them to companies and customers. We used survey online tool, SurveySolutions 7.0 [Perseus Survey Solutions, Vovici Corporation], to develop our questionnaires and post them on University of Ottawa's website.

5.4 Survey Design

Two steps were sent to companies and their customers separately. One step was addressed to CRM managers or marketing and IT managers in companies because it included a large number of CRM performance variables and it was thought that these managers should also be familiar with the information system of their organizations. This step of survey included CRM manager questionnaire and CRM IT questionnaire.

Another step focused on customer satisfaction because their views were evident measurement criteria for CRM systems. We sent CRM customer satisfaction questionnaire to companies' customers after the companies finished CRM manager questionnaire and CRM IT questionnaire.

5.4.1 Selection of Companies and Clients

In this research the companies operating CRM systems were selected, as

companies in the business or departments of government communicating with their customers. Hence, CRM systems played a major role in developing relationships between the company and the customer.

A web-based survey was e-mailed to a database of people who were parts of the mailing list of the Career Center at University of Ottawa. The centre focuses on company contact and relationship issues, and the database consists of all companies related with CRM systems contact professionals.

5.4.2 Procedure

For CRMMQ and CRMITQ, 267 Emails were sent to the mailing list from the Career Center. The email referred potential respondents to a website for the survey. At same time, follow-up telephone calls made increased the total responses. We also took 11 interviews with some companies' marketing managers and got direct results face to face in Ottawa. Of the 108 completed surveys, 16 surveys were disregarded because of missing responses, more than 5%. Thus, the study used data from the remaining 92 subjects (34.5% of the original sample).

For CRMCSQ, based on the result we got from 92 companies, we sent email to their customers directly or indirectly. We also took lots of interviews with customers who were company's clients like, Canada Post Co. and LCBO. 125 results were received and used to analyze.

In this chapter, we developed three questionnaires to evaluate four aspects of CRM performance, service channels, strategy, IT and customer satisfaction. Based on validation of questions by experts, we ensured that each question has clarity of meaning. Finally, we sent these three questionnaires, CRM manager, CRM IT and CRM customer satisfaction, to selected companies and their clients.

Chapter 6: Reliability and Validity Assessment

In this chapter, according to data we collected from email survey, dedicated analysis are operated to select a reliable and valid diagnostic CRM performance measurement tool. We firstly discuss the survey sampling of CRM performance measurement related to the three questionnaires, CRM manager questionnaire (CRMMQ), CRM information technology questionnaire (CRMITQ) and customer satisfaction questionnaire (CRMCSQ). The questionnaires are designed to investigate how CRM managers, IT manager and clients of companies perceive the performance of CRM systems.

Two strategies for analysis are performed to establish the reliability of items and validity of the CRM performance measurement. One is an analysis based on predetermined dimension and the other is an analysis conducted directly on preceived dimension. Item analysis and factor analysis are considered to evaluate questions for CRM performance measurement criteria. We test the independence of the CRM performance questionnaires regarding control variables.

6.1 Survey Sample

A web-based survey was e-mailed to companies who are on the mailing list of the Career Center at University of Ottawa. The centre focuses on company connections and relationship issues, and the database consists of 293 companies' professionals from multiple industries. Recent studies indicate that electronic surveys compared to paper-based studies demonstrate reliable and comparable results [Laughlin, 2001] and quicker response rate [Yun and Trumbo, 2000].

Our survey was sent to the companies which were related on banking, finance, insurance, marketing, public relations and retail industries. These companies were chosen because the highly competitive nature of their markets and their need to capitalize on customer-centric opportunities make them prim adopters of CRM [Peppard, 2000]. They are more motivated to differentiate and customize their products and services to better fit

their customers' needs and expectations since many are engaged in Internet marketing [Peterson al., 1997]. Because they represent a large segment of CRM user, their representatives tend to be more familiar with CRM performance and organizational objectives.

Three months after the initial email, 67 responses were received. Follow-up telephone calls and face-to face interview made two months later increased to the total 108 CRM manager questionnaire and 106 CRM IT questionnaire responses, for a response rate of 36 percent and 35 percent. Among the returned surveys, 16 and 14 were incomplete and therefore discarded; the final sample covers a broad cross-section. As a result in **Figure 9**, it is clear to show that how many responders we received in each type of firms. Moreover, 125 subjects responded in CRM customer satisfaction questionnaire. These customers were selected random to complete CRMCSQ.

6.1.1 CRM Managers Questionnaire

In CRMMQ, total 108 questionnaires were received, but 16 were uncompleted in CRMM questionnaire. Our analyses are based on the 92 responses. 108 subjects responded.

Males accounted for 70% of the subjects, and 94.5% were between 20 and 50 years of age. All of the subjects have some CRM performance experience.

Firm Industry	Number of Responders	Percentage
Banking	23	21.3
Finance	42	38.8
Insurance	13	12.0
Marketing	14	12.9
Public Relations	3	2.7
Retail	13	12.0

Table 12 Percentage of Respondents by Industry (CRMMQ)

In **Table 12**, we observe that Banking and Finance are in the Capital National region of most concerned by CRM. 23 responders and 42 responders are from these two industries that are more than 60% in all industries. Therefore, CRM systems are widely used in

Banking and Finance companies.

Size of the Firm (total full-time employees)	Number of Responders	Percentage
<20	8	8.7
21-50	15	16.3
50-100	35	38.0
101-200	28	30.4
>200	6	6.5

Table 13 Percentage of Respondents by Size of Firm (CRMMQ)

In **Table 13**, 63 responders out of 92 responders are firms in size from 50 to 200 employees. These two groups of firms have a proportion of more than 68%. Therefore, we conclude that CRM systems are widely operated in firms that have 50 to 200 employees.

Gender Proportion--CRMM Questionnaire

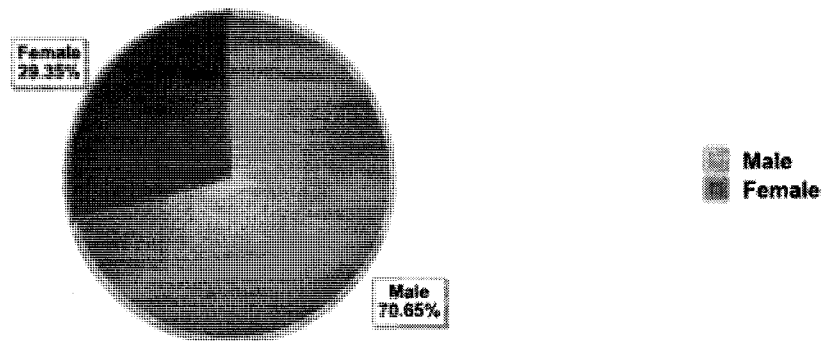


Figure 7 Gender Proportion (CRMMQ)

In 108 respondents of CRMMQ result, 70.65% of respondents are male people and 29.35% from female people. Much more male people are working in CRM systems rather than females.

6.1.2 CRMIT Questionnaire

106 subjects responded in CRMIT questionnaire. Males accounted for 79.3% of the subjects, and 92.4% were between 20 and 50 years of age. All of the subjects have CRM

development experience.

Firm Industry	Number of Respondents	Percentage
Banking	20	18.8
Finance	46	43.4
Insurance	10	9.4
Marketing	15	14.1
Public Relations	3	2.8
Retail	12	11.3

Table 14 Percentage of Respondents by Industry (CRMITQ)

In **Table 14**, we observe that Banking and Finance are in the Capital National region of most concerned by CRM IT performance. 20 responders and 46 responders are from these two industries that are more than 60% in all industries.

Size of the IT Department (total full-time employees)	Number of Respondents	Percentage
<20	3	3.3
21-50	27	29.3
50-100	36	39.1
101-200	22	23.9
>200	4	4.3

Table 15 Percentage of Respondents by Size of Firm (CRMITQ)

In **Table 15**, we observe that 85 responders out of 92 responders that are firms in size from 21 to 200 employees. These two groups of firms have a proportion of more than 90%. Therefore, we conclude that CRM systems are widely operated in medium firms.

Gender Proportion--CRMIT Questionnaire

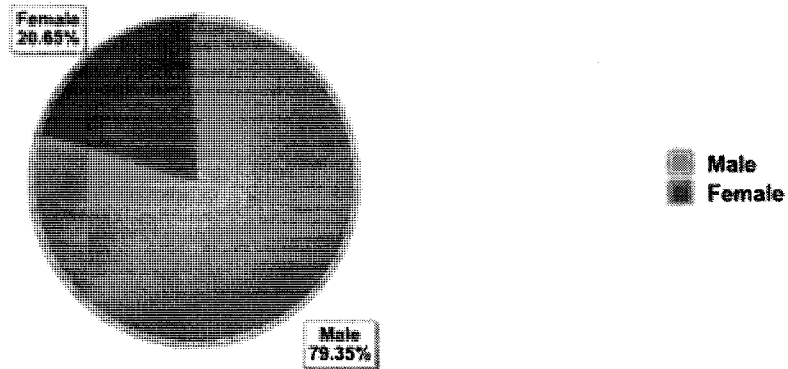


Figure 8 Gender Proportion (CRMIT Questionnaire)

More male people work on CRM IT performance field compared with female responders. From **Figure 8** result, they indicate the gender proportion of responders of CRMM and CRMIT questionnaires. Percentage of male responders increases from 70.65% to 79.35% because more male people work in IT area rather than in business.

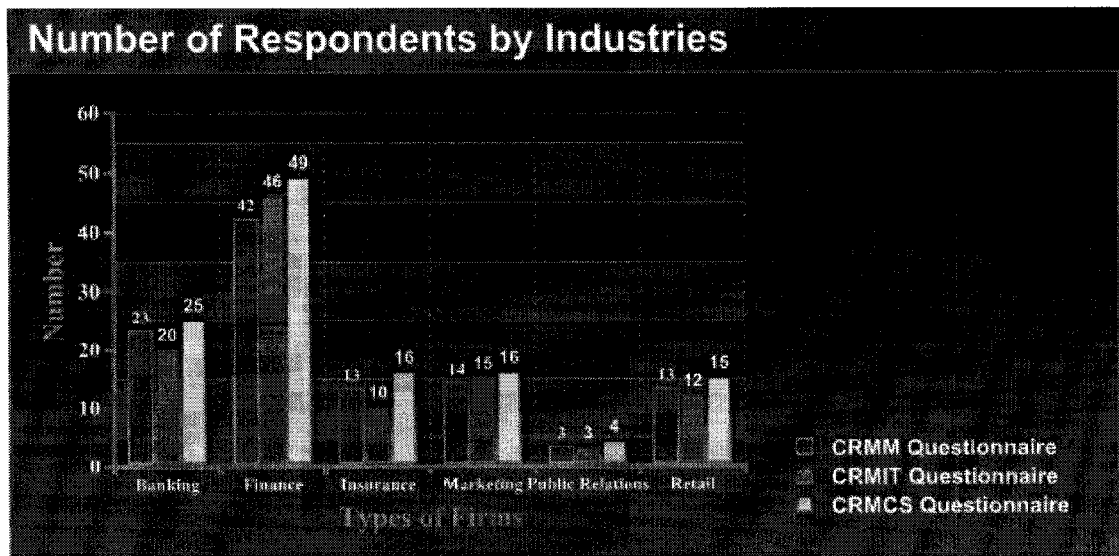


Figure 9 Characteristic of Firms/Respondents

As **Figure 9** shown, we received 108 respondents of CRMMQ, 106 respondents of CRMITQ and 125 respondents of CRMCSQ. Compared with respondents of CRMMQ, the respondents of CRMITQ were little more in two industries, Finance and Marketing. However, it was not a big different between the numbers of respondents of two

questionnaires. Our sample of survey had a high quality to analyze.

