THE ROLE OF DATA MINING ON THE SUCCESSFUL CUSTOMER RELATIONSHIP MANAGEMENT

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Abstract - The relationship between Data Mining (DM) and Customer Relationship Management (CRM) has been studied within an empirical study in Carrefour Chain Store-Family Mall branch in Erbil province-Iraq. Data Mining has been considered as a vital element in business domain. As such Customer Relationship Management has become more important in the industry especially the service segmentation. That is why this study has been select Carrefour Store as a biggest store in Erbil province. The study proposed that there is no statistical relationship between DM techniques and CRM as a dependent variable. A specific Questionnaire has been considered In order to complete the practical side of this paper. SPSS-20 software package has been used to find out data analysis. Based on the analysis a conclusion has been drawn that DM techniques represent the main key for the success of CRM.

Keywords - Data Mining, Data Mining techniques, Data Mining Process, Customer Relationship Management , Successful Customer Relationship Management.

I. INTRODUCTION

The success of any organization depends primarily on how it manages its customer relationships, which leads to lifelong customer satisfaction. CRM has recently emerged as a strategic solution to modern business problems. It is based on an important philosophy which is that all the business activities must focus on customer [1]. Customer relations is the process of expanding the relationship between the organization and its customers, but in today's markets cannot build such a relationship in its traditional form, but the spirit of the era calls on marketing personnel to act intelligently to achieve the best possible investment from the customers of the Organizations. This can be done through applying information and communication technologies in order to know more about customer's needs and behaviors. Data mining is the best tool to do that [2]. Building a long-term interactive relationship with the customer obsession revolves throughout the organization. Nowadays business organizations are spending a lot of money on CRM, the philosophy behind that is to create an integrated view of the customer across the organization. Thais need to acquire huge information about the customers. This is going to be done through use the DM techniques [3]. CRM is the process of manage customer information carefully in all aspects in order to maximize loyalty. CRM allows organizations to provide timely customer service through optimal use of individual information based on what you know about the value of each customer [4]. The need for a procedural stage to derive data specifications and relationships and to provide new information previously unknown in traditional information systems has revealed the importance of Data Mining. The role of information systems in this new environment has become systems for knowledge as integrated systems that add to their traditional functions new roles that provide extensive information in various fields including relationship with customers [5]. Data mining has become a modern concept in the success of decision support systems in modern business organizations [6]. Data Mining provides a solution to many problems. It aims to obtain unknown information from databases for use in the decision-making process. It also improves the understanding of the accumulated data and the extraction of existing information in order to invest in a manner that leads to a sound decision to avoid the organization any potential losses and raise the level of performance. It can help to identify the right opportunities, and offers the right additional products to the existing customers and identify good customers who may be about to leave. CRM applications that use data extraction are called analytical CRM [7]. This paper is keen to demonstrate the level of contribution of DM to the successful CRM.

II. REVIEW OF THE LITERATURE

2.1 Data Mining

Organizations which collect a large quantity of data are in fact wants information, so the newest and fastest technique to deal with this size of data and answer business questions is to explore data which is possible to be done through DM. This will be similar to gold exploration. Gold exploration is a process of screening between quantities of raw metal to find a mass of precious metal. As such the process of DM will be as a process of screening between quantities of data to find useful information for all of the organizational functions [8]. DM is the process of extracting and presenting implicit knowledge from large volumes of databases for actionable decisions. It can convert data into information and knowledge, such that the right decisions can be made. It can also provide the mechanisms to deploy knowledge into

operational systems, and then the right action occurs [5]. Bazsalica & Naim (2001) [9] highlighted that DM is the process of accurate analysis of data, as well as intelligent, interactive and sequential procedures allow users to make appropriate decisions regarding organizational activities. Hand et al (2001) [10] elucidate that DM is a process of analyzing large volumes of data and searching for possible relationships between them and then summarizing data in new forms in order to be understood and useful to users.

