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Data warehousing and Data Mining: A model for Designing and Testing CRM in Banking Sector

Dr.Porandla Srinivas
Lecturer/Department of Computer Science
Ambo University, Ambo, Ethiopia.

***Abstract*— Today, many businesses such as banks, insurance companies, and other service providers realize the importance of Customer Relationship Management (CRM) and its potential to help them acquire new customers retain existing ones and maximize their lifetime value. At this point, close relationship with customers will require a strong coordination between IT and marketing departments to provide a long-term retention of selected customers. This paper deals with the role of Customer Relationship Management in banking sector and the need for Customer Relationship Management to increase customer value by using some analytical methods in CRM applications.**

CRM is a sound business strategy to identify the bank's most profitable customers and prospects, and devotes time and attention to expanding account relationships with those customers through individualized marketing, re-pricing, discretionary decision making, and customized service-all delivered through the various sales channels that the bank uses. Under this case study, a campaign management in a bank is conducted using data mining tasks such as dependency analysis, cluster profile analysis, concept description, deviation detection, and data visualization. Crucial business decisions with this campaign are made by extracting valid, previously unknown and ultimately comprehensible and actionable knowledge from large databases. The model developed here answers what the different customer segments are, who more likely to respond to a given offer is, which customers are the bank likely to lose, which most likely to default on credit cards is, what the risk associated with this loan applicant is. Finally, a cluster profile analysis is used for revealing the distinct characteristics of each cluster, and for modeling product propensity, which should be implemented in order to increase the sales.

Index terms –Data mining, Data warehousing, CRM, campaign management, Dependency Analysis, Data Visualization.

I. RELATED WORK

In literature, many definitions were given to describe CRM. The main difference among these definitions is technological and relationship aspects of CRM. Some authors from marketing background emphasize technological side of CRM while the others consider IT perspective of CRM. From marketing aspect, CRM is defined by [Couldwell 1998] as "a combination of business process and technology that seeks to understand a company's customers from the perspective of who they are, what they do, and what they are like". Technological definition of CRM was given as "the market place of the future is undergoing a technology-driven metamorphosis" [Peppers and Rogers 1995]. Consequently, IT and marketing departments must work closely to implement CRM efficiently. Meanwhile, implementation of CRM in banking sector was considered by [Mihelis et al. 2001]. They focused on the evaluation of the critical satisfaction dimensions and the determination of customer groups with distinctive preferences and expectations in the private bank sector. The methodological approach is based on the principles of multi-criteria modeling and preference disaggregation modeling used for data analysis and interpretation. [Yli-Renko et al. 2001] have focused on the management of the exchange relationships and the implications of such management for the performance and development of technology-based firms and their customers. Specifically the customer relationships of new technology-based firms have been studied. [Cook and Hababou, 2001] was interested in total sales activities, both volume-related and non-volume related. They also developed a modification of the standard data envelope analysis (DEA) structure using goal programming concepts that yields both a sales and service measures. [Beckett-Camarata et al. 1998] have noted that managing relationships with their customers (especially with employees, channel partners and strategic alliance partners) was critical to the firm's long-term success. It was also emphasized that customer relationship management based on social exchange and equity significantly assists the firm in developing collaborative, cooperative and profitable long-term relationships. [Yuan and Chang 2001] have presented a mixed-initiative synthesized learning approach for better understanding of customers and the provision of clues for improving customer relationships based on different sources of web customer data. They have also hierarchically segmented data sources into clusters, automatically labeled the features of the clusters, discovered the characteristics of normal, defected and possibly defected clusters of customers, and provided clues for gaining customer retention. [Peppers 2000] has also presented a framework, which is based on incorporating e-business activities, channel management, relationship management and back-office/front-office integration within a customer centric strategy. He has developed four concepts, namely Enterprise, Channel management, Relationships and Management of the total enterprise, in the context of a CRM initiative. [Ryals and Knox

2001] have identified the three main issues that can enable the development of Customer Relationship Management in the service sector; the organizational issues of culture and communication, management metrics and cross-functional integration especially between marketing and information technology.