6.2 Item Analysis: Predetermined Dimensions Approach

To conduct this analysis, we first look at item analysis to select the set of items having reliability and validity score. We second examine the predetermined dimensions view from the set of selected items.

In this predetermined dimensions approach, data analysis started from item analysis. The survey had acceptable overall internal consistency, as well as acceptable internal consistency of the CRMM questionnaire, CRMIT questionnaire and CRMCS questionnaire. Then based on the result of items analysis, a factor analysis was concerned on each questionnaire. Finally, we gained a conclusion of a new item list that had high reliability and validity.

6.2.1 Reliability and Validity Criteria

The objectives of the item analysis are to select the set of items that present high scores for reliability and validity. Selection of items is based on criteria [Ferrand and Martel, 1985].

ρ_{ih} is the correlation of item i to the scale.

$\rho_{ih'}$ is the correlation of item i to the scale without the item i. So $(\rho_{ih} - \rho_{ih'})$ is an indicator of the contribution of the item i to the scale.

ρ_{id} is the correlation of item i to its factor d.

$\rho_{id'}$ is the correlation of item i to the factor d of excluding the item i. So $(\rho_{id} - \rho_{id'})$ is a measure of the contribution of the item i to the scale.

$\rho_{id''}$ is the correlation of item i to all factors of the scales, excluding the factor of item i. So $(1 - \rho_{id''})$ means current independence of item to other factors.

$(\rho_{id} - \rho_{ih})$ is an indicator of the appertaining of the item i to the factor d.

Generally, each questionnaire has one item as concept validity which has high intensity of the relation with the basic construct. ρ_{ic} is the correlation of item i to concept to be measured.

Cronbach's coefficient alpha (α) was used to assess the degree of internal consistency within a particular construct. If the α_i for item i without item i decreases from α , item i contributes positively to the scale. Otherwise, item i is rejected.

Based on item analysis criteria, we selected items that contribute positively to each questionnaire. The objective of conducting factor analysis was to determine the underlying dimensions to a manageable extent and then to employ the factor scores in cluster analysis. Through the analysis of SPSS software, principal component factor analysis was used to uncover the underlying questionnaire of the items used to measure the factors. Any variable having a low correlation with other another variable and low loading on the factor was removed. In order to extract the number of factors, scree tests were performed based on the criteria of eigenvalues greater than 1 [Wong, Chan and Leung, 2005].

A list of items was collected as predetermined validation analysis. Specific factors presented different measurement factors for questionnaire. We had a conclusion for each questionnaire keeping usable questions and removing weak questions which were confirmed by analysis.

6.2.2 Item Analysis of CRMM Questionnaire

Items are selected based on criteria that we are previously introduced. And alpha values of 0.70 or higher are considered to be acceptable, with 0.60 being acceptable for new scales [Chen and Ching, 2004]. In **Table 16**, all scales exceed those thresholds, satisfying the exploratory research norm set. As a result, we validate all items from measurement criteria. Basically, if the item's value of α increases from α (without item i), item i contribute positively to the scales.

Item i	ρ_{ih}	$\rho_{ih} - \rho_{ih'}$	ρ_{id}	$\rho_{id} - \rho_{id'}$	$1 - \rho_{id''}$	$\rho_{id} - \rho_{ih}$	ρ_{ic}	α	α without i
Item 1	0.56	0.02	0.47	0.03	0.92	-0.09	-0.144	0.554	0.604
Item 2	0.56	0.03	0.5	0.13	0.75	-0.06	0.124	0.667	0.592
Item 3	0.59	0.06	0.6	0.3	0.93	0.01	0.014	0.782	0.6074
Item 4	0.57	0.04	0.62	0	0.74	0.05	0.143	0.803	0.5867
Item 5	0.65	0.02	0.57	0.21	0.57	-0.02	0.275	0.609	0.5912
Item 6	0.59	0.06	0.72	0.4	0.8	0.13	0.021	0.847	0.5965
Item 7	0.63	0.10	0.67	0.17	0.73	0.04	0.071	0.704	0.5845
Item 8	0.60	0.07	0.69	0.27	0.81	0.09	-0.093	0.818	0.594
Item 9	0.69	0.16	0.72	0.45	0.77	0.03	0.218	0.842	0.5919
Item 10	0.67	0.14	0.69	0.25	0.69	0.02	0.1	0.535	0.58
Item 11	0.68	0.15	0.88	0.29	0.68	0.20	0.159	0.41	0.5837
Item 12	0.68	0.05	0.71	0.38	0.89	0.03	0.299	0.851	0.5905
Item 13	0.67	0.14	0.71	0.4	0.72	0.04	0.251	0.705	0.586
Item 14	0.63	0.10	0.67	0.07	0.71	0.04	1	0.533	0.5815
Item 15	0.69	0.17	0.68	0.49	0.8	-0.01	0.253	0.74	0.5931
Item 16	0.75	0.22	0.65	0.25	1.2	-0.10	0.128	0.812	0.6383
Item 17	0.58	0.06	0.53	0.04	0.78	-0.05	0.062	0.407	0.5916
Item 18	0.66	0.04	0.65	0.15	1.01	-0.01	0.06	0.695	0.6341
Item 19	0.68	0.16	0.7	0.35	0.87	0.02	0.216	0.786	0.5717
Item 20	0.88	0.36	0.88	0.1	0.81	0.00	0.09	0.624	0.599
Item 21	0.71	0.19	0.77	0.49	0.85	0.06	0.05	0.735	0.6014
Item 22	0.77	0.25	0.87	0.56	0.59	0.10	0.164	0.746	0.5706
Item 23	0.80	0.27	0.88	0.48	0.75	0.08	-0.056	0.799	0.5877
Item 24	0.53	0.01	0.74	0.38	0.72	0.21	0.05	0.772	0.5809

Table 16 Item Analysis of CRMM Questionnaire

Based on the results of this analysis, we can select the items having a satisfying level of reliability and validity of CRMMQ.

Item i	ρ_{ih} >0.6	$\rho_{ih} - \rho_{ih'}$ >0.1	ρ_{id} >0.6	$\rho_{id} - \rho_{id'}$ >0.1	$1 - \rho_{id''}$ >0.7	$\rho_{id} - \rho_{ih}$ >0	ρ_{ic} >0	$\alpha \rightarrow \alpha$ without i	Selected Item
Item 1	No	No	No	No	Yes	No	No	Increase	No
Item 2	No	No	No	Yes	Yes	No	Yes	Increase	No
Item 3	No	No	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 4	No	No	Yes	No	Yes	Yes	Yes	Decrease	Yes
Item 5	Yes	No	No	Yes	No	No	Yes	Decrease	No
Item 6	No	No	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 8	Yes	No	Yes	Yes	Yes	Yes	No	Decrease	Yes
Item 9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 10	Yes	Yes	Yes	Yes	No	Yes	Yes	Increase	No
Item 11	Yes	Yes	Yes	Yes	No	Yes	Yes	Increase	No
Item 12	Yes	No	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 14	Yes	Yes	Yes	No	Yes	Yes	Yes	Increase	No
Item 15	Yes	Yes	Yes	Yes	Yes	No	Yes	Decrease	Yes
Item 16	Yes	Yes	Yes	Yes	Yes	No	Yes	Decrease	Yes
Item 17	No	No	Yes	No	Yes	No	Yes	Increase	No
Item 18	Yes	No	Yes	Yes	Yes	No	Yes	Decrease	Yes
Item 19	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 20	Yes	Yes	Yes	No	Yes	Yes	Yes	Decrease	Yes
Item 21	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 22	Yes	Yes	Yes	Yes	No	Yes	Yes	Decrease	Yes
Item 23	Yes	Yes	Yes	Yes	Yes	Yes	No	Decrease	Yes
Item 24	No	No	Yes	Yes	Yes	Yes	Yes	Decrease	Yes

Table 17 Item Analysis Decision Table (CRMMQ)

Therefore, resulting from the analysis, the following list of item is selected: Item 3, Item 4, Item 6, Item 7, Item 8, Item 9, Item 12, Item 13, Item 15, Item 16, Item 18, Item 19,

Item20, Item 21, Item 22, Item 23, and Item 24. The global α of the set of selected items is 0.7294.

6.2.3 Factor Analysis of CRMM Questionnaire

To identify the factors that structure the set of selected items, factor analysis was performed to selected items into factors. In order to extract the number of factors, scree plot were performed based on the criteria of eigenvalues greater than 1. Therefore, six factors are selected to describe the structure of CRMM questionnaire.

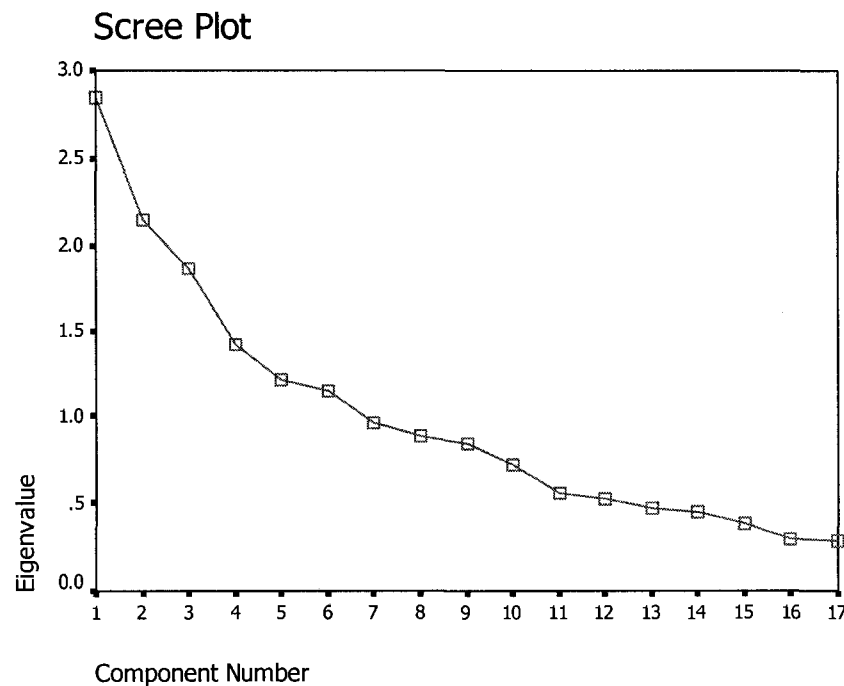


Figure 10 Scree Plot of CRMMQ

Items with loadings (correlation between each item and each factor) lower than 0.60 were considered not significant and eliminated. **Table 18** lists the items that have a loading of 0.60 or higher. The eigenvalues and percent variance listed at the top of the table were calculated after removing the insignificant factor loadings. The total percent variance explained by the six factors was 62.592%.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Cronbach Alpha	0.773	0.790	0.823	0.758	0.758	0.758
Eigenvalue	2.852	2.146	1.869	1.422	1.209	1.143
Percent of Total Variance	16.778	12.623	10.996	8.362	7.110	6.722
Cumulative Percent of Total Variance	16.778	29.401	40.398	48.760	55.870	62.592
Item 21	0.806					
Item 22	0.690					
Item 23	0.775					
Item 24	0.603					
Item 7		0.826				
Item 8		0.671				
Item 13		0.639				
Item 15		0.672				
Item 4			0.748			
Item 18			0.639			
Item 20			0.660			
Item 6				0.615		
Item 16				0.686		
Item 9					0.749	
Item 12					0.615	
Item 3						0.784
Item 19						0.681

Table 18 Factor Analysis of CRMM Questionnaire

The factors were rotated by the Varimax method. Six factors were extracted with an eigenvalue that was greater than 1 accounting for 62.592 percent of the variance for the unrotated and rotated solutions. Upon examination of the loading on the factors, names were assigned to each factor according to the content of the variables having the greatest contribution to each of the aspects. The six factors identified were establishing a relationship with customers, deepening the relationship with the customers, managing customer data, impact of CRM on the customer attitude, impact of CRM on the organization and CRM policies.

