

Designing an Artificial Intelligence-Based Customer Relationship Management Model to Achieve Competitive Advantage in the Food Industry



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Citation: Foruzandeh, E., Jalali, S. M., & Taherikia, F. (2025). Designing an Artificial Intelligence-Based Customer Relationship Management Model to Achieve Competitive Advantage in the Food Industry. *Business, Marketing, and Finance Open*, 2(3), 25-33.

Received: 08 February 2025

Revised: 16 February 2025

Accepted: 05 March 2025

Published: 01 May 2025



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Abstract: The present study aims to design a customer relationship management (CRM) model based on artificial intelligence (AI) to achieve competitive advantage in the food industry. The research method is fundamental in terms of purpose. Data collection was conducted using the grounded theory approach, focusing on in-depth and semi-structured interviews. In this study, a systematic review of theoretical foundations and previous research was performed to extract relevant concepts and initial contextual factors related to the topic. Subsequently, in-depth and semi-structured interviews were conducted, and expert opinions were collected. The interviews with experts were meticulously analyzed. The statistical population of the study includes experts in the food industry, all managers and specialists from the Ministry of Health, Treatment, and Medical Education (Food and Drug Administration), managers and specialists from the Cultural Heritage, Handicrafts, and Tourism Organization, and private sector professionals active in the food industry. The sampling method employed was snowball sampling. The researcher achieved theoretical saturation after conducting 13 interviews. In fact, a few interviews before the 13th one, the researcher noticed that no new insights were being generated. However, to ensure the reliability of the findings and to review and refine the results, the interviews continued until the 15th interview. In each interview, concepts were coded using the grounded theory approach. This study applied grounded theory through three main stages: open coding, axial coding, and selective coding. The results indicated that in the open coding stage, more than 49 subcategories were identified. In the axial coding stage, a more precise examination of the identified codes was conducted, revealing that although many codes were expressed using different terms and interpretations, they conveyed the same meaning based on the research questions posed in this study. Further analysis of open codes and the aggregation and classification of related codes led to the identification of 10 main categories.

Keywords: Customer Relationship Management, Artificial Intelligence, Competitive Advantage, Food Industry.

1. Introduction

The concept of Customer Relationship Management (CRM) became prevalent in the field of commerce in the 1990s and has garnered significant attention as a scientific research topic, stimulating interest within both the global research and business communities. The need to establish a new business environment serves as the foundation for

this approach, creating an opportunity for customer relationship management [1]. Since everything and everyone is becoming online in the twenty-first century, society is profoundly influenced by the internet, leading to a new revolution [2, 3]. Technology is now regarded as an essential and influential component of life [2, 4]. Moreover, companies can track their online behavior and performance, customize prices, communications, services, and products, and attract new customers through internet technology [5, 6].

Customer Relationship Management (CRM) is a comprehensive process for developing and maintaining profitable customer relationships by delivering value and customer satisfaction. The term CRM encompasses all business-related strategies concerning customers, including data collection, storage, and evaluation, while ensuring data privacy and security [7, 8]. When properly implemented, CRM enables organizations to perform these three critical tasks at a lower cost [9]. However, achieving this in an era of globalization—when an organization may have millions of customers—is impossible without the use of information and communication technology [10].

To ensure long-term profitability and remain competitive in today's business world, organizations must not only focus on customer acquisition but also prioritize sustainability, which enhances customer trust, and maintain existing customers [11, 12]. The most fundamental and profitable strategy for customer retention is CRM. As a result, CRM has attracted significant attention in recent years across various domains, including information technology and marketing. Consequently, establishing a reliable CRM model in the food industry is crucial for Iranian companies to increase their global market share, strengthen their brand, and enhance their position in the industry.

