CHAPTER 3

CUSTOMER RELATIONSHIP MANAGEMENT

As discussed in the introduction Chapter, the important task in business for improving Customer Relationship Management (CRM) is to analyze the customer behavior. This can be achieved by employing data mining techniques using the benefits of RST. RST and its relevance in data mining are already described in Chapter 2. This Chapter introduces the importance of CRM and its related technologies. As this dissertation focuses on analysis of customer behavior, the analytical CRM is mainly concentrated in this Chapter.

3.1 IMPORTANCE OF CRM

The ways in which the organizations interact with their customers have changed dramatically over the past few years. This is because the organizations are faced with more customers, more competitors, more products, and less time to react to the changes in the business environment. This means that understanding customers are becoming more difficult and being able to keep up with changing customer behavior is more vital for organization survival (Berson et al 2000). The collected data needs to be converted into meaningful information or knowledge, in order to acquire a better understanding of many aspects of business and to enhance managers’ capability to make better decisions.
It is impossible for managers to make the correct decisions if the needed information cannot be accessed or presented to them intelligibly. The need for decision makers to have efficient access to knowledge, and not only data, has resulted in more and more organizations adopting the use of data mining. The wide availability of huge amounts of data and the imminent need for turning that data into useful information or knowledge is highlighted in the above discussion. It is one of the major reasons for the increased amount of attention that data mining and its related technologies have been attracted by the information technology companies and businesses in general in recent years (Berry & Linoff 2000). In this current changing business environment, organizations, and in particular, managers must be in a position to make informed decisions in order to respond to the changes in their business environments and to remain competitive. This is where, CRM came into existence.

CRM comprises a set of processes and enabling systems supporting a business strategy to build long term, profitable relationships with specific customers (Ling & Yen 2001). It is a philosophy of business operation for acquiring and retaining customers, increasing customer value, loyalty and retention, and implementing customer-centric strategies (Ngai et al 2009). It is an important technology in every business because the business is customer centric.

The benefits of CRM are different in each business and there are some benefits common to all businesses (Swift 2000). The common benefits are lower cost of customers’ acquisition, improvement of customer services, increase in customer retention and loyalty, higher customers’ profitability, easier identification of profitable customers and increase in company’s productivity. The cost of customers’ acquisition decreases due to the possibility of saving on marketing, mailing, contact, follow-up and fulfillment
services (Swift 2000). Customer service improves due to the analysis of processes promoted by CRM. The data integration and the knowledge sharing with all dealers incite the design of customized processes, which stimulates increased levels of service (Bull 2003). As a consequence of customer service improvement, customer satisfaction increases and customers stay longer. Moreover, loyalty increases because companies can use customers’ knowledge to develop loyalty programs (Swift 2000). Regarding customers’ profitability, it increases due to the increase of up-selling, cross-selling and follow up sales (Bull 2003). Companies are able to know which customers are profitable, which are going to be profitable in the future and which ones will never be profitable by the analysis of customers’ data (Swift 2000). CRM also promotes the increase of companies’ productivity since it enables the integration of all companies’ departments, such as information technology, finance and human resources (Romano & Fjermestad 2003).

From the architecture point of view, the CRM framework can be classified into operational and analytical (Berson et al 2000). Operational CRM refers to the automation of business processes. It helps to improve the efficiency of day-to-day customer operations (Peppers & Rogers 2011). Analytical CRM refers to the analysis of customer characteristics and behaviors so as to support the organization’s customer management strategies (Greenberg 2004). As this dissertation focuses on analysis of customer behavior, the analytical CRM is briefly explained in the next section.

3.2 ANALYTICAL CRM

Analytical CRM helps organizations to better discriminate and more effectively allocate resources to the most profitable group of customers through the cycle of customer identification, customer attraction, customer retention and customer development. Detailed knowledge must be built up
systematically so as to obtain a deeper understanding of each customer’s behaviors, characteristics and needs. The four dimensions of the analytical CRM cycle are essential to gain customer insight (Ling & Yen 2001).