Factor 1 is explained by item 21, item 22, item 23 and item 24 considering all the items are interpreting the factor 1 as meaning establishing a relationship with customers.

Factor 1: Establishing a Relationship with Customers

Item 21: CRM systems record whole communication processes between company and customers.

Item 22: To accomplish business tasks, the company uses cross-functional teams involved in CRM.

Item 23: The company implements marketing activities to strengthen customer relationship.

Item 24: CRM multiple service channels are coordinated.

Factor 2 is explained by item 7, item 8, item 13 and item 15 considering all the items are interpreting the factor 2 as meaning deepening the relationship with the customers.

Factor 2: Deepening the Relationship with the Customers.

Item 7: There is sufficient training provided on CRM in our company.

Item 8: Company can apply customer information for all situations not only when serving customer.

Item 13: There is an atmosphere of open discussion.

Item 15: Service representatives can find some client's usual business habits in CRM systems.

Factor 3 is explained by item 4, item 18 and item 20 considering all the items are interpreting the factor 3 as meaning managing customer data management.

Factor 3: Managing Customer Data Management

Item 4: Rules of protecting customers' information security and privacy are systematically applied.

Item 18: The company enters the change in customer information.

Item 20: System of customer knowledge management (CKM) supports business processes.

Factor 4 is explained by item 6 and item 16 considering all the items are interpreting the factor 4 as meaning impact of CRM on the customers.

Factor 4: Impact of CRM on the Customers

Item 6: Customer satisfaction has increased since the use of CRM.

Item 16: Some situations happen where the decision rendered by CRM systems is not made in the timeframe deemed acceptable by the clients.

Factor 5 is explained by item 9 and item 12 considering all the items are interpreting the factor 5 as meaning impact of CRM on the organization.

Factor 5: Impact of CRM on the Organization

Item 9: You have felt that profitability of the company has improved since the use of CRM.

Item 12: Information about customers is easily communicated throughout the organization.

Factor 6 is explained by item 3 and item 19 considering all the items are interpreting the factor 6 as meaning CRM policies.

Factor 6: CRM Policies

Item 3: The manufacture processes are customer-centric in the company.

Item 19: Customers complaint that they have to wait a long time to have their service.

6.2.4 Item Analysis of CRMIT Questionnaire

As the same as item analysis of CRMM questionnaire, in CRMIT questionnaire, as shown in **Table 19**, all scales exceed the thresholds, satisfying the exploratory research

norm set.

Item i	ρ_{ih}	$\rho_{ih} - \rho_{ih'}$	ρ_{id}	$\rho_{id} - \rho_{id'}$	$1 - \rho_{id''}$	$\rho_{id} - \rho_{ih}$	ρ_{ic}	α	α without i
Item 1	0.51	0.30	0.53	0.02	0.84	0.02	0.2	0.585	0.405
Item 2	0.45	0.14	0.46	0.17	0.67	0.01	0.27	0.546	0.394
Item 3	0.47	0.24	0.52	0.28	0.96	0.05	0.05	0.523	0.446
Item 4	0.49	0.26	0.56	0.13	1.1	0.07	0.21	0.647	0.544
Item 5	0.48	0.26	0.62	0.16	0.83	0.14	0.3	0.61	0.412
Item 6	0.56	0.24	0.62	-0.04	0.81	0.06	0.27	0.665	0.614
Item 7	0.52	0.31	0.67	0.19	0.82	0.15	0.31	0.645	0.406
Item 8	0.58	0.38	0.52	0.17	0.67	-0.06	0.13	0.367	0.646
Item 9	0.67	0.49	0.79	0.55	0.58	0.12	1	0.776	0.334
Item 10	0.72	0.53	0.7	0.36	0.55	-0.02	0.52	0.73	0.347
Item 11	0.51	0.33	0.63	0.2	0.57	0.12	0.29	0.771	0.314
Item 12	0.61	0.41	0.73	0.52	0.66	0.12	0.15	0.815	0.382
Item 13	0.68	0.43	0.54	0.42	1.26	0.16	-0.06	0.477	0.525
Item 14	0.46	0.27	0.56	0.25	1.25	0.10	-0.18	0.557	0.516
Item 15	0.43	0.19	0.82	0.06	1.14	0.09	0.05	0.513	0.483
Item 16	0.74	0.52	0.62	0.21	0.9	-0.12	0.11	0.674	0.437
Item 17	0.69	0.47	0.75	0.39	0.89	0.06	-0.05	0.754	0.432
Item 18	0.66	0.42	0.79	0.4	1.21	0.13	-0.12	0.686	0.491

Table 19 Item Analysis of CRMIT Questionnaire

Based on the results of this analysis, we can select the items having a satisfying level of reliability and validity of CRMITQ.

Item i	ρ_{ih} >0.6	$\rho_{ih} - \rho_{ih'}$ >0.1	ρ_{id} >0.6	$\rho_{id} - \rho_{id'}$ >0.1	$1 - \rho_{id''}$ >0.7	$\rho_{id} - \rho_{ih}$ >0	ρ_{ic} >0	$\alpha \rightarrow \alpha$ without i	Selected Item
Item 1	No	Yes	No	No	Yes	Yes	Yes	Decrease	Yes
Item 2	No	Yes	No	Yes	No	Yes	Yes	Decrease	No
Item 3	No	Yes	No	Yes	Yes	Yes	Yes	Decrease	Yes
Item 4	No	Yes	No	Yes	Yes	Yes	Yes	Decrease	Yes
Item 5	No	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 6	No	Yes	Yes	No	Yes	Yes	Yes	Decrease	Yes
Item 7	No	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 8	No	Yes	No	Yes	No	No	Yes	Increase	No
Item 9	Yes	Yes	Yes	Yes	No	Yes	Yes	Decrease	Yes
Item 10	Yes	Yes	Yes	Yes	No	No	Yes	Decrease	Yes
Item 11	No	Yes	Yes	Yes	No	Yes	Yes	Decrease	Yes
Item 12	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	Yes
Item 13	Yes	Yes	No	Yes	Yes	Yes	No	Increase	No
Item 14	No	Yes	No	Yes	Yes	Yes	No	Decrease	No
Item 15	No	Yes	Yes	No	Yes	Yes	Yes	Decrease	Yes
Item 16	Yes	Yes	Yes	Yes	Yes	No	Yes	Decrease	Yes
Item 17	Yes	Yes	Yes	Yes	Yes	Yes	No	Decrease	Yes
Item 18	Yes	Yes	Yes	Yes	Yes	Yes	No	Decrease	Yes

Table 20 Item Analysis Decision Table (CRMITQ)

Therefore, we got the item list result: Item 1, Item 3, Item 4, Item 5, Item 6, Item 7, Item 9, Item 10, Item 11, Item 12, Item 15, Item 16, Item 17 and Item 18. These items had strict value for analysis criteria and were used to well describe question construction. The global α of the set of selected items is 0.7612

6.2.5 Factor Analysis of CRMIT Questionnaire

From scree plot, we selected four factors to present the structure of CRMIT

questionnaire.

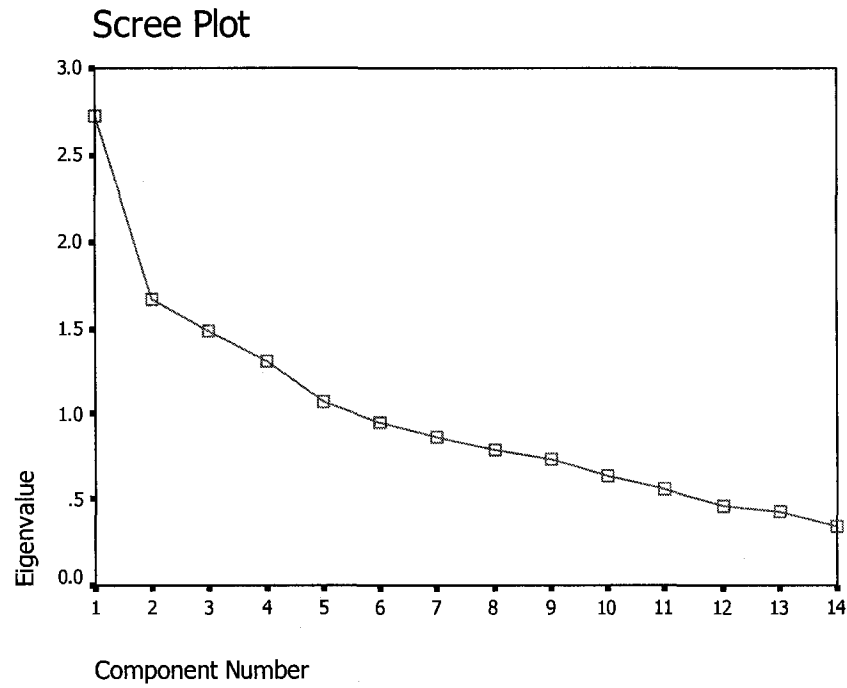


Figure 11 Scree Plot of CRMITQ

Table 20 lists the items that have a loading of 0.60 or higher. The eigenvalues and percent variance listed at the top of the table were calculated after removing the insignificant factor loadings. There were four factors are extracted. The total percent variance explained by the four factors was 51.351%.

	Factor 1	Factor 2	Factor 3	Factor 4
Cronbach Alpha	0.7012	0.698	0.7201	0.6883
Eigenvalue	2.728	1.665	1.484	1.313
Percent of Total Variance	19.484	11.890	10.597	9.381
Cumulative Percent of Total Variance	19.484	31.373	41.970	51.351
Item 1	0.819			
Item 5	0.708			
Item 9	0.631			
Item 10	0.685			
Item 11	0.628			
Item 12	0.674			
Item 6		0.887		
Item 7		0.714		
Item 16		0.674		
Item 17		0.604		
Item 4			0.846	
Item 15			0.714	
Item 3				0.747
Item 18				0.834

Table 21 Factor Analysis of CRMIT Questionnaire

As seen in table 1, factor 1 contains a large range of items. These items pertain to the overall information gathering processes. Thus, this attribute factor is classified as global CRM system performance. In factor 2, the loading items address testing IT quality. This

factor is therefore labeled quality of IT control. The third factor contained items that related to IT management and was labeled as IT management scope. The last factor described items that related to problems of IT service. So factor 4 was labeled as quality of service.

Factor 1 is explained by item 1, item 5, item 9, item 10, item 11 and item 12 considering all the items are interpreting the factor 1 as meaning global CRM System Performance.

Factor 1: Global CRM System Performance

Item 1: The company puts lots of effort into collecting customer information.

Item 5: You closely assess your level of commitment to serving customers' needs.

Item 9: Functionalities of the CRM systems are used to their fullest potential.

Item 10: Company gains updated technology service from CRM systems vendor.

Item 11: The CRM systems collect information from all service modes.

Item 12: The CRM systems operating have connection with other management information systems.

Factor 2 is explained by item 6, item 7, item 16 and item 17 considering all the items are interpreting the factor 2 as meaning quality of IT control.

Factor 2: Quality of IT Control

Item 6: A multi-functions IT platform systematically controls CRM systems for users.

Item 7: Your company strives to regularly update customer information.

Item 16: The level of security that is being implemented in CRM systems of the company.

Item 17: The reliability of CRM software vendor.

Factor 3 is explained by item 4 and item 15 considering all the items are interpreting the factor 3 as meaning IT management scope.

Factor 3: IT Management Scope

Item 4: There is good relationship between IT staff or consultants and other employees in your division.

