



**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH  
TECHNOLOGY**

**A REVIEW ON DATA MINING TECHNIQUES USED TO IMPROVE THE  
CUSTOMER RELATIONSHIP MANAGEMENT THAT HELPS TO IMPROVE THE  
BUSINESS REVENUE**

**Purnima Chourasiya\***

\*SOC, IPS Academy, Indore (M.P.), India

DOI: 10.5281/zenodo.1219794

**ABSTRACT**

In recent years many organizations have identified the need to become more customers facing with increased global competition. As a consequence, customer relationship management (CRM) has risen to the agenda of many organizational strategies. The past decade has witnessed a shift from the need to manage transactions to that of the need to manage relationships. Where Enterprise Resource Planning software dominated the management of transactions era, CRM software leads in regard to relationships. At present, a balanced view of CRM software is scantily presented instead relying on vendor oratory. The number of customer relationship management (CRM) implementations has grown dramatically in recent years. Data Mining is the process that uses a variety of data analysis and modeling techniques to discover patterns and relationships in data that may be used to make accurate predictions. It can help you to select the right prospects on whom to focus. The essence of the information technology revolution and, in particular, the World Wide Web is the opportunity to build better relationships with customers than has been previously possible in the offline world. For instance, as part of their CRM strategy, a business might use a database of customer information to help construct a customer satisfaction survey, or decide which new product their customers might be interested in. In this paper, we are introducing the data mining techniques to improve the customer relationship management.

**KEYWORDS:** Customer Relationship management, Data Mining Techniques, Relationship, Customer Value.

**I. INTRODUCTION**

Customer Relationship management is the strongest and the most efficient approach in maintaining and creating relationships with customers. Customer relationship management is not only pure business but also ideate strong personal bonding within people. Development of this type of bonding drives the business to new levels of success. Once this personal and emotional linkage is built, it is very easy for any organization to identify the actual needs of customer and help them to serve them in a better way. It is a belief that more the sophisticated strategies involved in implementing the customer relationship management, the more strong and fruitful is the business. Most of the organizations have dedicated world class tools for maintaining CRM systems into their workplace. Some of the efficient tools used in most of the renowned organization are BatchBook, Salesforce, Buzzstream, Sugar CRM etc.

**Looking at some broader perspectives given as below we can easily determine why a CRM System is always important for an organization. [13]**

1. A CRM system consists of a historical view and analysis of all the acquired or to be acquired customers. This helps in reduced searching and correlating customers and to foresee customer needs effectively and increase business.
2. CRM contains each and every bit of details of a customer, hence it is very easy for track a customer accordingly and can be used to determine which customer can be profitable and which not.
3. In CRM system, customers are grouped according to different aspects according to the type of business they do or according to physical location and are allocated to different customer managers often called as account managers. This helps in focusing and concentrating on each and every customer separately.
4. A CRM system is not only used to deal with the existing customers but is also useful in acquiring new customers. The process first starts with identifying a customer and maintaining all the corresponding details into the CRM system which is also called an 'Opportunity of Business'. The Sales and Field representatives then try getting business out of these customers by sophisticatedly following up with them and converting them into a winning deal. All this is very easily and efficiently done by an integrated CRM system.

5. The strongest aspect of Customer Relationship Management is that it is very cost-effective. The advantage of decently implemented CRM system is that there is very less need of paper and manual work which requires lesser staff to manage and lesser resources to deal with. The technologies used in implementing a CRM system are also very cheap and smooth as compared to the traditional way of business.
6. All the details in CRM system is kept centralized which is available anytime on fingertips. This reduces the process time and increases productivity.
7. Efficiently dealing with all the customers and providing them what they actually need increases the customer satisfaction. This increases the chance of getting more business which ultimately enhances turnover and profit.
8. If the customer is satisfied they will always be loyal to you and will remain in business forever resulting in increasing customer base and ultimately enhancing net growth of business.

