

Customer Relationship Management in a Data-Driven World: Leveraging Data Mining Tools

Tarinmoy Das, Sivaji Ganesh Kondamudi

GITAM School of Business, Visakhapatnam, Andhra Pradesh

Corresponding author: Tarinmoy Das, Email: tarinmoywaits4u@gmail.com

This study intends to explore Customer Relationship Management (CRM) and data mining in detail. Global firms are already using data mining tools to maintain better customer relations. So, this research work deals with the link between CRM systems and data mining tools. How the use of analytical data software by the firms in this digital era has helped them acquire new customers and retain existing customers is studied with examples of some latest technological development in CRM. Five case studies of top global firms successfully implementing data mining tools are discussed briefly. Concerning these case studies, suggestions have been provided for the Indian firms. Finally, it can be concluded that this research study focuses on how Customer Relationship Management (CRM) can be enhanced using data mining tools in this data-driven world.

Keywords: Customer relationship management, data mining, CRM systems, technological development, data-driven world.

1 Introduction

The procedure of handling every customer interaction, which includes prospecting, sales, and service, is known as Customer Relationship Management (CRM). CRM systems focus on strengthening the relationship between a firm and its customers by integrating various perspectives on customer interaction. According to Buttle and Maklan [1], CRM helps build valuable customer relationships as it is disciplined and came up with the argument that technology may or may not play an important role. But managerial and technical aspects were required for big global firms that deal with millions of customers. To meet the requirements of these big global firms, CRM was categorized into four types which are shown in Fig. 1 below.

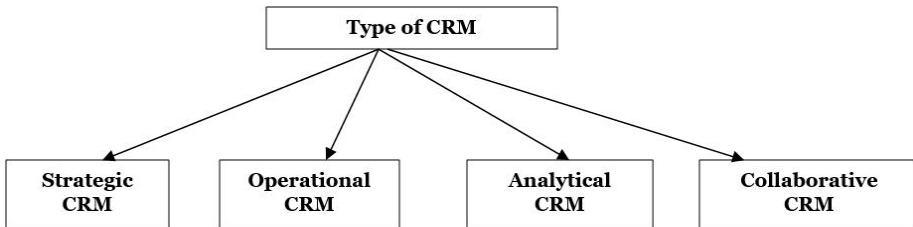


Fig. 1. Categorization of CRM (Source: [1])

- (i) Strategic CRM – is a customer-centric business strategy that retains profitable customers by providing better services than that of their competitors [1]
- (ii) Operational CRM – is responsible for automating customer-facing business problems such as marketing, selling, and service functions on CRM software platforms [1]
- (iii) Analytical CRM – through this type of CRM, firms can capture, store, extract, integrate, process, interpret, distribute, use, and report customer data to improve both company and customer value [1]
- (iv) Collaborative CRM – this type of CRM facilitates two-way communication between customers and the company. Communication is done through various channels primarily to improve customer interaction quality. Valuable information can be shared in the supply chain through collaborative CRM [2].

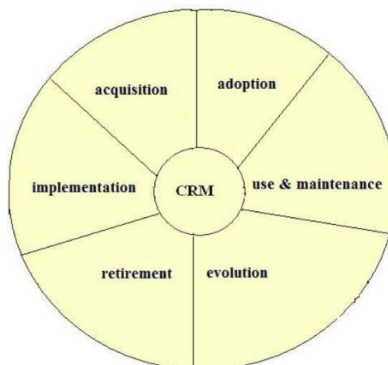


Fig. 2. CRM Lifecycle according to Paulissen (Source: [3])

The classification of CRM can be supported by the advantages and limitations available in the literature review.

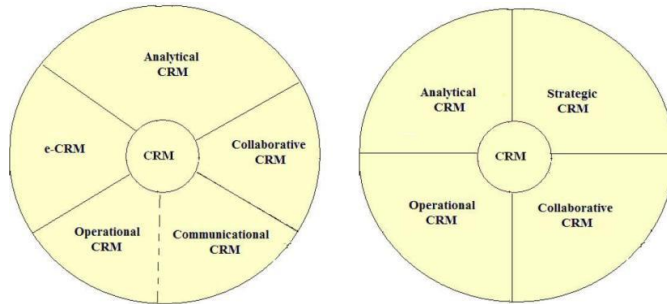


Fig. 3. (a) CRM lifecycle of Wahlberg *et. al.* (2009) (b) New CRM life cycle (Source: [3])

To formulate enhanced marketing decisions and strategies, nowadays, research is focused on making a customer database to understand consumers' needs and perceptions, queries made by the customer, knowing how the firms are addressing them, and doing an analysis using various applications. Customer information sharing can lead to a firm's high return on investment (ROI), steering the CRM competencies. Using an open-sourced cloud-based service, such as the LUIS framework, data models can be quickly employed for a particular task without the developers being machine learning experts [4].