Item 15: The CRM systems can record customers' different information format (text, video or audio, pictures, etc).

Factor 4 is explained by item 3 and item 18 considering all the items are interpreting the factor 4 as meaning quality of service.

Factor 4: Quality of Service

Item 3: Customers complaint that they have to wait a long time to have their service.

Item 18: The level of risk that customer's data is lost in case of system disaster.

6.2.6 Item Analysis of CRMCS Questionnaire

As the same as item analysis of above two questionnaires, in customer satisfaction questionnaire, as shown in **Table 21**, all scales exceed the thresholds, satisfying the exploratory research norm set.

Item i	ρ_{ih}	$\rho_{ih} - \rho_{ih'}$	ρ_{id}	$\rho_{id} - \rho_{id'}$	$1 - \rho_{id''}$	$\rho_{id} - \rho_{ih}$	ρ_{ic}	α	α without i
Item 1	0.62	0.37	0.51	0.25	0.61	-0.12	0.41	0.7731	0.6964
Item 2	0.66	0.41	0.55	0.25	0.66	-0.11	0.46	0.7594	0.6953
Item 3	0.47	0.21	0.33	0.19	0.48	-0.14	0.25	0.7034	0.7016
Item 4	0.66	0.43	0.59	0.19	0.64	-0.07	0.40	0.7238	0.6947
Item 5	0.66	0.42	0.67	0.17	0.61	0.01	0.43	0.6329	0.6945
Item 6	0.71	0.48	0.72	0.18	0.66	0.01	0.44	0.7985	0.692
Item 7	0.55	0.31	0.55	0.35	0.57	0.00	0.22	0.6948	0.6991
Item 8	0.53	0.29	0.49	0.08	0.51	-0.04	0.29	0.6103	0.6999
Item 9	0.66	0.42	0.51	0.18	0.65	-0.16	0.48	0.7403	0.6949
Item 10	0.54	0.31	0.69	0.24	0.53	-0.05	1.00	0.8530	0.6991
Item 11	0.59	0.34	0.65	0.21	0.61	-0.14	0.42	0.7495	0.6978
Item 12	0.51	0.25	0.35	0.20	0.52	-0.16	0.37	0.6394	0.7003
Item 13	0.68	0.41	0.49	0.25	0.68	-0.19	0.38	0.8498	0.6936
Item 14	0.61	0.39	0.56	0.25	0.60	-0.05	0.29	0.7394	0.6974

Table 22 Item Analysis of CRMCS Questionnaire

Based on the results of this analysis, we can select the items having a satisfying level

of reliability and validity of CRMCSQ.

Item i	ρ_{ih} >0.6	$\rho_{ih} - \rho_{ih'}$ >0.1	ρ_{id} >0.6	$\rho_{id} - \rho_{id'}$ >0.1	$1 - \rho_{id''}$ >0.7	$\rho_{id} - \rho_{ih}$ >0	ρ_{ic} >0	$\alpha \rightarrow \alpha$ without i	Selected Item
Item 1	Yes	Yes	No	Yes	Yes	No	Yes	Increase	Yes
Item 2	Yes	Yes	No	Yes	Yes	Yes	Yes	Increase	Yes
Item 3	No	Yes	No	Yes	No	No	Yes	Decrease	No
Item 4	Yes	Yes	No	Yes	Yes	Yes	Yes	Increase	Yes
Item 5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Decrease	No
Item 6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Increase	Yes
Item 7	No	Yes	No	Yes	No	Yes	Yes	Decrease	No
Item 8	No	Yes	No	No	No	Yes	Yes	Increase	No
Item 9	Yes	Yes	No	Yes	Yes	No	Yes	Increase	Yes
Item 10	No	Yes	Yes	Yes	No	Yes	Yes	Increase	Yes
Item 11	No	Yes	Yes	Yes	Yes	No	Yes	Increase	Yes
Item 12	No	Yes	No	Yes	No	No	Yes	Decrease	No
Item 13	Yes	Yes	No	Yes	Yes	No	Yes	Increase	Yes
Item 14	Yes	Yes	No	Yes	Yes	Yes	Yes	Increase	Yes

Table 23 Item Analysis Decision Table (CRMCSQ)

Therefore, we got the item list result: Item 1, Item 2, Item 4, Item 6, Item 9, Item 10, Item 11 and Item 13. These items had strict value for analysis criteria and were used to well describe question construction. The global α of the set of selected items is 0.8671

6.2.7 Factor Analysis of CRMCS Questionnaire

The four main predetermined customer satisfaction aspects related to CRM were service channels, CRM strategy, CRM technology and brand loyalty. Factor analysis with varimax rotation yielded only one factor with an eigenvalue equal to or greater than 1.00, therefore only one factor was selected for the customer attitude items. Following the elimination of unrelated factors (see **Table 24**) the total percent variance explained by the

factor is 52.452%.

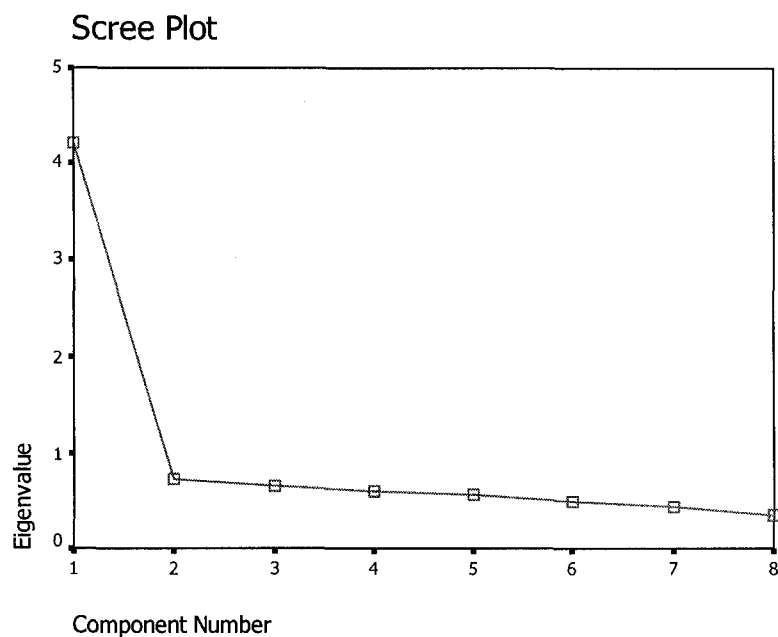


Figure 12 Scree Plot of CRMCSQ

	Factor 1
Cronbach Alpha	0.8671
Eigenvalue	4.196
Percent of Total Variance	52.452
Cumulative Percent of Total Variance	52.452
Item 1	0.741
Item 2	0.746
Item 4	0.736
Item 6	0.742
Item 9	0.723
Item 10	0.682
Item 11	0.701
Item 13	0.721

Table 24 Factor Analysis of CRMCS Questionnaire

Upon examination of the loading on the factors, name was signed to the factor according to the content of the variables having the greatest contribution to the aspect. The factor identified was customer satisfaction.

Factor is explained by item 1, item 2, item 4, item 6, item9, item 10, item 11 and item 13 considering all the items are interpreting the factor as meaning customer satisfaction.

Factor: Customer Satisfaction

Item 1: The waiting time for having my questions addressed was satisfactory.

Item 2: I am satisfied with the privacy protection and security of company.

Item 4: Compared to other companies, I prefer to receive current client service rather than others.

Item 6: I will recommend this company to my friends and relatives.

Item 9: I plan to stay with this company in the upcoming months.

Item 10: I feel I am highly rewarded by staying with your company.

Item 11: It is easy to find product or service information with this company.

Item 13: The service support staff of this company was able to help me solve my problem quickly.

6.3 Item Analysis: Preceived Dimensions Approach

In this study, the construct validity of CRM performance measurement was evaluated by factor analysis (principal components analysis with varimax rotation). Using the SPSS reliability program, factor analysis was applied to form a composite measure of each questionnaire's items.

In this approach, analysis began with factor analysis. As well as processes in predetermined dimensions, any item having a low correlation with other another variable and low loading on the factor was removed. Scree tests were performed based on the criteria of eigenvalues greater than 1. Depending on extracted factors, a list of items was selected and got off items that did not satisfy the required level on criteria.

Next step, we needed redo factor analysis when weak items were deleted. As a result, the conclusion of validated items was come out after item analysis which made sure each

items had high α .

6.3.1 Factor Analysis of CRMM Questionnaire

From following scree plot, even though eight factors were calculated by SPSS, we selected four key factors because they had more difference of eigenvalue with other components. Based on component matrix (**Table 24**), an items list was easily considered depending on factor loading criteria (loading > 0.5).

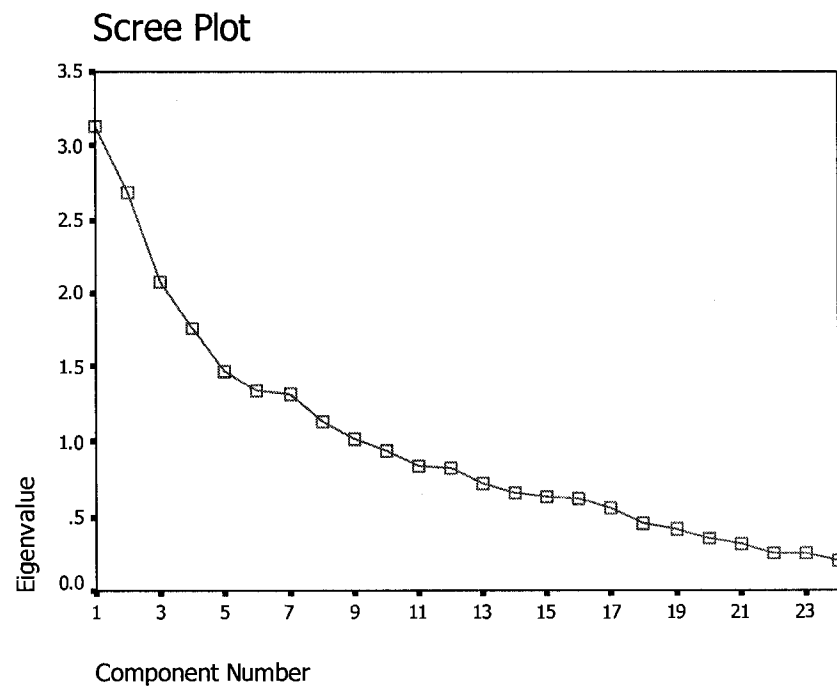


Figure 13 Scree Plot of CRMMQ

We gained four factors of CRMMQ based on the result of scree plot. Then we analyzed all items within these four factors. If the loading value was higher than 0.5, this item was selected as a valuable item because it had higher relation with factor.

	Factors			
	1	2	3	4
Item 1	.066	.016	.167	.288
Item 2	.107	.291	.488	-.326
Item 3	.145	.048	.629	-.336
Item 4	.278	.255	.698	-.205
Item 5	.309	.222	.049	-.428
Item 6	.305	.181	.160	-.097
Item 7	.516	.092	-.047	.133
Item 8	.497	.126	.148	.239
Item 9	.587	.122	-.182	.148
Item 10	.554	.299	-.009	.282
Item 11	.561	.182	-.135	.229
Item 12	.383	.284	-.243	-.011
Item 13	.550	.133	-.282	-.013
Item 14	.241	.422	-.165	-.192
Item 15	.577	.087	-.073	.044
Item 16	.124	-.334	.263	.664
Item 17	.179	.294	-.138	-.402
Item 18	-.354	.343	-.410	-.343
Item 19	-.075	.610	-.196	-.008
Item 20	-.266	.356	-.395	.123
Item 21	-.339	.402	.032	-.170
Item 22	-.360	.686	.044	.222
Item 23	-.411	.531	.404	.323
Item 24	-.237	.421	.184	.505

Table 25 Factor Loading (CRMMQ)

As a result, it is necessary to get off Item 1, Item 2, Item 5, Item 6, Item 8, Item 12, Item 14, Item 17, Item 18, Item 20 and Item 21 that have no clear correlation with key

factors. Then we redo factor analysis when these items are deleted and outcome is shown as **Table 24**. The goal of this new factor analysis is to make certain of each factor with specific items.