CRM begins with customer identification, which is also referred as customer acquisition. This phase involves targeting the population who are most likely to become customers or most profitable to the company. It requires a comprehensive understanding of enterprise customers. It involves analyzing customers who are being lost to the competition and how they can be won back (Ngai et al 2009). Elements for customer identification include target customer analysis and customer segmentation. Target customer analysis involves seeking the profitable segments of customers through analysis of customers’ underlying characteristics, whereas customer segmentation involves the subdivision of an entire customer base into smaller customer groups or segments, consisting of customers who are relatively similar within each specific segment (Woo et al 2005).

Customer attraction is the phase following customer identification. After identifying the segments of potential customers, organizations can direct effort and resources to attract the target customer segments. An element of customer attraction is direct marketing. Direct marketing is a promotion process which motivates customers to place orders through various channels. For instance, direct mail or coupon distributions are typical examples of direct marketing (Cheung et al 2003, He et al 2004, Liao & Chen 2004, Prinzie & Poel 2005).

Customer retention is the central concern for CRM. Customer satisfaction, which refers to the comparison of customers’ expectations with his or her perception of being satisfied, is the essential condition for retaining customers (Kracklauer et al 2004). As such, elements of customer retention
include one-to-one marketing, loyalty programs and complaints management. One-to-one marketing refers to personalized marketing campaigns which are supported by analyzing, detecting and predicting changes in customer behaviors (Chen et al 2005, Jiang & Tuzhilin 2006, Kim & Moon 2006). Thus, customer profiling, recommender systems or replenishment systems are related to one-to-one marketing. Loyalty programs involve campaigns or supporting activities which aim at maintaining a long term relationship with customers. Specifically, churn analysis, credit scoring, service quality or satisfaction form part of loyalty programs (Ngai et al 2009).

Customer development involves consistent expansion of transaction intensity, transaction value and individual customer profitability. Elements of customer development include customer lifetime value analysis, up/cross selling and market basket analysis. Customer lifetime value analysis is defined as the prediction of the total net income a company can expect from a customer (Drew et al 2001, Etzion et al 2005, Rosset et al 2003). Up/Cross selling refers to promotion activities which aim at augmenting the number of associated or closely related services that a customer uses within a firm (Prinzie & Poel 2005). Market basket analysis aims at maximizing the customer transaction intensity and value by revealing regularities in the purchase behavior of customers (Aggarwal et al 2002, Brijs et al 2004, Chen et al 2005).

Customer identification is the important phase in analytical CRM because once the customer is identified; he can be attracted, retained and developed further. So, this thesis focuses on customer segmentation and target customer analysis of customer identification phase. It is used to analyze the behavior of the customers by employing data mining techniques.
3.3 RELEVANCE OF DATA MINING TOWARDS CRM

Data mining tools are a popular means of analyzing customer data within the analytical CRM framework. Many organizations have collected and stored a huge amount of data about their current customers, potential customers, suppliers and business partners. However, the inability to discover valuable information hidden in the data prevents the organizations from transforming these data into valuable and useful knowledge (Berson et al 2000). Data mining techniques could help these organizations to discover the hidden knowledge in the enormous amount of data. With comprehensive customer data, data mining technology can provide business intelligence to generate new opportunities. Data mining enables marketers to better extract valuable business information from the 'mountains of data' in a firm's systems. The application of data mining in CRM is an emerging trend in the global economy. Analyzing and understanding customer behaviors and characteristics is the foundation of the development of a competitive CRM strategy, so as to acquire and retain potential customers and maximize customer value. Appropriate data mining techniques, which are good at extracting and identifying useful information and knowledge from enormous customer databases help in making different CRM decisions (Berson et al 2000).