The method by which knowledge and attention-grabbing patterns are found from large data is known as data mining. Data mining can retrieve valuable information from a collection of extensive data. Data mining technology helps firms to get important information from the data repositories. Data mining techniques are instrumental in understanding consumer behavior in various emerging services. To develop data mining techniques, some challenges might be encountered as under –

- Mining information from different data sources
- Certainty, usefulness, and expressiveness of data mining results
- Interactive mining knowledge at multiple abstraction levels
- Scalability and efficiency of data mining algorithms
- Expression of various kinds of data requests and results
- Handling different types of data
- Protection of data security and privacy

Classification of data mining techniques can be done based on –

- What kind of database to work on?
- What kind of knowledge is to be mined?
- What kind of techniques are to be utilized?

Data summarization and data generalization are the most commonly used tools [6].

2 Customer Relationship Management

Researchers have defined customer relationship management in various ways based on their research work. Initially, research on customer relationship management inferred that only managerial aspects could be considered to have good relationships with valuable customers. But big global firms dealing with millions of consumers argued that the technological aspect should also be considered along with the managerial aspect. Thus, CRM was categorized into four forms, each having different functions. The study also revealed that CRM has some misunderstandings that researchers need to understand to have proper clarification about the process of CRM. Finally, researchers came up with a new definition after understanding the four types of CRM and CRM misunderstandings, which is, that CRM is the core business approach that merges internal

procedures and networks with external ones to generate and profitably offer value to specific customer segments. It is supported by information technology and built on high-quality customer-related data [1].

The background of relationship marketing is the point where the concept of Customer Relationship Management lies. CRM concept means that firms should maintain a long-term relationship with existing customers to cater to their complaints, opinions, and new requirements. At the same time, firms should also target to acquire new customers to whom they can sell their products and generate revenue. This is where relationship marketing comes into the picture, as it helps the firms to understand their prospective customers. In this way, customers feel that the company is valuable to them [7].

Researchers focused on studying the trends in customer relationship management separately between 2000 – 2006 and 2006 – present period. But during the period 2006 – 2010 inadequate research was conducted resulting in exploring less theoretical and practical practices in CRM. It was during this period when digital tools combined with traditional marketing, thereby leading to the development of mobile technologies and social media. So, to study the theoretical and practical practices of CRM between 2006 – 2010, researchers aimed to study the CRM systems considering five components namely operational, analytical, communicative, collaborative, and electronic. A review of recent literature will lead to understanding the future scope of research in CRM. CRM in other words can be referred to as one-to-one marketing. Firms use CRM systems to generate revenues so that their business is profitable. For this purpose, CRM systems should link front and back-office applications [3].

To implement and execute a customer relationship management strategy by a firm for enhancing financial growth, retaining existing customers, and acquiring new customers, CRM processes need to be understood as well. From the customer point of view, firms should identify the CRM process in four different aspects as under

- (i) Core of the marketing concept is provided through the development and implementation of continuous customer connections.
- (ii) Customer relationships evolve with distinct phases.
- (iii) Firms had to interact with customers and maintain long-term relationships with them.
- (iv) The knowledge that relational value to the firm is not uniformly distributed.

Research studies reveal that a company performs better if it implements the CRM process effectively [8].

3 Emerging technological development in Customer Relationship Management

In the past few years, research in Customer Relationship Management started increasing because the emerging technologies of the 21st century were blended with the CRM process that the firms adopted for customer acquisition and retention. Some of the emerging technologies that were adopted by various firms are listed below –

(i) **Artificial Intelligence (AI):** To enhance customer interaction, Artificial Intelligence (AI) was employed. Based on Teradata’s “State of Artificial Intelligence for Enterprises” report, 80% of interviewees who were about to implement AI in their firm can assist them in many ways such as Lead management, customer service, and following best action. *Example:* - Use of Chatbots by various business firms is one of the most common applications of artificial intelligence for customer service [9]

(ii) **Process Automation Advances:** The workflow will be automated using this technology. The status of any service request can be tracked using this. Even the necessary action such as sending an email to the customer, informing its status can also be done using this technology. *Example:* - Linking project management software with customer support software will ensure that whenever a complaint is raised by any customer, the concerned person responsible for handling the complaint automatically receives it [10]