	Factors			
	1	2	3	4
Item 3			.738	
Item 4			.738	
Item 7	.626			
Item 9	.604			
Item 10		.673		
Item 11		.681		
Item 13	.709			
Item 15	.694			
Item 16				.646
Item 19		.716		
Item 22	.609			
Item 23	.708			
Item 24				.742

Table 26 Factor Loading without Weak Items (CRMMQ)

In a conclusion, according to factor and item analysis, four factors are considered with items. Factor 1 has a large range of items covering with item 7, item 9, item 13, item 15, item 22 and item 23. This factor is labeled as establishing a relationship with the customers (EsReCust). Factor 2 includes item 10, item 11 and item 19. This factor is addressed on if company's business service is suitable for customers or not. Therefore it is labeled as delivering outstanding service to customers (DeOuSer). Factor 3, which includes item 3 and item 4, is labeled as CRM policies (CRMPol). Factor 4 has two items, item 16 and item 24 which are used to evaluate quality of service (QuOSer).

6.3.2 Item Analysis of CRMM Questionnaire

In item analysis processes of CRMMQ, we validated selected items with extracted factors depending on measurement criteria. Basically, the factors were considered as the factors of questionnaire. If the item's value of α increased from α (without item i), item i contributed positively to the scales. If α value was higher than it without certain item, item was confirmed logically and reasonably as question for measuring CRM performance (Table 27). More, standard alpha value is 0.7424 in range of list of valuable items.

Factors	Item i	ρ_{ih}	$\rho_{ih} - \rho_{ih'}$	ρ_{id}	$\rho_{id} - \rho_{id'}$	$1 - \rho_{id''}$	$\rho_{id} - \rho_{ih}$	ρ_{ic}	α	α without i
EsReCust	7	0.67	0.14	0.84	0.26	0.75	0.17	0.29	0.81	0.52
	9	0.73	0.20	0.84	0.32	0.85	0.10	0.05	0.77	0.53
DeOuSer	13	0.75	0.22	0.65	0.16	1.07	-0.11	0.27	0.66	0.53
	15	0.73	0.20	0.77	0.32	0.92	0.04	-0.10	0.76	0.52
	22	0.74	0.21	0.66	0.09	0.76	-0.08	-0.08	0.70	0.51
QuOSer	23	0.66	0.14	0.85	0.33	0.90	0.19	0.07	0.74	0.52
	10	0.77	0.24	0.64	0.22	0.95	-0.12	-0.08	0.65	0.50
	11	0.74	0.22	0.64	0.59	0.80	-0.10	0.20	0.89	0.51
	19	0.66	0.15	0.71	0.21	0.83	0.04	0.14	0.80	0.52
CRMPol	3	0.69	0.17	0.81	0.32	0.73	0.12	0.00	0.72	0.54
	4	0.71	0.18	0.66	0.15	0.88	-0.05	0.20	0.62	0.53
QuOSer	16	0.74	0.22	0.84	0.40	0.92	0.10	0.02	0.68	0.55
	24	0.70	0.17	0.70	0.24	1.04	0.00	0.22	0.75	0.50

Table 27 Item Analysis of CRMM Questionnaire

Factor 1 is explained by item 7, item 9, item 13, item 15, item 22 and item 23 considering all the items are interpreting the factor 1 as meaning establishing a relationship with the customers.

Factor 1: Establishing a Relationship with the Customers (EsReCust).

Item 7: There is sufficient training provided on CRM in our company.

Item 9: You have felt that profitability of the company has improved since the use of CRM.

Item 13: There is an atmosphere of open discussion.

Item 15: Service representatives can find some client's usual business habits in CRM systems.

Item 22: To accomplish business tasks, the company uses cross-functional teams involved in CRM.

Item 23: The company implements marketing activities to strengthen customer relationship.

Factor 2 is explained by item 10, item 11 and item 19 considering all the items are interpreting the factor 2 as meaning delivering outstanding service to customers.

Factor 2: Delivering Outstanding Service to Customers (DeOuSer).

Item 10: The organization will deliver an excellent service at any point of contact with customers.

Item 11: The company's strategy is focused on excel the customer needs.

Item 19: Customers complaint that they have to wait a long time to have their service.

Factor 3 is explained by item 3 and item 4 considering all the items are interpreting the factor 3 as meaning CRM policies.

Factor 3: CRM Policies (CRMPol).

Item 3: The manufacture processes are customer-centric in the company.

Item 4: Rules of protecting customers' information security and privacy are systematically applied.

Factor 4 is explained by item 16 and item 24 considering all the items are interpreting the factor 4 as meaning quality of service.

Factor 4: Quality of Service (QuOSer).

Item 16: Some situations happen where the decision rendered by CRM systems is not made in the timeframe deemed acceptable by the clients.

Item 24: CRM multiple service channels are coordinated.

6.3.3 Factor Analysis of CRMIT Questionnaire

We selected three key factors because they had more difference of eigenvalue with other components even though six factors were calculated by SPSS. Based on component matrix (**Table 28**), an items list was easily considered depending on factor loading criteria (loading > 0.5).

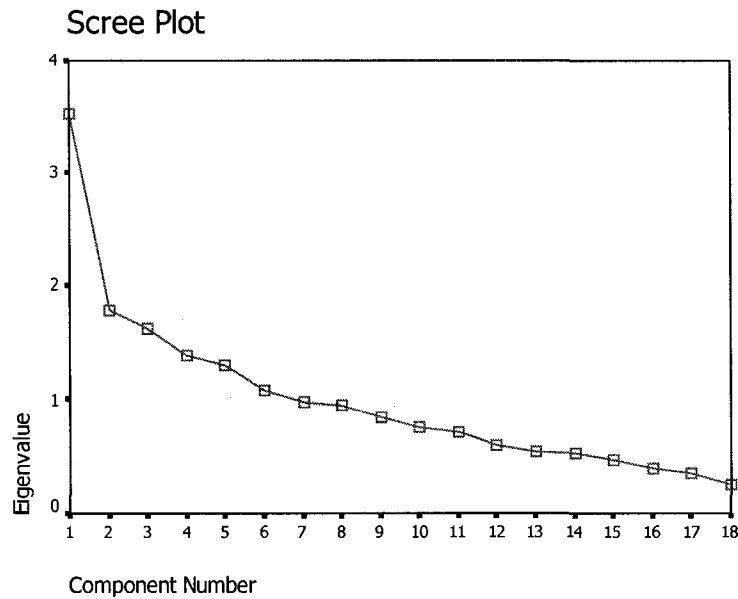


Figure 14 Scree Plot of CRMITQ

We gained three factors of CRMITQ based on the result of above scree plot. Then we analyzed all items within these four factors. If the loading value was higher than 0.5, this item was selected as a valuable item because it had higher relation with factor.

	Factors		
	1	2	3
Item 1	.443	.286	-.121
Item 2	.583	-.117	-.160
Item 3	.039	-.370	.107
Item 4	.181	-.276	.699
Item 5	.461	-.107	.488
Item 6	.441	.399	-.006
Item 7	.322	.617	-.106
Item 8	.493	.211	-.352
Item 9	.554	.177	.413
Item 10	.627	-.010	.244
Item 11	.580	.147	-.108
Item 12	.643	-.223	-.151
Item 13	-.415	.314	.074
Item 14	-.563	.176	.129
Item 15	-.358	.027	.271
Item 16	.168	-.552	-.133
Item 17	.252	.562	-.323
Item 18	-.177	-.097	.675

Table 28 Factor Loading (CRMITQ)

As a result, we remove Item 1, Item 3, Item 5, Item 6, Item 8, Item 13 and Item 15 that have no clear correlation with key factors from item list. Then we redo factor analysis when these items are deleted and outcome is shown as **Table 29**. The goal of this new factor analysis is to make certain of each factor with specific items.

	Factor		
	1	2	3
Item 2	.625		
Item 4			.673
Item 7		.723	
Item 9	.604		
Item 10	.696		
Item 11	.658		
Item 12	.671		
Item 14	.769		
Item 16		.698	
Item 17		.710	
Item 18			.787

Table 29 Factor Analysis without Weak Items (CRMITQ)

Depending on factor and item analysis, three factors are considered with items. Factor 1 has a large range of items covering with item 2, item 9, item 10, item 11, item 12, and item 14. This factor is labeled as quality of the CRM system (QuOCRMSy). Factor 2 includes three items, item 7, item 16 and item 17. This factor is addressed on CRM IT control and reliability of CRM software vender. Therefore it is labeled as quality of IT control (QuOITCl). Factor 3, which includes item 4 and item 18, is labeled as confidence on IT system (CfITSy) which is to measure IT providing a stable support to CRM performance.

6.3.4 Item Analysis of CRMIT Questionnaire

As same as the item analysis processes of CRMMQ, in CRMITQ, we validated selected items with extracted factors depending on measurement criteria. As a result, standard alpha value is 0.7424 in range of list of valuable items.

Factors	Item i	ρ_{ih}	$\rho_{ih} - \rho_{ih'}$	ρ_{id}	$\rho_{id} - \rho_{id'}$	$1 - \rho_{id''}$	$\rho_{id} - \rho_{ih}$	ρ_{ic}	α	α without i
QuO CRMSy	2	0.73	0.20	0.76	0.32	0.91	0.02	-0.10	0.6637	0.3743
	9	0.66	0.12	0.78	0.21	1.09	0.13	-0.05	0.7725	0.3133
	10	0.76	0.23	0.62	0.04	0.83	-0.14	0.16	0.6193	0.2954
	11	0.73	0.19	0.80	0.22	0.88	0.07	-0.10	0.6287	0.3002
	12	0.66	0.12	0.70	0.18	0.74	0.04	0.28	0.7206	0.3591
	14	0.73	0.19	0.82	0.59	0.97	0.10	0.05	0.7662	0.5587
QuOITC1	7	0.73	0.20	0.68	0.20	0.83	-0.05	-0.10	0.7995	0.4349
	16	0.69	0.16	0.75	0.34	0.85	0.06	0.06	0.8245	0.4151
	17	0.73	0.20	0.83	0.38	0.73	0.09	0.05	0.6796	0.3831
CfITSy	4	0.75	0.22	0.83	0.39	0.83	0.07	0.05	0.8304	0.4511
	18	0.67	0.15	0.70	0.20	0.81	0.03	0.07	0.7395	0.5046

Table 30 Item Analysis of CRMIT Questionnaire

Factor 1 is explained by item 2, item 9, item 10, item 11, item 12 and item 14 considering all the items are interpreting the factor 1 as meaning quality of the CRM system.

Factor 1: Quality of the CRM System (QuOCRMSy).

Item 2: The CRM systems are totally integrated with information technology (IT) provided internally.

Item 9: Functionalities of the CRM systems are used to their fullest potential.

Item 10: Company gains updated technology service from CRM systems vendor.

Item 11: The CRM systems collect information from all service modes.

Item 12: The CRM systems operating have connection with other management information systems.

Item 14: The company operates a proper IT management system for CRM.

Factor 2 is explained by item 7, item 16 and item 17 considering all the items are interpreting the factor 2 as meaning quality of IT control.

Factor 2: Quality of IT Control (QuOITCI).