According to Berry & Linoff (2000), the resulting knowledge or information gained from data mining efforts, can benefit an organization in one of three ways. These are increasing organizational profits by lowering costs, increasing organizational profits by increasing revenues and increased profit via either of the above mentioned two methods. Data mining attempts to accomplish one or more of these goals by predicting future business trends and customer behavior patterns from large data warehouses. A better understanding of the buying behavior of customers can enhance the
effectiveness of target marketing practices. Data warehousing technology has made it possible for organizations to accumulate massive amounts of data, and data mining offers an effective means of analyzing that data and converting it into valuable information or knowledge. According to Maimon & Rokach (2010), organizational theory suggests that knowledge management and decision making are constrained by the abilities of the decision maker, and that this organizational knowledge management is a learned ability that can only be achieved through an organized and deliberate methodology. Data mining is a key part of this methodology, and its successful implementation can lead to enhanced organizational decision making. According to Berry & Linoff (2000), many corporations of today have in many cases lost sight of their customers. The promise of data mining is to return the focus of these organizations to serve their customers better and to provide more efficient business processes.

The data mining techniques such as association, classification, clustering, forecasting, regression, sequence discovery and visualization fulfills the requirements of CRM. Choices of data mining techniques should be based on the data characteristics and business requirements (Giraud-Carrier & Povel 2003). Within the context of CRM, data mining can be seen as a business driven process aimed at the discovery and consistent use of profitable knowledge from organizational data (Ling & Yen 2001). It can be used to guide decision making and forecast the effects of decisions. For instance, data mining can increase the response rates of the marketing campaign by segmenting customers into groups with different characteristics and needs; it can predict how likely an existing customer is to take his/her business to a competitor (Giraud-Carrier & Povel 2003).

Association aims to establish relationships between items which exist together in a given record (Ahmed 2004, Jiao et al 2006, Mitra et al
Market basket analysis and cross selling programs are typical examples for which association modeling is usually adopted.

Classification is one of the most common learning models in data mining (Ahmed 2004, Berry & Linoff 2000, Giraud-Carrier & Povel 2003). It builds a model to predict future customer behaviors by classifying database records into a number of predefined classes based on certain criteria (Ahmed 2004, Berson et al 2000, Mitra et al 2002).

Clustering is the task of segmenting a heterogeneous population into a number of more homogenous clusters (Ahmed 2004, Berry & Linoff 2000, Giraud-Carrier & Povel 2003, Mitra et al 2002). It is used to segment the customers according to their purchase behavior. The customer segmentation based on the data mining can be helpful for the enterprises to make suitable promotion strategy with suitable products and services for suitable customers. The customer value and the customer loyalty are important to enterpriser’s stratagem and management tactics. Enterprises can confirm the rank of customer according to their expected value and loyalty analyzed by segmentation model based on data mining. Risk scoring is an effective way of evaluating certain specific types of customer risk, normally the risk of default. Enterprises can find out the preference of theirs customers by analyzing the customer based on data mining. It makes sure that various demands will be realized in the new design. Customer segmentation using data mining can make targeted customer group clear and locate the market explicitly (Chen et al 2006).

Forecasting estimates the future value of the customer based on a record’s patterns. It deals with continuously valued outcomes (Ahmed 2004, Berry & Linoff 2000). Demand forecast is a typical example of a forecasting
model. It finds its application in forecasting the future purchase of the customers.

Regression is a kind of statistical estimation technique used to map each data object to a real value which provide prediction value (Giraud-Carrier & Povel 2003, Mitra et al 2002). Uses of regression include curve fitting, prediction, forecasting, modeling of causal relationships, and testing scientific hypotheses about relationships between variables. Common tools for regression include linear regression and logistic regression. The lifetime value of a customer is obtained using regression analysis.

Sequence discovery is the identification of associations or patterns over time (Berson et al 2000, Giraud-Carrier & Povel 2003, Mitra et al 2002). Its goal is to model the states of the process which generates the sequence or trends over time. It also extracts deviation (Mitra et al 2002). It is used in market basket analysis and complaints management. Common tools for sequence discovery are statistics and set theory.