2.2 Data Mining Process

The process of DM can be summarized as follows: [11]; [12]

2.2.1 Business Understanding: This step involves identifying organizational objectives and the problems they face in order to identify the data needed to determine the current position of the organization and thus how to achieve the highest benefit from data mining.

2.2.2 Data Understanding: This step consists of "initial data gathering, data description, data investigation, and the verification of data quality".

2.2.3 Data Preparation: After selecting of data sources, the process of selecting, cleaning, inserting and formatting the data begins. At this stage data is cleaned up and converted through data modeling. Here the data can be explored at greater depth, using multiple models, allowing the opportunity to see new patterns based on business understanding.

2.2.4 DM Modeling: The construction of the model requires decision-making on the kind of prediction to be made (such as classification and regression) and then choosing the type of model for making prediction that can be a decision tree, neural network or other. It is important that many alternative models are built to find the most advantageous model in solving the problem. This requires some data changes. Note that models must be appropriate for multiple dimensions and their ability to handle digital and non-numeric data.

2.2.5 Evaluate model: The results of the model should be evaluated in the context of the business objectives identified in the first phase "business understanding". Therefore, the expected results are compared with the actual results in the stability of the data packet running. This comparison or differentiation leads to the verification of a model's accuracy.

2.2.6 Deployment: Data extraction can be used to verify previously held, hypotheses, or to discover knowledge "unexpected identification and useful relationships". This involves the dissemination and distribution of the model within the organization to assist decision-making.

2.3 Data Mining Techniques

Data mining uses many techniques to detect trends and hidden models in large amounts of data. One or more of these techniques can be used as follows: [13]; [11]; [14]; and [6]

2.3.1 Classification: It analyzes a set of data to form a set of aggregated rules that can be used to classify future data, i.e. to find information about common characteristics. Classification can be done through several tools such as decision tree, nearest neighbor, and regression. This will help in approach to predict customer behavior Database records.

2.3.2 Association: this is refers to a rule that contains constant association relationships between a set of data in the database. As such this will help in association between an event and another event.

2.3.3 Clustering: It is a descriptive technique that brings together similar entities together and heterogeneous data into several clusters based on similar characteristics in different groups and relies mainly on Similarity between data properties. The aim is to assist in the development of marketing programs designed to be compatible with customers in various marketing sectors. This technique designed to entice customers to repeat purchases or turn them into permanent customers.

2.3.4 Regression: This refers to look for relationships or links that exist between several properties. It includes a set of methods that are used to link buying patterns across similar marketing segmentations or over time. For example, the information contained in goods purchased by customers is used to predict goods that may be purchased if special offers are made to them.

2.4 Customer Relationship Management

The core concept of the Customer relationship management spouts from the benefits of modern marketing as a key to the organizational success, growth and survival and in the pursuit in order to achieve customer's satisfaction, and loyalty as well as customers value creation [15]. CRM is a renewed perspective in the principles of relationship marketing. The key difference is that CRM is applied in this context with unprecedented technological and technological innovations [16]. CRM is a business strategy to select and manage customers to optimize long-term value. CRM requires a customer-centric business philosophy and culture to support effective marketing sales and service processes. CRM applications can enable effective Customer Relationship Management, provided that an enterprise has the right leadership, strategy, and culture [17]. According to Ferrell et al. (2011) [18] CRM can be defined as a "Business philosophy helps to identify and increase the value of customers in ways that motivate customers to maintain loyalty". Patrick L. (2001) [19] highlighted that the CRM is a set of tools, processes and techniques that help to collect detailed information about customers and earn , maintain and increase added customer value in the organization. Philip and Kevin (2014) [20] illustrate that CRM is a process that involves collecting detailed and accurate information for each customer in a manner that leads to managing all the moments of contact with customers with high accuracy.