The literature on customer relationship management (CRM) highlights its significant impact on organizational performance, competitive advantage, and customer satisfaction. Studies emphasize that organizations must focus on customer satisfaction to maintain market competitiveness. Competitive advantage is closely linked to product performance, financial outcomes, and customer-oriented strategies [13]. The role of brand identity and brand rewards in enhancing customer loyalty through brand engagement has also been established. CRM components influence organizational performance, with CRM structuring having the most substantial impact and information technology playing a relatively minor role [14]. The integration of social media in CRM processes positively affects sales performance, with customer-oriented processes acting as mediators [15]. The effective implementation of electronic CRM significantly influences customer loyalty, profitability, and competitive advantage, with factors such as technology adoption, knowledge management, information sharing, and workforce training playing critical roles [16]. Research suggests that retaining existing customers is more cost-effective than acquiring new ones, reinforcing the importance of long-term customer relationships in financial, learning, internal process, and customer performance [17]. Key CRM performance improvement factors include organizational capital, human capital, customer retention, customer value, and customer development processes (Ahmadi, 2020). Establishing an optimal CRM environment has become an essential prerequisite for business survival and success in competitive markets [14]. Specific CRM dimensions, particularly customer relationship structuring and knowledge management, play a significant role in enhancing customer satisfaction [18]. In B2B settings, technological readiness is positively correlated with information and communication technology (ICT) capabilities and AI-driven CRM (AI-CRM) functionalities, with ICT capabilities acting as a mediator between technological readiness and AI-CRM [5]. Moreover, e-CRM enhances service quality, necessitating improvements in website design and usability to optimize electronic customer relationship management [10]. Despite the increasing adoption of electronic CRM tools, financial constraints, employee resistance, and managerial incompetence hinder implementation in some industries. AI-based CRM has been shown to positively impact organizational performance and competitive

advantage, while AI integration in B2B marketing decision-making significantly enhances company performance and competitiveness. AI also plays a pivotal role in improving e-CRM processes, increasing customer satisfaction, retention, and loyalty while elevating marketing performance and competitiveness. Customer interactions in social commerce environments influence perceived engagement, which in turn governs user trust and CRM effectiveness [5]. Collectively, these findings underscore the necessity of integrating AI, digital technologies, and strategic CRM frameworks to optimize customer relationships, enhance business efficiency, and sustain competitive advantage in evolving market environments.

The application of artificial intelligence (AI) in customer relationship management can facilitate market entry, increase sales, and enhance the customer experience [19]. AI-based CRM in the food industry is particularly significant due to its crucial role in business growth, customer acquisition, and retention. Given the intense competition in the food industry, businesses that leverage AI-driven CRM for competitive advantage can perform better in the market and achieve higher sales. Additionally, since AI can identify customer behavioral patterns, it can assist food businesses in understanding customer preferences regarding products and services. As a result, food businesses can enhance the customer experience, offer improved services, and ultimately increase their sales and profitability. Furthermore, as AI continues to evolve and advance, food businesses must seek innovative ways to utilize AI effectively to differentiate themselves from competitors and achieve long-term business sustainability. Therefore, addressing AI-based CRM in the food industry is essential, as neglecting it may cause businesses to fall behind competitors and face challenges in a highly competitive market. This study, in light of the identified research gap, seeks to answer the following question: What is the AI-based customer relationship management model for achieving competitive advantage in the food industry?

2. Methodology

In this study, the aim was to identify the components and present a model of artificial intelligence-based customer relationship management (CRM) in the food industry. Accordingly, given the research objective, the present study was conducted using a qualitative approach. The statistical population of this research included experts in the food industry, comprising all managers and specialists from the Ministry of Health, Treatment, and Medical Education (Food and Drug Administration), managers and specialists from the Cultural Heritage, Handicrafts, and Tourism Organization, and private sector professionals active in the food industry. The selected sample was chosen using a non-probabilistic purposive sampling method of the snowball type.