In today's commercial world, practice of dealing with existing customers and thriving business by getting more customers into loop is predominant and is mere a dilemma. Installing a CRM system can definitely improve the situation and help in challenging the new ways of marketing and business in an efficient manner. Hence in the era of business every organization should be recommended to have a full-fledged CRM system to cope up with all the business needs.

Data Mining is the process that uses a variety of data analysis and modeling techniques to discover patterns and relationships in data that may be used to make accurate predictions. It can help you to select the right prospects on whom to focus, offers the right additional products to your existing customers and identify good customers who may be about to leave. CRM applications that use data mining are called analytic CRM. By combining the abilities to respond directly to customer requests and to provide the customer with a highly interactive, customized experience, companies have a greater ability today to establish, nurture, and sustain long term customer relationships than ever before. The ultimate goal is to transform these relationships into greater profitability by increasing repeat purchase rates and reducing customer acquisition costs. The needs to better understand customer behavior and focus on those customers who can deliver long-term profits has changed how marketers [3] view the world.

Traditionally, marketers have been trained to acquire customers, either new ones who have not bought the product category before or those who are currently competitors' customers. This has required heavy doses of mass advertising and price-oriented promotions to customers and channel members. Today, the tone of the conversation has changed from customer acquisition to retention. A good thought experiment for an executive audience is to ask them how much they spend and/or focus on acquisition versus retention activities. While it is difficult to perfectly distinguish between the two activities although, the answer is usually that acquisition dominates retention.

## II. NEED OF RELATIONSHIP WITH CUSTOMERS

Building relationship with customers in current market trends is the most important aspect that an organization should focus on. Distinction and eminence are now most sustainable and affirm for which developing good relationship with customers is must. **Some of the substantial outcomes of building a quality relationship is explained below by which need of relationship with customer are insight:**

1. **Better Customer perceptiveness-** As the customer lengthens to deal with a supplier, the supplier tends to explicate a better insight of customer's needs and expectations. By this a high level of relationship can be developed between them. This will result in selling more products and retain the business with the customers which finally will lead to profitable business.[13]
2. **Lead to Customer Satisfaction-** Customer satisfaction is the measure of how the needs and responses are collaborated and delivered to excel customer expectation. It can only be attained if the customer has an overall good relationship with the supplier. In today's competitive business marketplace, customer satisfaction is an important performance exponent and basic differentiator of business strategies. Hence, the more is customer satisfaction; more is the business and the bonding with customer.[13]
3. **Lead to Customer Loyalty-** Customer loyalty is the tendency of the customer to remain in business with a particular supplier and buy the products regularly. This is usually seen when a customer is very much satisfied by the supplier and re-visits the organization for business deals, or when he is tended towards re-buying a particular product or brand over times by that supplier. To continue the customer loyalty the most important aspect an organization should focus on is customer satisfaction, hence it can be said that customer loyalty is also an outcome of good relationship.[13]
4. **Lead to Customer Retention-** Customer retention is a strategic process to keep or retain the existing customers and not letting them to diverge or defect to other suppliers or organization for business and

this only possible when there is a quality relationship between customer and supplier. Usually a loyal customer is tended towards sticking to a particular brand or product as far as his basic needs continue to be properly fulfilled. He does not opt for taking a risk in going for a new product. More is the possibility to retain customers the more is the probability of net growth of business.