2.5 Successful Customer Relationship Management

In order to successfully implement the concept of customer relationship management, there are five key elements that must be met to ensure successful implementation this concept is as follows: [21]; [22]; and [23].

a) Needs Analysis: This is the first step of successful CRM implementation which is should include a good needs analysis. This will be the vital step in order to implement and run a successful CRM system. As every business has different needs and processes; what makes CRM work in one company may not be relevant for another.

b) Customer- Oriented Strategy: The overall strategic direction of the organization must be geared toward customer service i.e. the activities of the organization at all levels must be dedicated to serving customers, satisfying their needs and responding to their purchasing preferences.

c) Competitive Advantage: The choice of competitive strategy is based on the distinction of marketing presentation Which provides the Organization of the other offers according to the basic data resulting from the organization's dealings with its customers, Thus, organizations that are able to provide a better understanding of their customers are closer to success than other organizations.

d) Availability of Information: Information about customers, sales, products, purchasing behavior, etc. will be useless if it is not used to formulate and implement marketing strategies that are appropriate with the reality that the customer seeks to reach.

e) Organizational Style: It is the way the organization chooses to practice its basic activities and functions, and it greatly influences the choice of how to deal with customers, this may include the following aspects:

- Understanding and anticipating customers and respond to them as quickly as possible.
- An incentive system based on customer understanding and satisfaction.
- A well-trained staff on how to deal with customers.

f) Customers Value: this represents the foundation for the organization to diagnose profitable non-profit costumers to bridge their relationships with them. It describes the tangible and intangible benefits of CRM activities that help to successfully arrange customer relationship and can be realized through value added by virtual community information, loyalty program.

III. METHODOLOGY

It is possible to clarify the methodology of this research through the following main features:

3.1 Problem Identification

The research problem can be identified through raising the following two questions:

(a) Is there a relationship between Data Mining and successful Customer Relationship Management?

(b) Does Data Mining have an influence on the success of Customer Relationship Management?

3.2 Hypothesis: It is possible to answer the questions faced in the research problem through the following hypotheses:

Hypothesis 1:

H0: There is no significant relationship between Data Mining and Successful Customer Relationship Management.

H1: There is a significant relationship between Data Mining and Successful Customer Relationship Management.

Hypothesis 2:

H0: There is no significant influence of Data Mining on Successful Customer Relationship Management.

H1: There is a significant influence of Data Mining on Successful Customer Relationship Management.

3.3 Objectives: This paper is keen to achieve several objectives, amongst these are:

1- To study the relationship between Data Mining and Successful Customer Relationship Management in Carrefour Chain Store-Family Mall branch in Erbil.

2- To study the influence of Data Mining on successful Customer Relationship Management in Carrefour Chain Store-Family Mall branch in Erbil.

3.4 Research Model: A default research model has been proposed to illustrate the dimensions of the problem being investigated and to test the hypotheses of the research as shown in Figure 1:

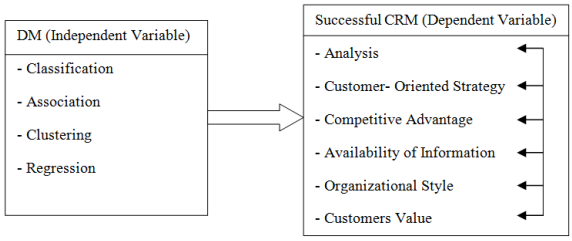

Fig.1. Research Model

IV. SAMPLES DATA ANALYSES AND RESULTS DISSECTIONS

This study has been done in Carrefour Chain Store-Family Mall branch in Erbil-Iraq. Carrefour is a French multinational retailer it is one of the largest hypermarket chains in the world (with 1,462 hypermarkets at the end of 2016). Carrefour operates in more than 30 countries, in Europe, Americas, Asia and Africa. The company opened the first Carrefour in Erbil-Iraq in 2011. In order to complete the practical side of this paper, and also to examine the presented two hypotheses, a specific “Questionnaire” has been considered. The data analyses were achieved through the respective “Questionnaire”, depending on the Statistical Package for Social Sciences (SPSS-20). Primary and secondary data have been utilized in this study. Secondary data collected from books and journals, whereas primary data have been collected from Carrefour Chain Store-Family Mall Branch. Target respondents were the employees of the sample

