

# Data Design Strategy for Data Governance Applied to Customer Relationship Management

<sup>1</sup>Sangwon LEE, <sup>2</sup>Joohyung KIM

<sup>1</sup>Prof., Dept. of Computer & Software Engineering, Wonkwang Univ., Korea  
[sangwonlee@wku.ac.kr](mailto:sangwonlee@wku.ac.kr)

<sup>2</sup>Associate Prof., Dept. of Mathematics Education, Wonkwang Univ., Korea  
[joohyung@wku.ac.kr](mailto:joohyung@wku.ac.kr)

## Abstract

Nowadays, many companies are striving to turn customer value into business value. Customer Relationship Management is a management system that develops effective and efficient marketing strategies by classifying customers in detail based on their information, i.e. databases, and consists of various information technologies. To implement this management system, a customer integration database must be established, and customer characteristics (buying behavior, preferences, etc.) must be analyzed with the databases established and the behavior of each customer must be predicted. This study aims to systematically manage a large amount of customer data generated by companies that apply Customer Relationship Management, in order to develop data design and data governance strategies that should be considered to increase customer value and even company value. We mainly looked at the characteristics of customer relationship management and data governance, and then explored the link between the field of customer relationship management and data governance. In addition, we have developed a data strategy that companies need to perform data governance for customer relationship management.

**Keywords:** Customer Relationship Management, Data Design, Data Governance, Data Management, Data Strategy

## 1. INTRODUCTION

Until now, offline financial companies such as banks and investment firms have used Customer Relationship Management (CRM) to set up call centers by creating data with customers' personal and transaction data using computer application technology [1-4]. Recently, however, all companies for which membership management is critical have adopted CRM as a means to secure, maintain, and empower customers. This is because CRM is a process whereby companies analyze and integrate internal or external data related to customers in order to maximize customer-centric resources and, on this basis, plan, support, and evaluate marketing activities according to customer characteristics. This has given rise to concepts such as database marketing, one-to-one marketing and relationship marketing. It actively manages and induces customers through cycles such as acquiring new customers, nurturing excellent customers, improving customer value, revitalizing potential customers, and making appropriate lifelong adjustments. If existing marketing is a one-time marketing tactic, CRM creates the opportunity to become a "one-time customer is a lifetime customer" by maintaining a continuous relationship with customers and maximizing customer value

---

Manuscript received: August 3, 2023 / revised: August 21, 2023 / accepted: August 29, 2023

Corresponding Author: [joohyung@wku.ac.kr](mailto:joohyung@wku.ac.kr)

Tel: +82-63-850- 6974

Associate Prof., Dept. of Mathematics Education, Wonkwang Univ., Korea

through lifetime customization.

Many organizations, on the other hand, need an integrated data management system to continuously discover, manage, and leverage as business value the valuable, high-quality data generated by their work. This management system is referred to as data governance [5- 8]. With the development of information and communication technology, the amount of data in enterprises has increased by leaps and bounds, and information systems have been distributed, resulting in a larger amount of dark data that is not used because the data is not effectively integrated and managed. Governance to manage and control data across the enterprise is needed to reduce information risk and administrative costs due to data management negligence, and to help create value through the discovery of high-quality data. In this context, many companies implementing CRM need to systematically manage customer data.

In order to build data design strategies for data governance that should be taken into account to boost corporate customer value and even corporate value, this study intends to systematically manage numerous customer data generated by businesses using CRM [9-12].