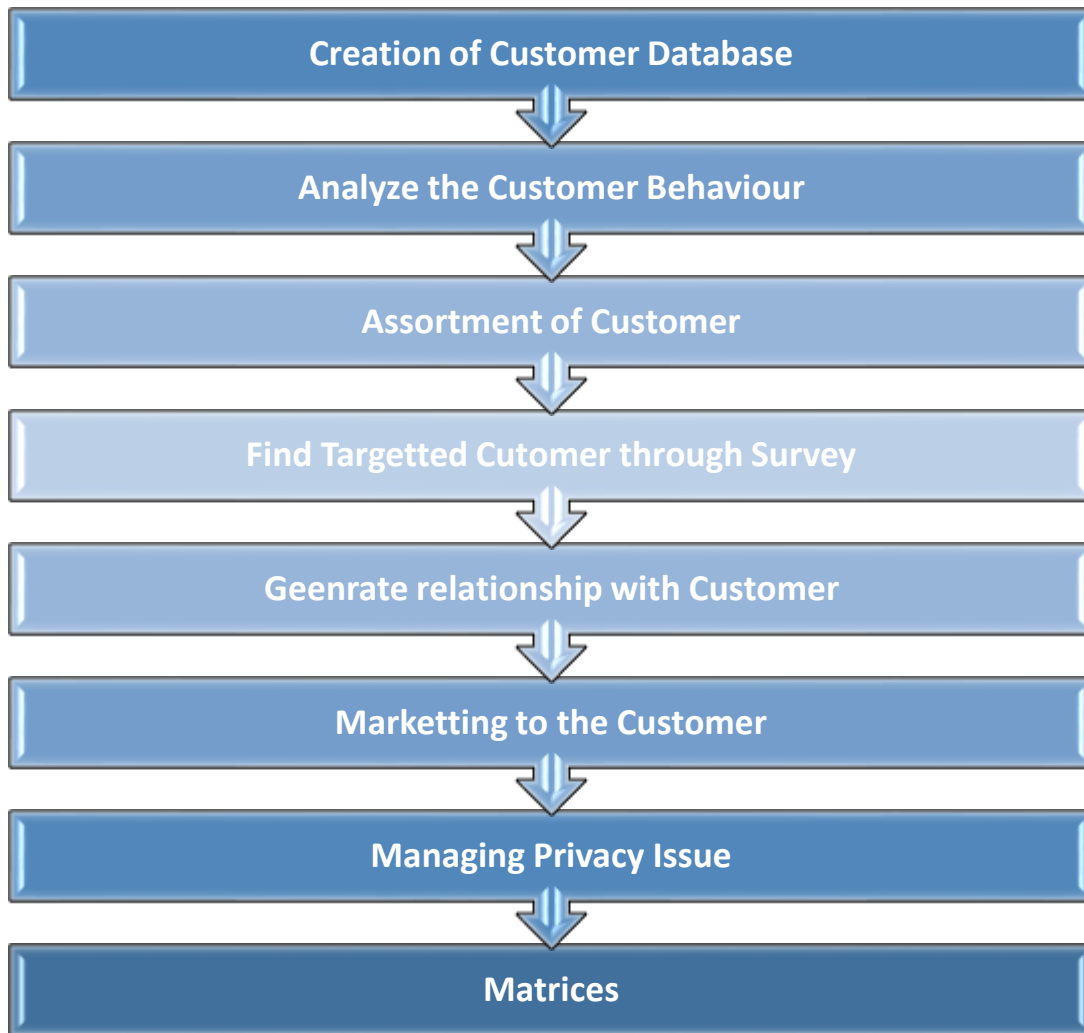
5. **Chances of getting referrals-** It is always a cost-free advocacy by customers to provide referrals to supplier when they feel satisfied and encouraged and when they have a healthy relationship with customers. These referrals or customer's reference of other customers acts like a piece of cake for suppliers as there is no cost and struggle involved in this. This could be treated as the best outcome of quality relationship what a supplier can think of. [13]
6. **Growth in revenue-** When suppliers have healthy relationship with customers the revenue of the organization always increases as customers tend to buy more and more. There is possibility that a satisfied customer seek to buy special category of related products apart from the regular ones from that particular supplier. For instance if a satisfied and loyal customer has a home insurance from an insurance company then there are positive chances that he could also insure his property and car also if he is fully satisfied with the services of that insurance company. This will definitely result in growth of business.
7. **Cost to serve is low-** Cost to serve existing satisfied customers is always very less for the supplier as they know and understand customers. Customers never come back with complaints and queries because they know the actual business flow and completely rely on the relationship with supplier.