Item 7: Your company strives to regularly update customer information.

Item 16: The level of security that is being implemented in CRM systems of the company.

Item 17: The reliability of CRM software vendor.

Factor 3 is explained by item 4 and item 18 considering all the items are interpreting the factor 3 as meaning confidence of IT system.

Factor 3: Confidence of IT System (CfITSy).

Item 4: There is good relationship between IT staff or consultants and other employees in your division.

Item 18: The level of risk that customer's data is lost in case of system disaster.

6.3.5 Factor Analysis of CRMCS Questionnaire

In scree plot of customer satisfaction questionnaire, we chose one as key factor to describe customer attitude measurement. Based on component matrix (**Table 31**), an items list was considered depending on factor loading criteria (loading >0.5).

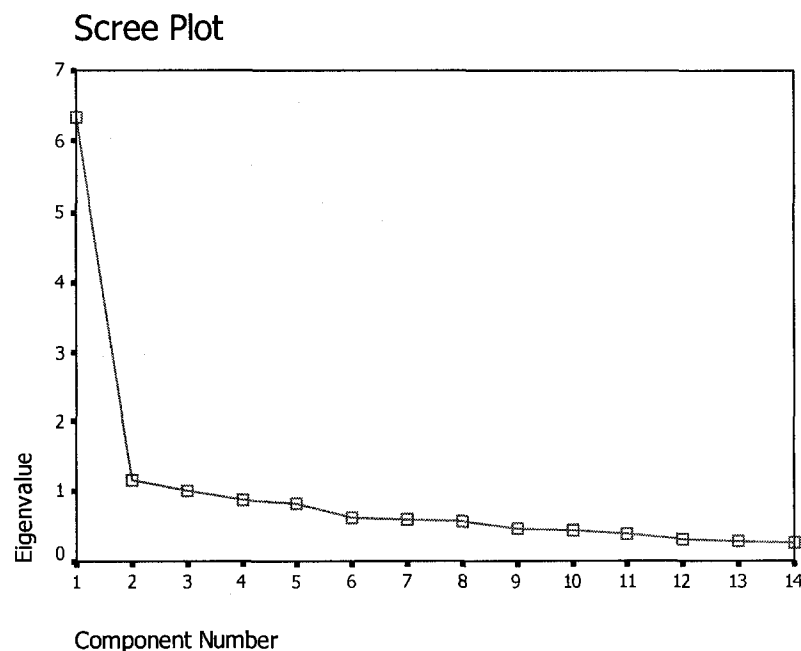


Figure 15 Scree Plot of CRMCSQ

We gained one factor of CRMCSQ based on the result of above scree plot. Then we analyzed all items within this factor. If the loading value was higher than 0.5, this item was selected as a valuable item because it had higher relation with factor.

	Factor
Item 1	.690
Item 2	.721
Item 3	.442
Item 4	.727
Item 5	.728
Item 6	.749
Item 7	.417
Item 8	.498
Item 9	.715
Item 10	.618
Item 11	.660
Item 12	.481
Item 13	.737
Item 14	.672

Table 31 Factor Loading (CRMCSQ)

We remove Item 3, Item 7, Item 8 and Item 12 that have no clear correlation with key factors from item list. Then we redo factor analysis when these items are deleted and outcome is shown as **Table 32**. The goal of this new factor analysis is to make certain of each factor with specific items.

	Factor
Item 1	.704
Item 2	.726
Item 4	.730
Item 5	.742
Item 6	.757
Item 9	.715
Item 10	.652
Item 11	.687
Item 13	.748
Item 14	.673

Table 32 Factor Analysis without Weak Items (CRMCSQ)

Depending on factor analysis, one factor is considered with items. The factor includes item 1, item 2, item 4, item 5, item 6, item 9, item 10, item 11, item 13 and item 14. This factor is labeled as customer satisfaction (CusSat).

6.3.6 Item Analysis of CRMCS Questionnaire

In item analysis processes of CRMCSQ, we validated selected items with one extracted factor depending on measurement criteria. As a result, standard alpha value is 0.8892 in range of list of valuable items. The item analysis is shown in **Table 33** while one factor was extracted as factor. So all criteria related to ρ_{id} are not considered.

Factors	Item i	ρ_{ih}	$\rho_{ih} - \rho_{ih'}$	ρ_{ic}	α	α without i
CusSat	Item 1	0.72	0.18	0.06	0.8137	0.6789
	Item 2	0.70	0.16	0.27	0.7316	0.6771
	Item 4	0.73	0.20	-0.08	0.6425	0.6755
	Item 5	0.77	0.24	-0.01	0.7011	0.675
	Item 6	0.71	0.18	-0.07	0.8598	0.6736
	Item 9	0.67	0.16	-0.06	0.7483	0.6773
	Item 10	0.67	0.14	0.02	0.7048	0.6789
	Item 11	0.70	0.17	-0.07	0.7184	0.6827
	Item 13	0.77	0.26	-0.03	0.8201	0.6729
	Item 14	0.77	0.25	0.27	0.7042	0.6808

Table 33 Item Analysis of CRMCS Questionnaire

Factor 1 is explained by item 1, item 2, item 4, item5, item 6, item9, item 10, item 11, item 14 and item 13 considering all the items are interpreting the factor 1 as meaning customer satisfaction.

Factor 1: Customer Satisfaction (CusSat)

Item 1: The waiting time for having my questions addressed was satisfactory.

Item 2: I am satisfied with the privacy protection and security of company.

Item 4: Compared to other companies, I prefer to receive current client service rather than others.

Item 5: I will repurchase products and/or services from this company.

Item 6: I will recommend this company to my friends and relatives.

Item 9: I plan to stay with this company in the upcoming months.

Item 10: I feel I am highly rewarded by staying with your company.

Item 11: It is easy to find product or service information with this company.

Item 13: The service support staff of this company was able to help me solve my problem quickly.

Item 14: I feel convenient buying product and/or service from this company.

6.4 Selection of Items Based on the Two Approaches

Based on two analysis approaches, we gain sets of selected items and factors that have high score of reliability and validity. **Table 34** shows the value of α in each approach for each questionnaire.

Questionnaire	Analysis Approach 1 (Predetermined Dimension)	Analysis Approach 2 (Preceived Dimension)
CRMMQ	0.73	0.75
CRMITQ	0.77	0.79
CRMCSQ	0.87	0.89

Table 34 Value of α for Each Analysis Approach

In order to obtain the best set of items, α value analysis from both approaches is tested to look for new sets of items compared with two approaches. Depending on the result of each analysis process, sets of items are selected with higher α value. As a result of **Table 35** shown, selections of items we get for each questionnaire have higher reliability and validity.

Questionnaire	Value of α	Selection of Items
CRMMQ	0.76	3,4,6,7,9,10,11,12,13,15,16,19,22,23,24
CRMITQ	0.80	1,3,4,6,7,9,10,11,12,14,15,16,17,18
CRMCSQ	0.89	1,2,4,5,6,9,10,11,13,14

Table 35 Selection of Items Based on the Two Approaches

Resulting questionnaires that include selected items for CRMMQ, CRMITQ and CRMCSQ are presented in **Appendix 5**.

6.5 Independence of the Scales

We test the linear independence of each scale. The scales are not linear dependent on each control variable, age, gender, education level and work experience. The linearity of relation is analyzed between scales and two control variables, gender and education level. Because other two control variables are non-linear, we evaluate scales in separate groups.

Multiple Regression estimates the coefficients of the linear equation, involving one or more independent variables, which best predict the value of the dependent variable [Field, 2005]. In this case, by multiple regression analysis, the goal is to attempt proving that the answers from respondents about CRM performance are independent with their background.

In CRMMQ and CRMITQ, four control variables are to test every respondent's background, gender, age, education level and work experience. The selected item lists are input as samples. The analysis is split in three models because age variable and work experience variable are not linear.

Based on the result in **Table 36**, the significance values are all greater than 0.10 which means the variables probably do not contribute to the models [Field, 2005]. According to multiple regression analysis, there is no huge different within three models. Therefore, we conclude that four independent variables have no significant with all dependent variables.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.999	.405		8.549	.802
	GENDER	-.227	.180	-.189	-1.637	.105
	AGE	.043	.080	.060	-1.536	.593
	EL	-.020	.131	-.017	-.154	.878
2	(Constant)	4.153	.447		8.199	.841
	GENDER	-.229	.180	-.191	-1.648	.103
	EL	-.022	.131	-.018	-.166	.868
	EXP	-.058	.062	-.098	-.929	.355
3	(Constant)	4.050	.453		8.935	.837
	GENDER	-.285	.180	-.181	-1.586	.116
	AGE	-.125	.106	-.130	-1.177	.243
	EL	-.009	.170	-.005	-.051	.760
	EXP	-.043	.080	-.056	-.539	.591

Table 36 Multiple Regression Analysis (CRMMQ)

Following the same statistics method, multiple regression analysis is used to CRMITQ. As a result in **Table 37**, we gain the similar conclusion with CRMMQ that all independent variables, gender, age, education level and work experience, do not contribute to dependent variables.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.162	.416		3.196	.802
	GENDER	.178	.167	.113	-1.066	.249
	AGE	.052	.095	-.060	.544	.688
	EL	.026	.180	.016	-.142	.488
2	(Constant)	1.854	.453		2.281	.811
	GENDER	.187	.164	.119	-1.144	.256
	EL	.040	.177	.024	-.224	.423
	EXP	.136	.064	-.022	2.121	.737
3	(Constant)	1.315	.446		2.947	.804
	GENDER	.213	.169	.135	1.267	.209
	AGE	-.015	.097	-.017	-.156	.676
	EL	.132	.182	.080	.726	.470
	EXP	-.019	.066	-.030	-.283	.778

Table 37 Multiple Regression Analysis (CRMITQ)

Canonical correlation analysis is an extension of multiple regression, where the second set does not contain a single response variable, but multiple ones. The goal is to explain as much as possible of the variance in the relationships among two sets of numerical variables in a low dimensional space. Initially, the variables in each set are linearly combined such that the linear combinations have a maximal correlation. Given these combinations, subsequent linear combinations are determined that are uncorrelated with the previous combinations and that have the largest correlation possible [Field, 2005].

Factors	Variables	Canonical Correlations	Sin.
1	22, 23, 24	.257/.189/.065/.328	.354/.738/.830/.416
2	7, 13, 15	.227/.090/.145/.291	.499/.701/.171/.102
3	3, 4	.555/.047	.101/.908/.593
4	6, 16	.317/.203	.096/.236/.290
5	9, 12	.320/.177	.187/.419/.694
6	10, 11, 19	.411/.109/.039/.193	.075/.978/.937/.803

Table 38 Canonical Correlation (CRMMQ)

Factors	Variables	Canonical Correlations	Sin.
1	1, 9, 10, 11, 12, 13	.328/.180/.071/.192	.150/.505/.507/.102
2	6, 7, 16, 17	.201/.132/.022/.275	.817/.814/.838/.367
3	4, 15	.309/.078	.155/.765/.142
4	3, 18	.198/.052	.712/.889/.291

Table 39 Canonical Correlation (CRMITQ)

In this case, based on selected factors as aspects, the canonical correlation of CRMMQ and CRMITQ are shown in **Table 38** and **Table 39**. The significant values of each a represents that control variables have no relation with aspects. In a conclusion, each scale in two questionnaires, CRMMQ and CRMITQ, is linear independence with the four control variables, age, gender, education level and work experience.

Chapter 7: Result Discussion

This chapter presents a discussion of the results that were drawn from the analysis of the data. In addition, implications of the study to practitioners and researchers, contributions to knowledge, and limitations are presented. Finally, future research plans are outlined.