II. Customer Relationship Management Objectives in Banking Sector

The idea of CRM is that it helps businesses use technology and human resources gain insight into the behavior of customers and the value of those customers. If it works as hoped, a business can: provide better customer service, make call centers more efficient, cross sell products more effectively, help sales staff close deals faster, simplify marketing and sales processes, discover new customers, and increase customer revenues. It doesn't happen by simply buying software and installing it. For CRM to be truly effective an organization must first decide what kind of customer information it is looking for and it must decide what it intends to do with that information. For example, many financial institutions keep track of customers' life stages in order to market appropriate banking products like mortgages or IRAs to them at the right time to fit their needs. Next, the organization must look into all of the different ways information about customers comes into a business, where and how this data is stored and how it is currently used. One company, for instance, may interact with customers in a myriad of different ways including mail campaigns, Websites, brick-and-mortar stores, call centers, mobile sales force staff and marketing and advertising efforts. Solid CRM systems link up each of these points. This collected data flows between operational systems (like sales and inventory systems) and analytical systems that can help sort through these records for patterns. Company analysts can then comb through the data to obtain a holistic view of each customer and pinpoint areas where better services are needed. In CRM projects, following data should be collected to run process engine:

1) Responses to campaigns
2) Shipping and fulfillment dates
3) Sales and purchase data
4) Account information
5) Web registration data
6) Service and support records
7) Demographic data and
8) Web sales data.

III. A Model Design For CRM at UCO Bank

UCO Bank, one of the leading banks in India was looking at new ways to enhance its customer potential and service quality. Electronic means of banking have proved a success in acquiring new customer groups until the end of 1999. After then, a strategic decision was made to re-engineer their core business process in order to enhance the bank's performance by developing strategic lines. Strategic lines were given in order to meet the needs of large Indian and multinational corporate customers, to expand commercial banking business, to focus expansion in retail banking and small business banking, to use different delivery channels while growing, and to enhance operating efficiency though investments in technology and human resources To support this strategy UCO Bank has implemented a number of projects since 1992 regarding branch organization, processes and information systems. The administration burden in the branches has been greatly reduced and centralized as much as possible in order to leave a larger room to marketing and sales. The BPR projects have been followed by rationalizing and modernizing the operational systems and subsequently by the introduction of innovative channels: internet banking, call center and self-servicing. In parallel, usage of technology for internal communication: intranet, e-mail, workflow and management reporting have become widespread.

IV. CRM Development

To be prepared to the changing economic conditions and, in particular, to a rapidly decreasing inflation rate scenario UCO Bank has started timely to focus on developing a customer relationship management (CRM) system. The total number of customers is presently around two millions, but an increase to roughly three millions is foreseen as merging with other banks are achieved and the present growth targets are reached. The importance for the bank of managing the relationships with their customers has been the drive of the joint projects that have been developed with IBM in the last three years. During the projects a number of crucial technological and architecture choices have been made to implement the entire process. Realizing the importance of customer information availability the first of these projects has focused on the problem of routinely collecting and cleansing data. The project has been undertaken by the bank with the spirit that has characterized the whole CRM development. The project has promoted a massive involvement of the branches, namely of the portfolio managers and campaigns have been launched for popularizing among branch staff the importance of gathering and maintaining reliable customer data. Another set of methods have been tested for customer not included in portfolios (pool customers), such as mailing or distributing questionnaires in the branches or using automatic teller machines (ATM) and the call center. Methods for data checking and testing have been developed to be routinely employed by the bank's staff. Results obtained are very good: for portfolio customers data available are respectively 98% for the commercial ones and 85% for the retail ones. For pool customers availability goes down to 65%: this is a well-known phenomenon due to the loose relationship with the latter customers.