store. 230 employees have been taken randomly. From 230 questionnaires only 205 questionnaires has been collected because 15 of them have failed to complete all questions in the questionnaire. Questionnaires and interviews conducted for empirical survey were done through face to face and it has been documented carefully. The questionnaire was developed using a five-point Likert scale to measure the ratings of the respondents. In rating scale, 5 is highest and 1 is the lowest ratings. Whereas 2, 3, 4 are "I don't agree", "Neutral", and "Agree" respectively.

4.1 Reliability

The authors used Cronbach's Alpha test in order to establish internal consistency as it's observe in table 1 below.

Reliability of the questionnaire	Cronbach's Alpha
	.80

Source: SPSS Results

Table 1: Reliability Statistics of the Questionnaire

The alpha coefficient calculated above in the table 1, found 0.80. This implies that the items have relatively high internal consistency, which is favorable for the research done.

4.2 Hypotheses Testing

Hypothesis 1:

Independent variable / Depended variable	Data Mining
Successful Customer relationship management	0.485**

** Correlation is significant at the 0.05 level

N= 205

Source: SPSS Results.

Table 2: The correlation between Data Mining and Successful Customer relationship management

The null hypothesis states that there is no significant relationship between DM and Successful CRM. In order to know the nature of relationship between DM and Successful CRM, The table (2) indicates that there is a positive correlation between DM and Successful CRM, as the value of r = .48 which is significant at 0.05 level. As such, the null hypothesis has been rejected.

Hypothesis 2:

Independent variable / Depended variable	Data Mining					
	R^2	D.F	F		0β	β
			Funded	Sig		
Successful CRM	0.221	1 204	91.831	.000	0.416	0.857 (9.485)**

**. Correlation is significant at the 0.05level N= 205

Source: SPSS Results.

Table 3: Model Summary of Regression analysis between DM and Successful CRM

Referring to the results of DM being an independent dimension affecting CRM as dependent dimension clarified in the table (3), it's observed that the specifying coefficient (R^2) indicates that the interpreted difference proportion in CRM due to the influence of DM is 22.1%, F (1.204) = 91.83, $p < 0.05$, whereas the rest of proportion represents the proportion of the participating variable not included in the study model, or the uncontrollable variables. This implies that gradient curve is adequate for interpreting the relation between DM and CRM as well as the significant implication towards the overall pertinent influence relation. The value of beta is .41 with the t value of 9.48 which is significant at .05 level.

CONCLUSIONS

The relationship between Data Mining (DM) and Customer Relationship Management (CRM) was studied in Carrefour Chain Store-Family Mall branch in Erbil province-Iraq. The major conclusions are as follows:

1. Customer service is considered as the key element that keeps the current business to be growing.
2. The primary objective of the study was achieved by contributing to greater success in organizations when implementing CRM through the adoption of data mining techniques.
3. The interest of members of the study community in applying the concepts of data mining in various functions, especially the organization's relations with customers, was generally high.
4. Data Mining allows to the companies to improve relationships with customers, better informing of them, and better strategic vision.
5. Carrefour Chain Store-Family Mall branch in Erbil has well established Data Mining in order to make Customer Relationship Management more successful.

6. There was a statistically significant correlation between data mining and customer relationship management where the correlation coefficient reached (0.485) at a significant level (0.05) indicating the existence of the effect of Data Mining on the Customer Relationship Management. As such the null hypothesis 1 rejected and alternative hypothesis 1 has been accepted.
7. There was a statistically significant correlation at α (0.05) between Data Mining and Customer Relationship Management. The correlation coefficient (R^2) (0.221) was statistically significant at α (0.05). As such the null hypothesis 2 rejected and alternative hypothesis 2 has been accepted.

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