Data Science and Intelligent Computing Techniques

(iii) **Data integration:** Large data dealt with by CRM systems can be integrated using Computer Telephony Integration (CTI), file integration, Application Programming Interfaces (APIs), Enterprise Service Bus (ESB), etc. *Example:* - See Food, Inc. (SFI) company uses Google Ads and Facebook Ads to acquire new users for their business

[11]

(iv) **Blockchain:** By tracking transactions between verified parties, it helps CRM systems with transparency, user control, clean data, and security. *Example:* - Incorporation of blockchain technology in supply chain management more transparent, efficient, and reliable [12]

(v) **VoIP:** It helps CRM systems improve customer service by eliminating location barriers and cutting costs. *Example:* - JustCall, a single platform for communicating with customers. For communication purposes, JustCall has a bundle of VoIP phone systems, an automatic call distribution system, analytics, and SMS workflow [13]

(vi) **Speech Applications:** It helps CRM systems since it is cost-effective.

(vii) **Social Networking:** Employees of firms can use social media platforms to acquire new customers and inform existing customers about new products. *Examples:* - Facebook, Twitter, Instagram

(viii) **Collaborative Chat:** It is a live customer service icon in the form of a chat box that enables customers to get clarification of any product along with its shipping details [14][15][16]

4 Case studies on the application of data mining for better customer relation

4.1 Case Study 1: Oracle

Oracle Advanced Analytics Database component of the Oracle Enterprise Edition, created by Oracle, the market leader in database software, by fusing its expertise in database technologies with analytical tools. It incorporates a range of data mining methods for classification, regression, prediction, anomaly detection, and other uses. The technical staff at Oracle is available to support this unique software while a company develops a data mining infrastructure at the enterprise scale. The algorithms connect directly with the Oracle database kernel and function natively on data stored in its database, obviating the need for data to be extracted and stored in independent analytics servers. The Oracle Data Miner offers graphical user interface (GUI) tools that help users through developing, evaluating, and deploying data models [17].

5

4.2 Case Study 2: Sisense

The firm is well known for its easy analytics software that users can use to locate helpful business ideas. It is designed very simple so that a person from a non-technical background can also use the software. It is the first data analytical software that provides a single-stack solution. It has the function of drag and drop, by which one can portray visual reports, graphs, and charts. Global firms such as Accenture, Philips, Nasdaq, Hewlett Packard, Fujitsu, and much more use this software [18].

4.3 Case Study 3: IBM

IBM has developed an analytical software called IBM Cognos, by which users can easily produce reports, dashboards, and ideas. The software has a variety of analytical tools like trend analysis, advanced analysis, and analytical reporting. These tools help users to find out unexpected information [18].

4.4 Case Study 4: DOMO

Data of any type can be obtained using this user-friendly system called DOMO. No prior training is required for using DOMO. Knowledge of coding for any user is also not essential. Users can compile their data from anywhere anytime. A unique feature of DOMO is the provision of real-time social collaboration capabilities. Mastercard, eBay, and DHL are some of its clients [18].

4.5 Case Study 5: RapidMiner

RapidMiner is an integrated platform for machine learning and text mining algorithms. It is considered one of the best predictive analysis and data mining software. Globally, more than 30,000 firms use RapidMiner solutions for their business. Barclays, BMW, CISCO, and many other firms are its clients [18].

5 Lessons to be learned by the Indian firms

The above-mentioned case studies give us an idea of why global firms became successful in having good customer relations, especially after using data mining tools. Other than the above firms, many global firms successfully have better customer relations because of data mining tools and analytical software. Keeping that in mind, Indian firms can learn much from these global firms. The following factors can make Indian firms successful in having better customer relations –

- (i) Availability of technical experts
- (ii) Providing various data mining methods
- (iii) 24 X 7 customer service
- (iv) User-friendly analytical software
- (v) Enabling a platform where users can find new information

If the above factors are considered for using data mining tools by the firms, a lot of customer acquisition and retention will be possible among the Indian firms.

6 Conclusions

This research study explored the basics of Customer Relationship Management (CRM) and data mining. The CRM definition, process, and concepts were discussed in detail. The recent and latest technological developments were also discussed in detail, and how each technology is helping CRM systems in acquiring new customers and retaining existing customers. The top global firms using data mining tools for better customer relations were explained with the help of five case studies. Suggestions were also provided for Indian firms concerning having good customer relations by referring to how global firms maintain profitable customer relationships. Some key factors that Indian firms can consider to be successful were listed as suggestions in this research study.