In this study, three researchers who had conducted research on designing an artificial intelligence-based CRM model for achieving competitive advantage in the food industry were initially selected and interviewed. After these interviews, they introduced new participants who were subsequently interviewed, and this process continued in the same manner. Based on the method of data collection, this study can be classified as a descriptive/interpretive research conducted cross-sectionally. Therefore, the data collection method employed in this study was both library-based and field-based. Initially, theoretical foundations and library resources were utilized for information gathering, followed by field studies (interviews) to collect research data and examine the perspectives of experts and specialists. The expert interviews were analyzed using MAXQDA software.

Due to the workload of the selected participants and existing constraints, interviews with some experts were conducted in person, while others were conducted online. After making the necessary arrangements, the researcher attended the workplace of the interviewees and recorded the conversations using a voice recorder with their permission to extract relevant codes. This process was carried out after each interview. If a new code was identified

during an interview, it was added to the previously extracted codes. Furthermore, apart from the researcher, a statistics expert and a university professor provided their opinions on the codes.

During the interview process, expert opinions were gathered regarding the appropriate indicators for the artificial intelligence-based CRM model. The primary and secondary factors were examined and finalized. It is worth noting that the duration of the interviews ranged between 30 to 50 minutes, and the interview process was conducted in December 2023.

3. Findings and Results

The demographic characteristics of the experts are presented in the table below:

Table 1. Demographic Characteristics of Experts

Demographic Characteristics	Frequency	Percentage
Gender		
Male	9	60%
Female	6	40%
Age		
Under 35 years	2	10%
35 to 45 years	6	40%
45 years and above	7	50%
Education		
Master's Degree	4	30%
PhD	11	70%
Work Experience		
10 to 20 years	11	70%
More than 20 years	4	30%
Total	15	100%

At this stage, several raw data points that share common meanings and concepts are categorized under an initial code. This initial code encompasses the raw data that constitute it.

Axial coding represents the second stage of data analysis in grounded theory development.

Table below presents the classification of the primary and secondary components of the study.

Table 2: Primary and Secondary Components of the Study

Dimensions	Primary Category	Secondary Category
Contextual Conditions	Software and Hardware Infrastructure	Developing appropriate hardware for existing software implementation
		Procuring suitable hardware for large, integrated databases
		Storing information in spreadsheet files and databases
		Establishing suitable software infrastructure for inter-program connectivity
Causal Conditions	Support and Assistance	Developing operational systems for automated data collection
		Creating a flexible and scalable technical infrastructure
		Need for measurable metrics to track progress
	Business and Technology Alignment	Availability of accurate and comprehensive reports and information
		Automated information circulation
		Financial and technological support
		Designing an appropriate artificial intelligence-based CRM architecture
		Understanding the current situation and information technology

		Managers' perception of information technology
		Updating technological equipment and business capabilities
	Information Transparency	A multi-dimensional approach to business information
		Sharing existing information across relevant departments
		The impact of information transparency on better business decision-making
		Providing transparent information for program-performance comparison
	Data Quality Improvement	Data sources (data integration and compatibility)
		Data processing (quality of acquisition, transformation, and loading processes)
		Data warehouse (establishing a robust framework for data governance and quality)
		Accuracy, reliability, and completeness of the utilized data
Central Phenomenon	Artificial Intelligence-Based Customer Relationship Management	Aligning employees with changes
		Performance measurement and evaluation
		Developing a market roadmap
		Involving individuals in decision-making processes
Intervening Conditions	CRM System Processes	Generating high-volume data
		Circulation of generated information
		Utilizing data generated by different processes across various business operations
		Acquiring, integrating, storing, sharing, and applying knowledge
	Environmental Conditions	Identifying environmental changes
		Rapid response to environmental changes
		Recognizing potential customers
Strategies and Actions	Integrated CRM Standards	Organizing and segmenting customers
		Developing systematic relationships with customers
		Expanding innovative and customer-oriented services
	Integrated Process Standards and Empowerment	Enhancing integrated management and planning
		Developing, equipping, and improving products and services
		Managing customer complaints effectively
		Planning and educating employees on customer relationship management
Outcomes	Economic Growth and Development	Advancing customer communication technologies
		Increasing business profitability
		Reducing operational costs
		Enhancing business efficiency and performance
		Attracting sufficient investment
		Securing financial and technological resources
	Gaining Competitive Advantage	Creating new opportunities and positions
		Implementing systematic business methods
		Establishing security standards in business operations
	Performance Enhancement	Identifying existing environmental risks
		Quick and reliable decision-making by managers
		Improving customer relationship management