### III. CUSTOMER RELATIONSHIP MANAGEMENT MODEL

Relationship with customers can change from time to time because it is evolved under distinguished situations.

[13] Following are the stages from where the relationship with customers can evolve-

- **Exploration-** Exploration is the process when customer investigates or tests the supplier's capabilities and performance or cross verifies the product's or brand's usefulness. If the test results fail to satisfy customer's demands, the relationship can drastically come to an end.
- **Awareness-** Awareness is the process when the customer understands the motivational values of supplier or the products he sells.
- **Expansion-** Expansion is the process when the supplier wins customer's faith and customer falls under huge interdependence of the supplier. This is time when there are more chances of business with that particular customer and expand business.
- **Commitment-** Commitment is a powerful stage when suppliers learn to adapting business rules and goal to excel.
- **Dissolution-** Dissolution is a stage when customer requirement suddenly changes and he looks for better perspectives. This sudden change is the end of relationship.



*Figure 1: Customer Relationship Management Model*

Relationship can come to an end due to many reasons like - customer is not satisfied with the services of supplier or customer diverges to other better brands and products. Suppliers can also prefer to break relationships due to customer failing to be a part to increase sales volume or when the suppliers are entangled with fraud cases.

**Broadly there can be two distinguished attributes of a developed relationship between supplier and customer [13]:**

1. **Trust:** Trust means confidence and security in any relationship and can be treated as the biggest investment in building long term relationships. Trust is developed between the two parties when they experience flawless and satisfied motives between each other. As a result of knowing more about each other, all the doubts and risks are minimized and leads to inevitably smooth business. Lack of trust on the other hand weakens the relationship foundation and chances of uncertainty and conflicts increases.
2. **Commitment:** Commitment is yet another milestone that should be achieved to set a long term mutual relationship. Commitment can only be attained when there is mutual trust and the two parties share each other's values. In a committed relationship both suppliers and customers strive to uphold the relationship and never want to exit which in turn results in building the relationship stronger and sharper. There is, in fact, huge cost which is incurred in switching from committed relationships of one supplier and build new relationships with other suppliers from scratch.

Relationship is always mutual or reciprocal so it is important for both supplier and customers to stick to common guideline to attain better relationship among each other. There is lot of involvement of cost, efforts and time in striving developed relationships between the two parties but the outcome is always inevitable.

#### **IV. DATA MINING TECHNIQUES USED FOR CUSTOMER RELATIONSHIP MANAGEMENT**

There will be four major steps in carrying out the data mining activity.

1) **Gathering Data** – The first step towards developing a data mining model is collection of useful data. Data preparation and cleaning is an often neglected but extremely important step in the data mining process. The important factor is identifying data critical to the business, refine it and prepare it for data mining process. This stage usually starts with data preparation which may involve cleaning data, data transformations, selecting subsets of records and - in case of data sets with large numbers of variables, performing some preliminary feature election operations to bring the number of variables to a manageable range.

2) **Selecting an algorithm** – The next step is to choose one or more algorithms in data mining to apply to the problem in hand. One of the preliminary stage in predictive data mining, when the data set includes more variables than could be included in the actual model building phase, is to select predictors from a large list of candidates. For example, when data are collected via automated (computerized) methods, it is not uncommon that measurements are recorded for thousands or hundreds of thousands of predictors. The standard analytic methods for predictive data mining, such as neural network analyses, classification and regression trees, generalized linear models, or general linear models become impractical when the number of predictors exceed more than a few hundred variables.