References

- [1] F. Buttle and S. Maklan, "Customer relationship management: Concepts and technologies: Fourth edition," in *Customer Relationship Management: Concepts and Technologies: Fourth Edition*, FOURTH ED., Taylor and Francis Inc., 2016, pp. 1–23. doi: 10.4324/9781351016551.
- [2] H. A. Al-homery, H. Asharai, and A. Ahmad, "The Core Components and Types of CRM," *Pakistan Journal of Humanities and Social Sciences*, vol. 7, no. 1, pp. 121–145, 2019.
- [3] M. Alokla, M. Alkhateeb, M. Abbad, and F. Jaber, "Customer relationship management: A review and classification," *Transnational Marketing Journal*, vol. 7, no. 2, pp. 187–210, 2019, doi: 10.33182/tmj.v7i2.734.
- [4] H. S. Chiranjeevi and M. K. Shenoy, "Evaluating the satisfaction index using automated interaction service and customer knowledgebase : a big data approach to CRM," *Int. J. Electronic Customer Relationship Management*, vol. 12, no. 1, pp. 21–39, 2019.
- [5] S. Hussain and S. Gaftandzhieva, "Regression analysis of student academic performance using deep learning," pp. 783–798, 2021.
- [6] M. Chen, S. Member, J. Han, S. Member, and P. S. Yu, "Data mining - an overview from a database perspective," vol. 8, no. 6, pp. 866–883, 1996.
- [7] M. Urbanowicz, "Concept of Customer Relationship Management as an example of innovation in banking sector," *IET Working Paper Series*, 2008, [Online]. Available: <http://run.unl.pt/handle/10362/1729>
- [8] W. Reinartz, M. Krafft, and W. D. Hoyer, "The customer relationship management process: Its measurement and impact on performance," *Journal of Marketing Research*, vol. 41, no. 3, pp. 293–305, 2004, doi: 10.1509/jmkr.41.3.293.35991.
- [9] J. Streets, "10 examples of AI in customer service," *TechTarget*, 2021. <https://www.techtarget.com/searchcustomerexperience/feature/10-examples-of-AI-in-customer-service> (accessed Aug. 24, 2022).
- [10] "5 Business Process Automation Examples (And Why You Should Use BPA in Your Company)," *getcloudapp*, 2022. <https://www.getcloudapp.com/blog/business-process-automation/> (accessed Aug. 24, 2022).
- [11] C. Moorman, "What is Data Integration? Examples and Use Cases | Stitch," *stitchdata*, 2022. <https://www.stitchdata.com/data-integration/> (accessed Aug. 24, 2022).
- [12] T. Guerpinar, G. Guadiana, P. Asterios Ioannidis, N. Straub, and M. Henke, "The Current State of Blockchain Applications in Supply Chain Management," *ACM International Conference Proceeding Series*, pp. 168–175, 2021, doi: 10.1145/3460537.3460568.
- [13] A. Mittal, "VoIP Integration With CRM: Everything You Need to Know | JustCall Blog," *justcall*, 2022. https://justcall.io/blog/voip-integration-crm.html#Top_VoIP_Providers_for_CRM_Integration (accessed Aug. 24, 2022).
- [14] D. Trzupek, "4 CRM Trends Driving CRM Innovation | TTEC," *ttec*, 2022. <https://www.ttec.com/articles/4-crm-trends-driving-crm-innovation> (accessed Jul. 09, 2022).
- [15] C. Bailor, "10 Technologies That Are Reinventing the CRM Industry," *destinationCRM*, 2004. <https://www.destinationcrm.com/Articles/Editorial/Magazine-Features/10-Technologies-That-Are-Reinventing-the-CRM-Industry-47288.aspx> (accessed Jul. 09, 2022).
- [16] M. Viljoen, J. A. Bennett, A. D. Berndt, and C. R. van Zyl, "The use of technology in customer relationship management (CRM)," *Acta Commercii*, vol. 5, no. 1, pp. 106–116, 2005, doi: 10.4102/ac.v5i1.75.
- [17] A. Sarangam, "Top 14 Data Mining Tools," *jigsawacademy*, 2022. <https://www.jigsawacademy.com/blogs/data-science/data-mining-tools/> (accessed Jul. 09, 2022).
- [18] S. Valcheva, "Top Data Mining Companies: List of Software And Service Providers," *Intellspot*, 2017. <https://www.intellspot.com/data-mining-companies/> (accessed Jul. 09, 2022).