7.1 Research Results

The purpose of this study was to examine what CRM performance measurement is regarding CRM framework. Based on our survey for companies and their customers, two analysis methods assess the data collected from respondents, predetermined dimension and preceived dimension approaches. Each approach includes item analysis and factor analysis according to identified criteria.

We assessed the reliability and validity of each questionnaire. CRM manager questionnaire, by predetermined and preceived approaches, is related with validity result in 15 items composed of six factors. The factors are establishing a relationship with customers, deepening the relationship with the customers, managing customer data management, impact of CRM on the customers, impact of CRM on the organization and CRM policies.

In CRM IT questionnaire, four factors are extracted from 14 items to well describe CRM IT performance measurement. They are global CRM system performance, quality of IT control, IT management scope and quality of service.

In CRM customer satisfaction questionnaire, 10 items are selected to significantly contribute to customer attitude. The factor analysis of the customer attitudes result in one factor of customer attitude.

Those three questionnaires' analysis results are all related with CRM framework components as we described. Customers, CRM systems, customer touch points, strategy management and IT support are five key components of CRM framework.

Customer satisfaction reflects customers' attitude to CRM systems. Factors in CRM manager questionnaire (CRMMQ) are considered to evaluate customer touch points and strategy management. Moreover, factors in CRM IT questionnaire (CRMITQ) focus on CRM systems and IT support.

Four control variables exist in CRM manager and IT questionnaires, gender, age, education level and work experience of respondents. We analyzed four variables in independence of the scale analysis. According to each analysis conclusion, four control variables have no significance for CRM performance measurement. That means the understanding of CRM performance for respondents are independent with their gender, age, education level and experience background.

7.2 Implications of the Study

This study will be most valuable in assisting corporations and researchers to understand what CRM framework is and how to assess CRM performance by our measurement tool. CRM framework is a model to systematically design, develop and execute CRM systems in companies. Based on background of CRM performance measurement criteria and our study, a diagnostic measurement tool is used to evaluate current CRM performance.

Firstly, the goal of CRM framework is to make practitioners understand what CRM systems require to build in companies. Our study represents an attempt to build a conceptual framework of CRM. Five key components of CRM framework exist in our model, customers, CRM systems, various customers touch points, strategy management department and IT supporting. Based on this framework, practitioners are able to design, develop and operate CRM systems fulfilling with business requirements.

Secondly, CRM performance measurement criteria direct CRM researchers to measure current CRM performance. We define CRM performance and performance measurement criteria into four aspects, CRM service channels performance, CRM strategy performance, CRM IT performance and CRM customer satisfaction

performance. Finally, on customer's side, customer satisfaction is a measurement criterion for CRM performance.

Thirdly, practitioners can evaluate their current CRM performance in companies by three questionnaires. Depending on related measurement methodologies and our CRM framework model, we develop a new CRM performance measurement tool to evaluate CRM performance. Three survey questionnaires are designed to deal with CRM performance and customer satisfaction, CRM manager questionnaire for marketing department of company, IT questionnaire for IT department and customer satisfaction questionnaire for clients of firm.

The implication to researchers is that the CRM framework and CRM performance measurement summarize clear conceptions to understand CRM systems operating to reestablish organizational structure. The factors of questionnaires we got reflect CRM performance measurement criteria. Meanwhile, the implication to practitioners is that the CRM framework provides key components and three CRM questionnaires assess their CRM performance.

7.3 Contributions to Knowledge

The results of this study provide two major contributions to knowledge. First, it provides clear understanding of CRM framework and CRM performance. While several authors have defined CRM and its performance, there has been very little empirical work to verify or refute them. Our study has described the key components of CRM framework and their relationships. For CRM performance, we figure out its description into four aspects, CRM service channels performance, CRM strategy performance, CRM IT performance and CRM customer satisfaction performance based on our CRM framework. The results from this study suggest more emphasis should be placed on the CRM performance and its measurement.

The second contribution is in the development of reliable and valid diagnostic tool to evaluate CRM performance. Although some organizational CRM measures have been available and tested, they are all partial measurement on CRM performance.

Therefore, this study presents effort to develop a diagnostic measurement tool covering all the aspects in service channels performance, strategy performance, IT performance and customer satisfaction performance. This tool will help companies understand the weakness of CRM performance and direct their investment on CRM systems. The results of this study provide better assessment measures in the future for CRM performance.

7.4 Limitations of the Study

Many factors are involved in CRM performance. These include factors outside the organizational context measurement criteria and customer satisfaction used in this study. For that reasons, there are some limitations for the study that we discussed.

The main limitation of the study is the restriction of the organizational context measurement criteria used in the study. The criteria used are the major ones identified in the literature that influence CRM performance. Throughout the study the criteria were continually reviewed to ensure that they were appropriate. Although the final results showed that not all the items tested were significant, no additional items are proposed at this time as a result of the research. Other criteria may be identified as additional research in the area continues.

The number of sample is another limitation of our research. We also utilized a broad range of companies from numerous industries to increase internal validity and generalization. This minimized any limitations regarding generalization and increased confidence in the conclusions.

More external validation could bring benefit for our survey results. Our survey may be taken by different language in different locations. In our study, the questionnaires are sent to Canadian companies. However, they could be translated to other language, as French, Chinese, and Japanese. If we could collect survey results in other countries in the future, they are helpful for supporting our conclusions.

7.5 Future Research

This thesis suggests some future research directions for studying CRM. First, it would be useful to further assess CRM performance developed in this study to other business environments, for example, the systems of CRM in other nations, such as the USA and European countries. With more replicative and creative research, a more comprehensive conceptual framework related to CRM can be developed in the future.

Second, the response rate was 34.5 percent. This rate can be considered fair for email surveys, and the final sample size was considered adequate. Obviously, a larger sample would permit firmer conclusions to be drawn from the statistical analysis.

On the whole, continued refinement of the CRM performance measurement criteria proposed and supported in this thesis is possible and desired, based on further research and changes in business environments. Such refinements and modifications could necessitate the inclusion of new items, or the deletion of original items.

The next step in examining CRM performance is an extension of this study to evaluate the impact of CRM performance and CRM performance success to CRM application success. When successful CRM can be associated with an improvement in the CRM application in supporting the needs of the organization, then CRM performance measurement will become a major tool. This study is a step in that direction.

An extension of measurement can be executed on more aspects of organization with CRM performance. Our research is based on main organizational management in companies, such as marketing management, service management and IT management. However, other aspects are related with CRM performance, human resource, public relation and planning management. The researches on these departments of organization are parts of future work on CRM performance.

There is much to be done in the area of CRM framework and CRM performance measurement research. Hopefully, this study will be the stepping stone to additional search for knowledge in CRM.

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Appendix 1

CRM control variables for CRM manager questionnaire (CRMMQ) and CRM IT questionnaire (CRMITQ)

1. Are you:

- ☐ Male
- ☐ Female

2. How old are you?

- ☐ Less than 20
- ☐ 20-30
- ☐ 30-40
- ☐ 40-50
- ☐ More than 50

3. What is your highest level of education?

- ☐ High School degree or equivalent
- ☐ CEGEP
- ☐ Community College/Technical Degree
- ☐ Bachelor's Degree
- ☐ Master's Degree (other than MBA)
- ☐ MBA
- ☐ PhD
- ☐ Other (Please specify)

4. What is your position in the company?

- ☐ CIO (Chief Information Officer)
- ☐ Senior or Executive Vice President
- ☐ Vice President
- ☐ Director or Assistant Vice President
- ☐ Manager
- ☐ Other (please specify)

5. Number of employees in your company?

- ☐ Less than 20
- ☐ 21-50
- ☐ 50-100
- ☐ 101-200
- ☐ More than 200

6. How long have you been personally working with a CRM system or equivalent?

- ☐ Less than 1 year
- ☐ 1-3 years
- ☐ 3-5 years
- ☐ 5-10 years
- ☐ More than 10 years

7. How long have you been working for this company?

- ☐ Less than 1 year
- ☐ 1-3 years
- ☐ 3-5 years
- ☐ 5-10 years
- ☐ More than 10 years

8. How many training days did you have on CRM systems or equivalents in this company in last 3 years?

- ☐ Less than 1 day
- ☐ 2-5 days
- ☐ 5-8 days
- ☐ More than 8 days

9. How long has your business been supporting by the CRM thus far?

- ☐ Less than 6 months
- ☐ 6-12 months
- ☐ 1-2 years
- ☐ 2-3 years
- ☐ More than 3 years

10. In your mind, what is the level of CRM that is being implemented in your company?

- ☐ Low (Very general/basic CRM activities focused only on those functions that deal directly with the clients).
- ☐ Medium (Moderately structured CRM activities in some departments of your company).
- ☐ High (Highly structured CRM activities in throughout the whole company).

11. What service/department are you now working with? (please specify)



Appendix 2

Candidate items for CRM manager questionnaire (CRMMQ)

	Agree	Tend to agree	Tend to disagree	Disagree	Don't Apply
1. Business strategies are driven by the goal of increasing customer value.	☐	☐	☐	☐	☐
2. The company encourages teamwork in CRM service.	☐	☐	☐	☐	☐
3. The manufacture processes are customer-centric in the company.	☐	☐	☐	☐	☐
4. Rules of protecting customers' information security and privacy are systematically applied.	☐	☐	☐	☐	☐
5. When customers want to contact with company representative, it is possible to achieve through multiple service channels (e.g. Internet, Call Center, etc.).	☐	☐	☐	☐	☐
6. Customer satisfaction has increased since the use of CRM.	☐	☐	☐	☐	☐
7. There is sufficient training provided on CRM in our company.	☐	☐	☐	☐	☐
8. Company can apply customer information for all situations not only when serving customer.	☐	☐	☐	☐	☐
9. You have felt that profitability of the company has improved since the use of CRM.	☐	☐	☐	☐	☐
10. The organization is able to deliver an excellent service at any point of contact with customers.	☐	☐	☐	☐	☐
11. The company's strategy is focused on excel the customer needs.	☐	☐	☐	☐	☐
12. Information about customers is easily communicated throughout the organization.	☐	☐	☐	☐	☐

	Agree	Tend to agree	Tend to disagree	Disagree	Don't Apply
13. In your department, there is an atmosphere of open discussion.	☐	☐	☐	☐	☐
14. In your mind, the company provides excellent service to customers.	☐	☐	☐	☐	☐
15. Service representatives can find some client's usual business habits in CRM systems.	☐	☐	☐	☐	☐
16. Some situations happen where the decision rendered by CRM systems* is not made in the timeframe deemed acceptable by the clients.	☐	☐	☐	☐	☐
17. The company accumulates a huge amount of customer information systematically.	☐	☐	☐	☐	☐

	Never	Seldom	Occasionally	Frequently	All the time
18. The company enters the change in customer information.	☐	☐	☐	☐	☐
19. CRM systems record whole communication processes between company and customers.	☐	☐	☐	☐	☐
20. System of customer knowledge management (CKM**) supports business processes.	☐	☐	☐	☐	☐
21. Customers complaint that they have to wait a long time to have their service.	☐	☐	☐	☐	☐
22. To accomplish business tasks, the company uses cross-functional teams involved in CRM.	☐	☐	☐	☐	☐
23. The company implements marketing activities to strengthen customer relationship.	☐	☐	☐	☐	☐
24. CRM multiple service channels are coordinated.	☐	☐	☐	☐	☐

Appendix 3

Candidate items for CRM information technology questionnaire (CRMITQ)