## **2. RELATED WORKS**

### **2.1. Strategies for Customer Relationship Management**

In a contemporary business setting, CRM refers to the idea of both strategies and processes that successfully manage and optimize business contacts with customers. CRM extends beyond transaction processing to create and sustain continuous relationships with clients, boost client loyalty, and enhance business efficiency. CRM is a type of client-focused business approach that aids organizations in managing and enhancing client relationships. The emphasis is on improving customer interactions to raise customer happiness, ensure long-term client loyalty, and boost business growth. As a result, the purpose, components, tactics, technical elements, performance, and challenges of the CRM strategy can be summarized from many angles. CRM is a crucial strategic component for a number of reasons. Above all, CRM's tight interaction with customers can boost patronage and customer happiness. In other words, CRM enhances the customer experience by using customer data analysis to create and provide specialized goods and services. CRM also conducts customer data analysis to implement precise target marketing and create effective marketing plans. Resales and new revenue opportunities can be generated by relationships with both existing and potential clients.

Three crucial elements are regarded as or are in charge of the CRM. Customer analytics, customer interaction management, and customer data management are some of these elements. The customer analytics component performs client segmentation and analyzes the obtained data to determine consumer behavior patterns, affinities, preferences, etc. In order to provide a tailored experience, customer contact management components connect with customers through a range of channels, storing and managing them. In order to acquire valuable insights, customer data management components routinely collect and manage customer information, transaction history, and interaction history. Based on these variables, various areas decide on CRM strategies. Relationships with customers are strengthened through encouraging client participation and boosting interaction across various channels in order to increase customer participation. For customer route analysis, the path of brand interaction is identified, and the best contact point is chosen to maximize customer interaction. Customers are segmented by characteristics, strategies are developed for each group, and individualized services are provided. Future technological development is anticipated, coupled with the creation of more advanced CRM approaches and solutions. For instance, it is anticipated that emphasis would be drawn to automated interactions with artificial intelligence and machine learning, detailed customer insights through big data analysis, and bolstering data security with blockchain. By effectively managing client interactions, the CRM is a customer-focused business strategy that seeks to increase customer loyalty and boost company performance. CRM would therefore undoubtedly be a crucial tactic to boost company growth and competitiveness through data analysis, customized services, better interaction, and technical assistance.

## **2.2. Strategies for Data Governance**

Data management is a concept that encompasses methods and procedures for efficiently handling and utilizing data in contemporary commercial settings. The management guarantees your data's quality, security, compliance, and more while enabling us to use it in accordance with the policies and objectives of your company. It describes a collection of tactics, procedures, rules, guidelines, job descriptions, and duties for efficiently managing and regulating data within an organization. By assuring data quality, security, compliance, consistency, and availability, managing data seeks to efficiently use and administer data assets inside your organization. Data management has significant effects on company compliance, resource efficiency, decision-making strength, and data quality. High-quality data-based decisions boost organizational efficiency and competitiveness. Utilizing resources effectively could reduce the production of duplicate data and data inconsistency. To avoid data breaches, the administration of the data complies with legal and regulatory obligations. Data management ensures the correctness, consistency, and integrity of the data to offer accurate data.