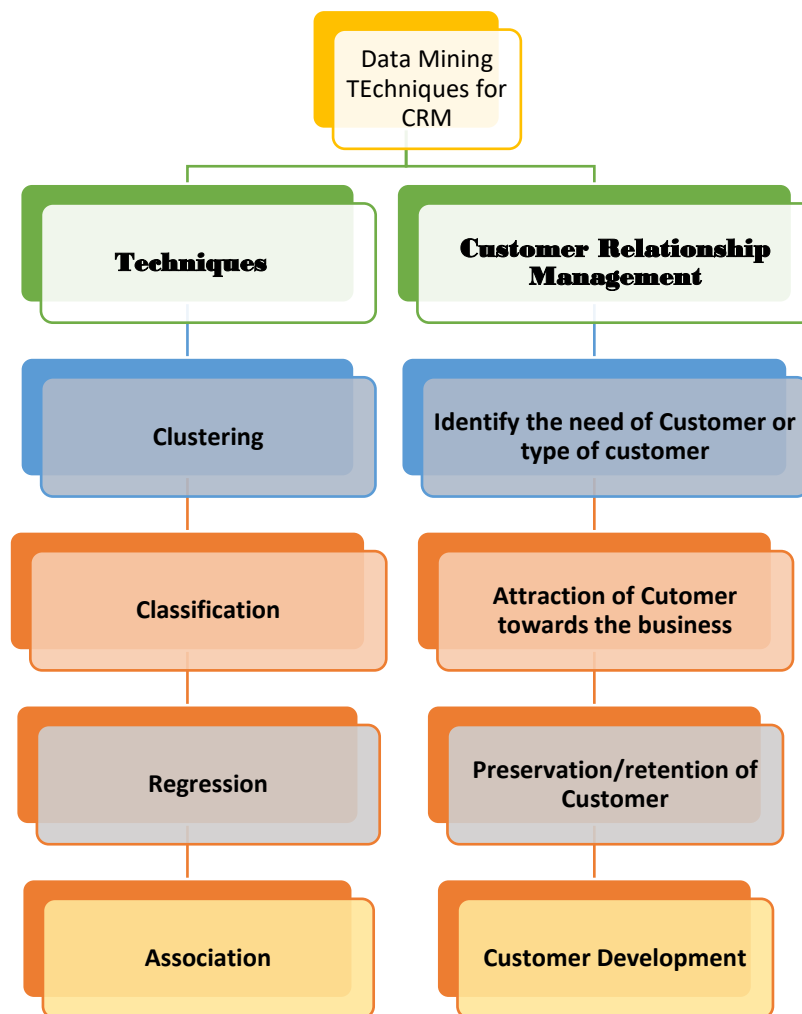


Figure 2: Data Mining Techniques used for Customer Relationship Management

**3) Automating the data mining process** – A user interface is to be developed and the algorithm need to be coded so as to facilitate easy retrieval of information. This is done by setting up a predetermined analysis methodology. An algorithm is developed that attempts to replicate the step by step decision making process that a trained modeler would follow. At each step in the process, preset criteria are used to select analysis options.

**4) Validation of model & Deployment** - The final stage involves using the model selected as best in the previous stage and applying it to the new data in order to generate predictions or estimates of the expected outcome. Validation is concerned with building the right model. It is utilized to determine that a model is an accurate representation of the real system. Validation is usually achieved through the calibration of the model, an iterative process of comparing the model to actual system behavior and using the discrepancies between the two, and the insights gained, to improve the model. This process is repeated until model accuracy is judged to be acceptable. Measures of data mining generally fall into the categories of accuracy, reliability, and usefulness. Accuracy is a measure of how well the model correlates an outcome with the attributes in the data that has been provided. Reliability assesses the way that a data mining model performs on different data sets. Usefulness includes various metrics that tell you whether the model provides useful information.

As in the above figure CRM dimensions include Customer identification, Customer attraction, Customer retention and CRM can be viewed as a customer centric initiative that regards customer lifecycle as an important business asset and aims to retain customers and enrich the customer satisfaction [7]. Customer Relationship Management helps in building long term and profitable relationships with valuable customers [5]. CRM includes all the steps which an organization employs to create and establish beneficial relationships with the customers. Data mining techniques in CRM will improve CRM's efficiency and provide a better prediction ability to companies, organizations and industries to achieve more Profitability. It is possible to improve CRM efficiency, to have an effective and rapid response to customer needs, by integrating CRM and data mining techniques[12].