In grounded theory development, the integration of data is of great importance. During the research process, after data collection, analysis, and interpretation, the study proceeds to model presentation, conclusion, and summarization.

Figure 1 illustrates the paradigm model of artificial intelligence-based customer relationship management for achieving competitive advantage in the food industry.

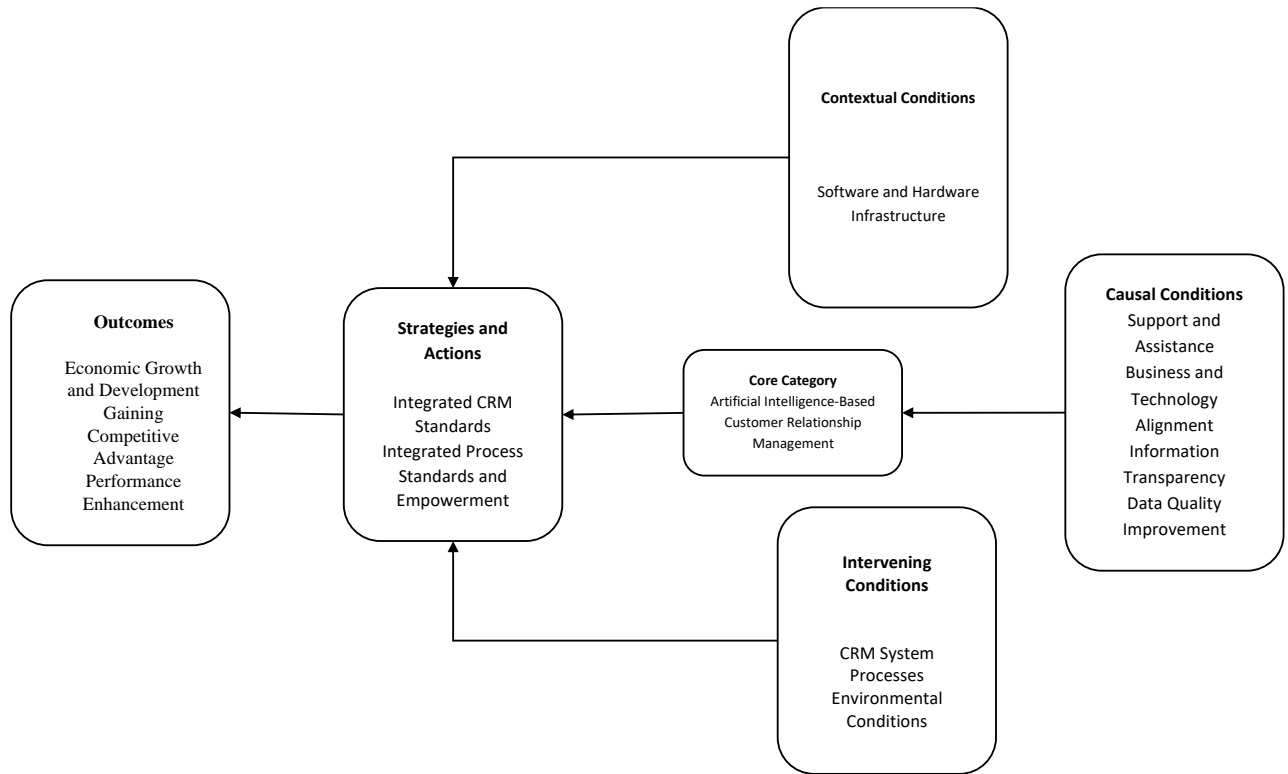


Figure 1. Final Model of the Study

4. Discussion and Conclusion

Based on the findings, support and assistance, business and technology alignment, information transparency, and data quality improvement, along with the presence of measurable metrics, are considered causal conditions for the artificial intelligence-based customer relationship management (CRM) model in the food industry. The results of this study align with the prior findings [12, 17, 19].