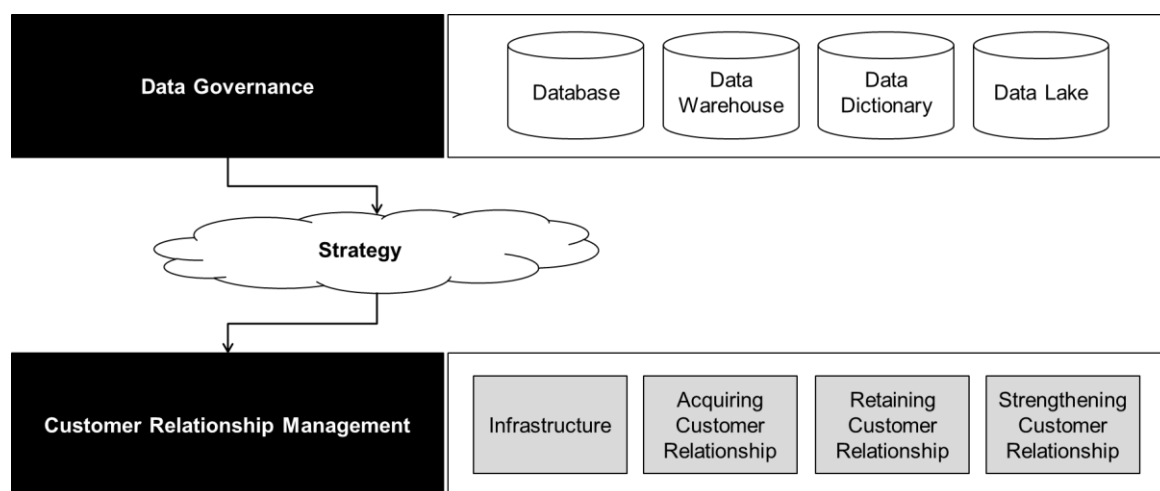
Data management is managed on several levels. Data management is efficiently carried out because the tasks and obligations in the area are first defined in terms of roles and responsibilities. Methods are managed to stop unwanted access to data and preserve data security in terms of data security. Additionally, it specifies procedures and rules for assessing and enhancing data quality. Regulations governing data usage, security, and access are set at the political and regulatory levels, and data use is uniform. Data assets are cataloged within the organization and searchable catalogs are made starting at the level of the data catalog. Data requirements that specify the significance and connections among the organization's data are maintained at the metadata management level, making data easier to comprehend.

Data management is regarded strategically in terms of ownership and involvement, procedures and standards, and creating an organizational culture. By defining procedures and guidelines for data collection, storage, analysis, and reporting, consistency will be ensured. A clear definition of data security and participation from various organizational departments and roles are necessary for data management. Additionally, corporate culture must support data management and be geared toward promoting its significance inside the company. Automation and Artificial Intelligence (AI) are anticipated to have a significant impact on data management in the future. Data quality monitoring and automated data management procedures are made possible by big data and AI technology. The importance of training and role definition for data utilization is also anticipated to increase. To manage data quality, security, compliance, and to support your organization's business objectives, data management is a crucial strategy. We can use reliable data to make better decisions and boost corporate performance thanks to data management. To succeed in data management, we must overcome obstacles including shifting company cultures and a lack of resources. The future of data management is anticipated to be brighter and more intelligent as a result of developments in AI and automation.

## **3. DATA GOVERNANCE OF CUSTOMER RELATIONSHIP MANAGEMENT**

### **3.1. Structure for Data Governance of CRM**

Data governance [13] and CRM make up the two main components of the data design framework for data governance of CRM as shown in Figure 1. Databases, data warehouses, data dictionaries, data lakes, and other types of data repositories are all handled by data governance. CRM manages and coordinates a variety of business disciplines, including infrastructure, obtaining, maintaining, and growing client connections, among others. The major parts of managerial target for are infrastructure platform and procedural process via acquiring, retaining, and strengthening customer relationships.



**Figure 1. Data design structure for data governance of CRM**

### 3.2. Consideration for Data Governance of CRM

Data management generally provides businesses with a wide range of benefits. Utilizing data effectively increases the value and efficiency of business processes, and managing data provides value for the company. By removing unnecessary data and keeping consistent data, it also effectively leverages resources to manage corporate resources. Data management also guarantees data security and compliance as a regulatory measure, averting legal issues. Data management, of course, assists in decision-making by providing accurate data through consistent data quality. The administration of this data, however, poses a number of difficulties. Data management may be challenging due to the complexity of several data sources and business units inside an organization. As a result, data management can be challenging to adopt without sufficient funding and assistance. Changes in organizational culture are also necessary for data management.