	Agree	Tend to agree	Tend to disagree	Disagree	Don't Apply
1. The company puts lots of effort into collecting customer information.	☐	☐	☐	☐	☐
2. The CRM systems are totally integrated with information technology (IT) provided internally.	☐	☐	☐	☐	☐
3. The current CRM systems have a security program that effectively protects against attack from hackers.	☐	☐	☐	☐	☐
4. There is good relationship between IT staff or consultants and other employees in your division.	☐	☐	☐	☐	☐
5. You closely assess your level of commitment to serving customers' needs.	☐	☐	☐	☐	☐
6. A multi-functions IT platform** systematically controls CRM systems for users.	☐	☐	☐	☐	☐
7. Your company strives to regularly update customer information.	☐	☐	☐	☐	☐
8. There is no complaint about CRM systems usage from employees who are serving clients.	☐	☐	☐	☐	☐

	Never	Seldom	Occasionally	Frequently	All the time
9. Functionalities of the CRM systems* are used to their fullest potential.	☐	☐	☐	☐	☐
10. Company gains updated technology service from CRM systems vendor.	☐	☐	☐	☐	☐
11. The CRM systems collect information from all service modes, e.g. Call Center, sales stores, e-mail etc.	☐	☐	☐	☐	☐
12. The CRM systems operating have connection with other management information systems (e.g. SCM or/and ERP or/and financial management etc.).	☐	☐	☐	☐	☐
13. The company analyses customer information stored in database.	☐	☐	☐	☐	☐

14. In which proportion, your company operates a proper IT management system for CRM?

- ☐ 0% -20%
- ☐ 20%-50%
- ☐ 50%-80%
- ☐ 80%-100%

15. The CRM systems can record customers' different information format (text, video or audio, pictures, etc). (Check all that apply)

- ☐ Text
- ☐ Video
- ☐ Audio
- ☐ Pictures
- ☐ Others

16. In your mind, what is the level of security that is being implemented in CRM systems of the company?

- ☐ Very High
- ☐ High
- ☐ Medium
- ☐ Low
- ☐ Very Low

17. How do you describe the reliability of CRM software vendor?

- ☐ Very High
- ☐ High
- ☐ Medium
- ☐ Low
- ☐ Very Low

18. What is the level of risk that customer's data is lost in case of system disaster?

- ☐ Very High
- ☐ High
- ☐ Medium
- ☐ Low
- ☐ Very Low

Appendix 4

Candidate items for CRM customer satisfaction questionnaire (CRMCSQ)

	Agree	Tend to agree	Tend to disagree	Disagree	Don't Apply
1. The waiting time for having my questions addressed was satisfactory.	☐	☐	☐	☐	☐
2. I am satisfied with the privacy protection and security of company.	☐	☐	☐	☐	☐
3. The customer service representative was very knowledgeable.	☐	☐	☐	☐	☐
4. Compared to other companies, I prefer to receive current client service rather than others.	☐	☐	☐	☐	☐
5. I will repurchase products and/or services from this company.	☐	☐	☐	☐	☐
6. I will recommend this company to my friends and relatives.	☐	☐	☐	☐	☐
7. I am satisfied with the support I received from the company.	☐	☐	☐	☐	☐
8. I will buy "other" products/services from this company.	☐	☐	☐	☐	☐
9. I plan to stay with this company in the upcoming months.	☐	☐	☐	☐	☐
10. I feel I am highly rewarded by staying with your company.	☐	☐	☐	☐	☐

	Never	Seldom	Occasionally	Frequently	All the time
11. It is easy to find product or service information with this company.	☐	☐	☐	☐	☐
12. I was given wrong information of products or service by representatives.	☐	☐	☐	☐	☐
13. The service support staff of this company was able to help me solve my problem quickly.	☐	☐	☐	☐	☐
14. I feel convenient buying product and/or service from this company.	☐	☐	☐	☐	☐

Appendix 5

Selected items for CRM manager questionnaire (CRMMQ)

	Agree	Tend to agree	Tend to disagree	Disagree	Don't Apply
1. The manufacture processes are customer-centric in the company.	☐	☐	☐	☐	☐
2. Rules of protecting customers' information security and privacy are systematically applied.	☐	☐	☐	☐	☐
3. Customer satisfaction has increased since the use of CRM.	☐	☐	☐	☐	☐
4. There is sufficient training provided on CRM in our company.	☐	☐	☐	☐	☐
5. You have felt that profitability of the company has improved since the use of CRM.	☐	☐	☐	☐	☐
6. The organization is able to deliver an excellent service at any point of contact with customers.	☐	☐	☐	☐	☐
7. The company's strategy is focused on excel the customer needs.	☐	☐	☐	☐	☐
8. Information about customers is easily communicated throughout the organization.	☐	☐	☐	☐	☐
9. In your department, there is an atmosphere of open discussion.	☐	☐	☐	☐	☐
10. Service representatives can find some client's usual business habits in CRM systems.	☐	☐	☐	☐	☐
11. Some situations happen where the decision rendered by CRM systems* is not made in the timeframe deemed acceptable by the clients.	☐	☐	☐	☐	☐

	Never	Seldom	Occasionally	Frequently	All the time
12. CRM systems record whole communication processes between company and customers.	☐	☐	☐	☐	☐
13. To accomplish business tasks, the company uses cross-functional teams involved in CRM.	☐	☐	☐	☐	☐
14. The company implements marketing activities to strengthen customer relationship.	☐	☐	☐	☐	☐
15. CRM multiple service channels are coordinated.	☐	☐	☐	☐	☐

Selected items for CRM information technology questionnaire (CRMITQ)

	Agree	Tend to agree	Tend to disagree	Disagree	Don't Apply
1. The company puts lots of effort into collecting customer information.	☐	☐	☐	☐	☐
2. The current CRM systems have a security program that effectively protects against attack from hackers.	☐	☐	☐	☐	☐
3. There is good relationship between IT staff or consultants and other employees in your division.	☐	☐	☐	☐	☐
4. A multi-functions IT platform** systematically controls CRM systems for users.	☐	☐	☐	☐	☐
5. Your company strives to regularly update customer information.	☐	☐	☐	☐	☐

	Never	Seldom	Occasionally	Frequently	All the time
6. Functionalities of the CRM systems* are used to their fullest potential.	☐	☐	☐	☐	☐
7. Company gains updated technology service from CRM systems vendor.	☐	☐	☐	☐	☐
8. The CRM systems collect information from all service modes, e.g. Call Center, sales stores, e-mail etc.	☐	☐	☐	☐	☐
9. The CRM systems operating have connection with other management information systems (e.g. SCM or/and ERP or/and financial management etc.).	☐	☐	☐	☐	☐

10. In which proportion, your company operates a proper IT management system for CRM?

- ☐ 0% -20%
- ☐ 20%-50%
- ☐ 50%-80%
- ☐ 80%-100%

11. The CRM systems can record customers' different information format (text, video or audio, pictures, etc). (Check all that apply)

- ☐ Text
- ☐ Video
- ☐ Audio
- ☐ Pictures
- ☐ Others

12. In your mind, what is the level of security that is being implemented in CRM systems of the company?

- ☐ Very High
- ☐ High
- ☐ Medium
- ☐ Low
- ☐ Very Low

13. How do you describe the reliability of CRM software vendor?

- ☐ Very High
- ☐ High
- ☐ Medium
- ☐ Low
- ☐ Very Low

14. What is the level of risk that customer's data is lost in case of system disaster?

- ☐ Very High
- ☐ High
- ☐ Medium
- ☐ Low
- ☐ Very Low

Selected items for CRM customer satisfaction questionnaire (CRMCSQ)

	Agree	Tend to agree	Tend to disagree	Disagree	Don't Apply
1. The waiting time for having my questions addressed was satisfactory.	☐	☐	☐	☐	☐
2. I am satisfied with the privacy protection and security of company.	☐	☐	☐	☐	☐
3. Compared to other companies, I prefer to receive current client service rather than others.	☐	☐	☐	☐	☐
4. I will repurchase products and/or services from this company.	☐	☐	☐	☐	☐
5. I will recommend this company to my friends and relatives.	☐	☐	☐	☐	☐
6. I am satisfied with the support I received from the company.	☐	☐	☐	☐	☐
7. I feel I am highly rewarded by staying with your company.	☐	☐	☐	☐	☐

	Never	Seldom	Occasionally	Frequently	All the time
8. It is easy to find product or service information with this company.	☐	☐	☐	☐	☐
9. The service support staff of this company was able to help me solve my problem quickly.	☐	☐	☐	☐	☐
10. I feel convenient buying product and/or service from this company.	☐	☐	☐	☐	☐

Concept List

Analysis item: In this thesis, items are the questions in survey questionnaires.
[Field, 2005]

Application software: The software record what information is needed to make decisions and how to perform activities based on that information. [Kincaid, 2003]

Business functions: The business function is responsible for defining the business requirement, and the IT department is responsible for specifying the technical solution. [Kincaid, 2003]

CRM framework: The CRM framework is the image that brings all the CRM elements together. [Zikmund et al., 2003]

CRM projects: A CRM project is a well-defined effort with specific deliverables, due dates, and cost. [Kincaid, 2003]

CRM strategy: A CRM strategy allows company to take the steps that are more likely to be successful, while ensuring that each one takes company in the direction of ultimate goal. [Kincaid, 2003]

CRM technology: CRM technology is made up of the computer tools (hardware, software, and networks) employed to manage the information and process companies use to deliver customer experiences. [Zikmund et al., 2003]

CRM-centric company: A customer-centric company has an external point of view, making plans and decisions based on the anticipated impact on the customer. [Kincaid, 2003]

Customer life cycle: The customer life cycle is the total time that the customer is engaged with your company from the customer's experience and viewpoint. [Zikmund et al., 2003]

Customer touch points: Customer touch points are the means (media) that companies use to interact with their customers. [Zikmund et al., 2003]

Customer: A customer is a person (or a group of persons) who influences or decides on the acquisition of one of our products or services, or who uses one of

these products or services. [Kincaid, 2003]

Data classes: Data classes are the high-level categories of stuff that is important to the business. [Kincaid, 2003]

Data warehouse: The data warehouses are built from the information captured in transaction systems and reference or master files. [Kincaid, 2003]

e-CRM: The e-CRM is a special case of customer relationship management on the Internet. [Zikmund et al., 2003]

Eigenvalue: The eigenvalue is the scale factor with which the eigenvector length changes. [Field, 2005]

Factor analysis: Factor analysis attempts to identify underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. [Field, 2005]

Factor loading: The factor loadings are the correlation coefficients between the variables and factors. [Field, 2005]

Information quality: The information quality is mapped customer data deterioration, source data quality etc. that ensure information is correct in CRM system. [Kincaid, 2003]

Item analysis: The item analysis is an analysis based on the responses to individual questions. [Field, 2005]

Multiple regression analysis: The purpose of Multiple Regression is to analyze the relationship between a dependent variable (DV) and a set of independent variables (IV). [Field, 2005]

Principal component analysis (PCA): Principal component analysis (PCA) is a statistical and computational technique for revealing hidden factors that underlie sets of random variables, measurements, or signals. [Field, 2005]

Process: A process is a series of work steps that lead to a specific result. [Kincaid, 2003]

Product-centric company: Product-centric company is one that makes plans and decisions based on an internal perspective (the impact inside the company). [Zikmund et al., 2003]

Return on investment (ROI): ROI is the cost of project divided by revenue from project. [Kincaid, 2003]

Scree plot: A scree plot shows the sorted eigenvalues, from large to small, as a function of the eigenvalue index. [Field, 2005]

Security: Security is keeping customer information safe from anyone with whom companies have not planned to share it. [Zikmund et al., 2003]

The back office: The back office is comprised of functions such as R&D, manufacturing, procurement, quality, etc., because these are all involved in the development, construction, and delivery of the product or service itself. [Kincaid, 2003]

The front office: The front office is comprised of functions such as marketing, sales, customer service, product support, and any channel partner organizations that perform any of these functions. [Zikmund et al., 2003]