Visualization refers to the presentation of data so that users can view complex patterns (Shaw 2001). It is used in conjunction with other data mining models to provide a clearer understanding of the discovered patterns or relationships. Examples of visualization model are 3D graphs, Hygraphs and SeeNet (Shaw 2001).

A combination of data mining techniques is often required to support or forecast the effects of a CRM strategy. For instance, in the case of up/cross selling programs, customers can be segmented into clusters before an association model is applied to each cluster. In such cases, the up/cross selling program would be classified as being supported by an association model because relationships between products are the major concern. In the case of
direct marketing, a certain portion of customers may be segmented into clusters to form the initial classes of the classification model. The direct marketing program would be classified as being supported by classification as prediction of customers’ behavior is the major concern.

3.4 CHALLENGES FOR CRM THROUGH DATA MINING

The key data mining challenges and opportunities for better customer relationship management are discussed below:

Data is acquired for deeper understanding in a non-intrusive, low-cost and high accuracy manner. Companies collect their customer data from different resources for CRM. Once the datasets have been collected, they might be presented in different kind of formats and might be located at different departments within an organization. Therefore, data mining technique is required to solve these problems (Westphal & Blaxton 1998).

Models of customer behavior are developed to describe the understanding of the requirements of the customer. It is suggested that all the information from the customer point of views should be involved for building the customer model. Data mining technique could take an advantage in this point and it enables to detect all the customer data and integrate the data into one piece of information used in CRM. There are two specific issues to be considered. The first issue determines the level of the customer model. The second issue determines the dimensions to be considered in the customer model (Westphal & Blaxton 1998).

Framework for distinguishing between the correct or incorrect customer understanding is required, although company has found difficult to build up a customer model, but the evaluation of the model is also a complex task too. There is no standard metric to measure how well is the
particular model compared with others or whether the model will be reflected to the customer behavior or not. Yet, there are still metrics to measure the quality of the customer model, but it is essential to work better on the measurement. This depends on the data analysis from data mining (Westphal & Blaxton 1998).

Non-trivial results always need a combination of data mining techniques. This describes the importance to the composition of data mining and the data analysis in general. If the company wants to analyze the data for CRM, then it should observe the data from different angles and be aware that different aspects of the data could appear with different meanings. In this case, it requires the data mining technique to combine all the data into single relevant information for decision-making purposes (Westphal & Blaxton 1998).

Real-world validation of results is essential for acceptance. This describes the detected patterns for CRM by data mining techniques. They are usually tested for the real data for the actual acceptance. It is essential that the testing data should verify the acceptance because it shows that the data is realistic and reliable to use in the real situation (Westphal & Blaxton 1998).

Good actioning mechanisms are required even if data mining provides a trusted result. Therefore, the user has to integrate the analyzed data into the knowledge discovery process, so that they could focus on the patterns in the customer data based upon the discoveries (Westphal & Blaxton 1998).

Incorporating prior knowledge could help to solve the problem where data mining tends to find many divisions of patterns that may be already known or redundant. However, there are a number of difficulties existing such as the knowledge acquisition from domain expert being hard and
in other case that they might know a lot but difficult to contribute it by verbal means. Some experts might not be sure about what is the relevant to the knowledge, because it could be very wide. But after they understand the discovered patterns, then the experts could apply their knowledge onto it. Once again, data mining could be conducted to give the promised results but it still needs to apply specific expert knowledge before it provides a good recommendation for business purposes (Westphal & Blaxton 1998).

3.5 SUMMARY

This Chapter discusses the importance of CRM and its various aspects. In this Chapter, the focus is mainly on analytical CRM and the relevance of data mining in CRM. The various challenges faced in applying data mining for CRM is also discussed. This Chapter reveals that in analytical CRM, customer behavior analysis is the important task and it can be achieved by using both clustering and rule induction algorithms. The literature survey of clustering algorithms is presented in the next Chapter.