CRM is a managerial concept, but it also has a number of technological features. Software tools are used by CRM software to gather, manage, analyze, and track customer data. Additionally, it offers the capability of data engineering, which analyzes vast volumes of data to discover and forecast trends in consumer behavior. It now also has the capabilities of smart technology, which combines artificial intelligence and automated procedures to streamline client interactions and deliver individualized experiences. Through targeted marketing and customized content, this software support helps businesses increase their marketing ROI. Due to the new revenue stream and chances for upselling and reselling made possible by the relationships with current clients. Through intimate interactions with customers, this improvement in marketing effectiveness ensures a competitive edge and strengthens brand image. Through individualized services and improved interactions, CRM ultimately results in improved customer engagement, loyalty, and happiness. These CRM activities, however, also face a number of difficulties when used in businesses. Maintaining accurate and consistent customer data depends on data quality and security, and CRM calls for stringent monitoring in both areas. When putting the CRM system into place and integrating it into the company organization, it's also important to handle changes in organizational culture and staffing. Additionally, it's necessary to continuously gather and reconcile client information as wants and requirements change.

### 3.3. Consideration for Business Process of CRM

The main work areas to be taken into account while implementing data governance in CRM can be broken down as shown in Table 1. The development of a customer relationship infrastructure, the acquisition

of customers, the maintenance of customers, and the bolstering of customers are crucial components of CRM. The management of customer support, customer analysis and prediction, customer loyalty, marketing, sales, sales opportunity, channel management, communication management, performance analysis, data management, etc. are some of these variables.

**Table 1. Consideration for business process of CRM**

| Business area                  | Remarks  |
|--------------------------------|--|
| Customer support management    | By answering questions and complaints in a methodical manner, customer support management raises customer satisfaction. Systems for tracking customer inquiries respond quickly, offer precise resolutions, and gather client feedback to raise the caliber of goods and services. |
| Customer Analysis and Forecast | Consumer analysis focuses on using data to recognize and forecast trends and tendencies in consumer behavior. It creates tactics to lower the probability of departure by anticipating the likelihood of leaving and offers individualized services to each consumer.              |
| Customer loyalty management    | Through programs and perks, customer loyalty management fosters long-lasting relationships and improves client loyalty. Through loyalty programs, it fosters consumer contact and brand trust.   |
| Marketing management           | Customer data is analyzed by marketing management to create niche markets and specialized marketing plans. This emphasizes brand awareness, customer attraction, and marketing goods and services to satisfy consumer demands.   |
| Sales management               | Based on customer information, sales management keeps track of sales prospects and improves client contact with a tailored strategy. To boost sales efficiency, comprehend customer preferences and wants, and suggest items, it optimizes sales forecasting and order processing. |
| Opportunity management         | Upselling and cross-selling are made possible by opportunity management, which analyzes client data to find extra revenue potential. It effectively boosts sales by providing clients with value through individualized offers and services.                                       |
| Channel management             | Utilize a range of communication platforms to engage with customers and preserve strong relationships with companies. Customers can easily access and communicate through their preferred channels.  |
| Communication management       | To improve customer engagement, communication management makes use of a range of tools and tactics. Through individualized communication, it strengthens customer relationships and delivers good experiences.   |
| Performance analysis           | By examining the data gathered, performance analysis quantifies the effectiveness of customer relationship management. This evaluates the success of your plan and establishes the course for the expansion and progress of your company.  |
| Data management                | Customer data is efficiently stored and managed by data management in a central database. It protects privacy, ensures the accuracy of the data, and uses data to enhance the client experience.   |

## **4. DATA DESIGN FOR DATA GOVERNANCE OF CUSTOMER RELATIONSHIP MANAGEMENT**

### **4.1. Strategy Proposition of Data Design**

CRM is a crucial business approach that helps organizations improve customer interactions and service. CRM systems are designed to fulfill this purpose, and data governance is crucial to guarantee data quality and integrity. A crucial step in this process is the data design for the use of data governance for CRM. The form and properties of customer data maintained in a CRM system are determined by data design, which is crucial in maintaining data consistency, accuracy, and redundancy. Data modeling and data schema design are the two main components of the data design process. The first step in data modeling is defining the entities and attributes linked to consumer data as well as modeling the connections between those entities. Analyze client data to comprehend the necessary facts and business processes, then describe them logically in a data model. A physical data schema design results from the construction of a logical model based on data modeling. By defining tables, columns, constraints, and other elements that are appropriate for your database system, you construct the data storage structure in this step. Establish data kinds, restrictions, standards, etc. to guarantee the accuracy of consumer data. To reduce duplicate data and guarantee data consistency, duplicate checks can also be implemented.