## V. CONCLUSION

Data Mining has important applications in Customer Relationship Management. Customer Relationship Management (CRM) Is the methods and tools that help businesses manage relationships between customers in an structured manner. Customer Relationship Management has an important role in today's world. The more effectiveness of using the information of the customers to meet their needs is directly proportional to the profit you will get. CRM considers "Customer as the King" in a business. A discovery and predictive modeling algorithm is proposed to be developed and automated which will be applied on internal data like billing details, survey, web logs etc. Prior to this internal data need to be converted in to a structure format which facilitates knowledge extraction. The expected output is a score for a particular transaction, customer or decision and recommended action based on the score. The performance of the model is to be validated using the data from real world business environment

## VI. REFERENCES

- [1] Keyvan Vahidy Rodpysh , Amir Aghai and Meysam Majdi, "Applying data mining in customer relationship management" published in International Journal of Information Technology, Control and Automation (IJITCA) Vol.2, No.3, July 2012.
- [2] Gaurav Gupta and Himanshu Aggarwal Improving Customer Relationship Management Using Data Mining published in International Journal of Machine Learning and Computing, Vol. 2, No. 6, December 2012.
- [3] Md. Rashid Farooqi and Khalid Raza A Comprehensive Study of CRM through Data Mining Techniques published in NCCIST-2011, September 09, 2011Apeejay School of Management, Sector-8, Dwarka, New Delhi.
- [4] Dileep B. Desai #1 ,Dr. R.V.KulkarniA Review: Application of Data Mining Tools in CRM for Selected Banks published in (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 4 (2) , 2013, 199 – 201.
- [5] Ling, R., Yen D. Customer relationship management: An analysis framework and implementation strategies, Journal of Computer InformationSystems; 41, 2001. p. 82–97.
- [6] R. Uma Maheswari 1, \*\* S. Saravana Mahesan 2, Dr. Tamilarasan 3 , A. K. Subramani Role of Data Mining in CRM published in International Journal of Engineering Research Volume No.3, Issue No.2, pp : 75-78.
- [7] Mubeena Shaik, Naseema Shaik, Dhasaratham Meghavath Data Mining Concepts with Customer Relationship Management published in Inernational. Journal of Engineering Research and Applications ISSN : 2248-9622, Vol. 4, Issue 7( Version 6), July 2014, pp.98-100.
- [8] E.W.T. Ngai a,\*, Li Xiu b, D.C.K. Chau " Application of data mining techniques in customer relationship management: Aliterature review and classification" published in International Journal " Expert Systems with Applications 36 (2009) 2592–2602".

- [9] P Salman Raju, Dr V Rema Bai, G Krishna Chaithanya Data mining: Techniques for Enhancing Customer Relationship Management in Banking and Retail Industries published in International Journal of Innovative Research in Computer and Communication Engineering Vol. 2, Issue 1, January 2014.
- [10] Femina Bahari T, Sudheep Elayidom M An Efficient CRM-Data Mining Framework for the Prediction of Customer Behaviour published in International Conference on Information and Communication Technologies (ICICT 2014);
- [11] Berson A, Smith S, Thearling K. Building data mining applications for CRM, McGraw-Hill; 2000.
- [12][12] Mohammad Behrouzian Nejad, Ebrahim Behrouzian Nejad, Ali Karami "Using Data Mining Techniques to Increase Efficiency of Customer Relationship Management Process" published in International Journal " Research Journal of Applied Sciences, Engineering and Technology 4(23): 5010-5015, 2012".
- [13] <http://managementstudyguide.com/customer-profiling.htm>.

#### CITE AN ARTICLE

Chourasiya, P. (n.d.). A REVIEW ON DATA MINING TECHNIQUES USED TO IMPROVE THE CUSTOMER RELATIONSHIP MANAGEMENT THAT HELPS TO IMPROVE THE BUSINESS REVENUE. *INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY*, 7(4), 555-561.