V. Data Warehouse and Data Mining

The Data warehouse is the core of any decision support

system and hence of the CRM. In implementing its Data Warehouse UCO Bank has selected an incremental approach, where the development of information systems is integrated with the business strategy. Instead of developing a complete design of a corporate Data Warehouse before implementing it, the bank has decided to develop a portion of the Data Warehouse to be used for customer relationship management and for the production of accurate and consistent management reports. Here we are not concerned with the latter goal, but are concentrating on the former.

The Data Warehouse has been designed according to the IBM BDW (Banking Data Warehouse) model that has been developed as a consequence of the collaboration between IBM and many banking customers. The model is currently being used by 400 banks worldwide. The UCO Bank Data Warehouse is regularly populated both from operational systems and from intermediate sources obtained by partial preprocessing of the same raw data.

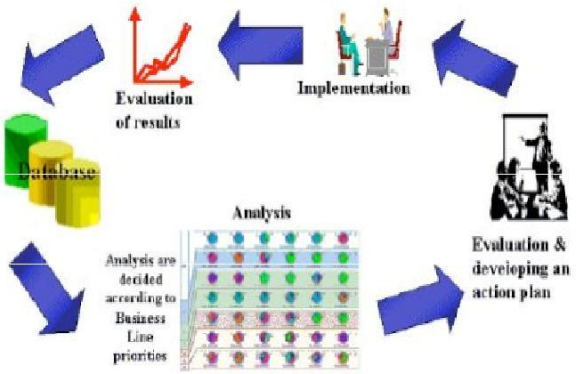

Figure 1. The process of Relational Marketing

STATISTICA Data Miner, A venture of StatSoft worldwide, is a revolutionary product in the data mining applications. It enables financial institutions to Detect patterns of fraud; Identify causes of risk; create sophisticated and automated models of risk, Segment and predict behaviour of homogeneous groups of customers, Uncover hidden correlations between different indicators.

11Ants Analytics Ltd is a venture backed company located in Hamilton, New Zealand. 11Ants Analytics is committed to making advanced data mining accessible to non-technical users. They have built incredibly powerful data mining software which is deceptively simple to use.

Data Mining with SAS® Enterprise Miner: SAS data mining software helps customers to: detect fraud; anticipate resource demands, increase acquisitions, curb customer attrition.

VI. CONCLUSION

Data mining is a tool used to extract important information from existing data and enable better decision-making throughout the banking and retail industries. They use data warehousing to combine various data from databases into an acceptable format so that the data can be mined. The data is then analyzed and the information that is captured is used throughout the organization to support decision-making. It is universally accepted that many industries (including banking, retail and telecom) are using data mining effectively. Undoubtedly, data mining has many uses in industries. Its practical applications in such areas as analyzing medical outcomes, detecting credit card fraud, predicting customer purchase behavior, predicting the personal interests of Web users, optimizing manufacturing processes etc. have been very successful. It has also led to a set of fascinating scientific questions about how computers might automatically learn from past experience. The retail industry is also realizing that data mining could give them a competitive advantage. A majority of the banks in developing countries (particularly in the public sector) are not usually known to exploit their information 'asset' for deriving business value through data mining and gain competitive advantage. But with progressive liberalization of rules on entry for private and foreign multinational banks, under the GATS framework of WTO, competitive pressure on domestic banks is increasing. Thus, customer retention and acquisition will be an important determinant of the banks' bottom lines. Those banks and retailers that have realized the utility of data mining and are in the process of building a data mining environment for their decision-making process will reap immense benefit and derive considerable competitive advantage to withstand competition in future.

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Authors Profile

Porandla Srinivas received the **B.Tech.** Degree in Information Technology from the Kshathriya College of Engineering, Armoor, JNTUH, India, received the **M.Tech.** Degree in CSE from Acharya Nagarjuna University, India and received the Ph.D. degree in Computer Science from Allahabad University. His research interest includes Data Mining, Cloud Computing, and Communication networks.