The control of data redundancy and consistency is a crucial step in the data design process. CRM systems include checks for data redundancy and data uniformity to prevent duplicating customer information. Maintain data consistency by accurately standardizing and preserving information such as customer names, addresses, and contacts. Data cleanup methods constantly eliminate redundant data, enhancing the data's quality. Data access and security should be taken into account throughout data design. Numerous users have access to the CRM system, therefore data access must be restricted based on each user's credentials and duties. It's also important to take into account how sensitive personal information is processed and stored in accordance with laws and regulations. Utilize data access control and security policies to stop unauthorized data access, secure consumer personal information, and stop data breaches. Data design must also be an ongoing, recurring process. Customer data requirements are subject to vary as business operations and environments do. Data design therefore necessitates updating and change management. In order to preserve data consistency and quality and adapt to changes, it creates a framework for data change management and versioning.

Therefore, establishing the structure and traits of client data is a crucial first step in applying data governance for CRM. Clarifying the meaning and structure of the data through data modeling and physical schema design ensures its consistency, accuracy, and redundancy. System design should take into account data access, security, and regulatory compliance. Ongoing change management should be used to preserve data quality. For CRM to succeed, data governance and data design are crucial strategic components.

#### **4.2. Strategy Proposition of Data Store**

Let's use the database, data warehouse, knowledge base, data lake, data standard, data quality, and data security perspectives to derive the data governance approach. The goal of the data governance plan is to assure consistency, quality, and security throughout all phases of data collection, storage, processing, analysis, and sharing in order to enable businesses to manage and utilize data effectively. We'll examine the significance of databases, data warehouses, knowledge bases, data lakes, data standards, data quality, and data security views as they relate to data governance. Data governance is approachable from a multitude of angles.

(Database) The main data of an organization should be stored and managed through a database. Throughout database design and operation, data governance solutions work to maintain data accuracy, deduplication, and consistency. Applying guidelines like standardization, redundancy checks, and consistency inside the database will maintain data quality and guarantee consistency with business operations.

(Data Warehouse) A system that integrates and saves data to aid in business decision-making is known as a data warehouse. Data governance controls mistakes and consistency problems during data transformation and keeps track of the source and quality of data within a data warehouse. To improve security and stop

unwanted access, it also manages user access permissions.

(Knowledge Base) A knowledge base is a system used by an organization to store and distribute knowledge and information. To avoid the exposure of sensitive data, data governance controls the responsibilities and rights of users accessing the knowledge base. Additionally, it upholds the data's dependability and integrity, guaranteeing that decisions are made accurately thanks to a knowledge base.

(Data Lake) A platform called Data Lake is used to store and analyze vast amounts of data in many different formats. By identifying and documenting the data's origin and transformation inside the data lake, data governance helps to ensure the accuracy of the data. To improve data security and stop unauthorized use, it also keeps an eye on analytics and data access activities.

(Data Standards) Data standards are crucial for harmonizing the vocabulary, procedures, and structure of data used inside an organization. Data standards are defined and managed by data governance to encourage data uniformity and comprehension. Data homogeneity is maintained via standardized data formats and terminology, which also helps to avoid misunderstandings.

(Data Quality) Data quality refers to how accurate and trustworthy the data is. By establishing checkpoints and quality measures for data quality, data governance monitors and enhances data quality. Higher data quality promotes effective decision-making and increases productivity.

(Data Security) Data security entails safeguarding data, a valuable resource for the business. Data governance controls access to data and guards against the disclosure of private information. Protect your data from internal and external dangers with secure features like data encryption, access control, and audit trail.

Together, the databases, data warehouses, knowledge bases, data lakes, data standards, data quality, and data security are all considered as part of the data governance strategy's overall goal to manage and utilize data efficiently. As a result, businesses can use data as a reliable tool to enhance decision-making and operational efficiency.

## **5. CONCLUSIONS**

Until now, we've looked at deployment techniques for the data design that CRM should use for data governance. CRM, which in the past was only used by businesses in the finance and sales sectors, is now used by all businesses that interact with clients. Additionally, many businesses perceive even their own staff as internal clients, and they experiment with CRM in a number of ways from this perspective. Since there is no management system to improve data quality, data design for data governance is a crucial component for businesses to transform the value of data into corporate value. This study provided a data design approach for CRM-based data governance. Future research should focus on increasing business value and customer satisfaction.

## **ACKNOWLEDGEMENT**

This paper was supported by Wonkwang University in 2022.

## **REFERENCES**

- [1] Rigby, D. K., & Ledingham, "CRM done right," *Harvard business review*, Vol. 82, No. 11, pp. 118-130, 2024.
- [2] Østergaard, D., Dieckmann, P., & Lippert, A. "Simulation and CRM," *Best Practice & Research Clinical Anaesthesiology*, Vol. 25, No. 2, pp. 239-249, 2011. DOI: <https://doi.org/10.1016/j.bpa.2011.02.003>
- [3] Payne, A., *Handbook of CRM*. Routledge, 2012.
- [4] Nguyen, T. H., Sherif, J. S., & Newby, M., "Strategies for successful CRM implementation. *Information management & computer security*," Vol. 15, No.2, pp. 102-115, 2007. DOI: <https://doi.org/10.1108/0968>

5220710748001

- [5] Abraham, R., Schneider, J., & Vom Brocke, J., "Data governance: A conceptual framework, structured review, and research agenda," *International journal of information management*, Vol. 49, pp. 424-438, 2019. DOI: <https://doi.org/10.1016/j.ijinfomgt.2019.07.008>
- [6] Khatri, V., & Brown, C. V., "Designing data governance," *Communications of the ACM*, Vol. 53, No. 1, pp. 148-152, 2010. DOI: <https://doi.org/10.1145/1629175.1629210>
- [7] Alhassan, I., Sammon, D., & Daly, M., "Data governance activities: an analysis of the literature," *Journal of Decision Systems*, Vol. 25, No. sup1, pp. 64-75, 2016. DOI: <https://doi.org/10.1080/12460125.2016.1187397>
- [8] Al-Ruithe, M., Benkhelifa, E., & Hameed, K., "A systematic literature review of data governance and cloud data governance," *Personal and Ubiquitous Computing*, Vol. 23, pp. 839-859, 2019. DOI: <https://doi.org/10.1007/s00779-017-1104-3>
- [9] Wiederhold, G., *Database design*, Vol. 1077, McGraw-Hill, 1983.
- [10] Schema, C., *Relational database design*. Prentice Hall Austria, 1995.
- [11] Nijssen, G. M., & Halpin, T. A. (Eds.), *Conceptual Schema and Relational Database Design: a fact oriented approach*. Prentice-Hall, Inc., 1989.
- [12] Sagioglu, S., & Sinanc, D. "Big data: A review," In *2013 international conference on collaboration technologies and systems (CTS)*, IEEE, pp. 42-47, 2013. DOI: <https://doi.org/10.1109/CTS.2013.6567202>
- [13] Kim, T. H., & Kim, Y. G., "Improvement of IoT sensor data loss rate of wireless network-based smart factory management system", *The International Journal of Advanced Smart Convergence*, Vol. 12, No. 2, pp. 173-181, 2023. DOI: <http://doi.org/10.7236/IJASC.2023.12.2.193>