According to the obtained results, the primary category of artificial intelligence-based CRM includes aligning employees with changes, performance measurement and evaluation, market roadmap development, and individual participation in decision-making. These were identified as central phenomena in presenting the AI-based CRM model in the food industry. The findings related to the central phenomenon are consistent with prior studies [5, 6, 9, 20]. AI-based CRM is effective in the food industry because this model enhances customer experience, increases efficiency, improves business processes, and facilitates personalized customer communications through intelligent data analytics.

Based on the findings, software and hardware infrastructures constitute the primary category of the AI-based CRM model in the food industry. Secondary categories include developing suitable hardware for implementing existing software, acquiring appropriate hardware for large and integrated databases, storing information in spreadsheet files and databases, establishing proper software infrastructure for inter-program connectivity, developing operational systems for automated data collection, and creating a flexible and scalable technical infrastructure. The results align with the prior findings [14, 20].

Intervening conditions affecting the development of the AI-based CRM model in the food industry include CRM system processes. Secondary categories under this condition include factors such as high-volume data production, circulation of generated information, utilization of data by various business processes, and acquiring, integrating, storing, sharing, and applying knowledge. The results obtained regarding intervening conditions are consistent with the prior findings [5, 12].

The primary indicators identified in the AI-based CRM model for the food industry include process integration standards and empowerment. The secondary indicators include customer organization and segmentation, systematic development of customer relationships, expansion of innovative and appropriate customer services, development of integrated management and planning, improvement of products and services, customer complaint management, customer relationship planning and training, and the advancement of customer communication technologies. The findings of this study align with prior findings [2, 5, 12, 13, 16-19].

Given that the AI-based CRM model in the food industry comprises numerous components, it was not feasible to include all of them within the scope of this study. Therefore, only a limited number of components, based on the perspectives of theorists, were considered. Undoubtedly, in the process of conducting any scientific research or project, at any level, there are certain obstacles that slow the researcher's progress toward achieving their goal. These obstacles can be considered research limitations. Such limitations may take various forms, but what is essential in this regard is the researcher's effort and persistence in overcoming these barriers.

Considering the rapid advancement of intelligent technologies and artificial intelligence development in both global and Iranian markets, businesses can leverage AI-based technological progress to enhance their operations. The following are several practical recommendations regarding the use of AI-based CRM systems:

Legal and Security Considerations: In designing and implementing a CRM system, legal and security issues must be taken into account. To comply with these considerations, reliable and secure methods should be used for data collection and utilization, ensuring adherence to relevant laws and regulations.

Utilization of Artificial Intelligence and Deep Learning: The application of AI and deep learning technologies is crucial for CRM systems. These technologies enable businesses to analyze their data effectively and make better business decisions.

Optimization of Business Processes: AI-based technologies can be used to enhance and optimize customer relationship processes. Optimizing customer engagement processes reduces costs, improves service quality, and enhances overall business operations.

Development of AI-Based Marketing Solutions: Given the emergence of AI-driven technologies, the development of smart marketing solutions is essential. These solutions can enhance marketing and sales strategies, allowing businesses to perform more effectively in competitive markets.

Advancement of Smart Payment Systems: With the progress of payment technologies, the development of smart payment systems is highly significant. These systems can streamline and accelerate transactions, providing customers with a seamless purchasing experience.

Integration of Blockchain Technology: The adoption of blockchain technology is crucial. This technology ensures high-security standards in financial and data transactions.

Development of Smart Applications: The implementation of smart applications can enhance customer experience and improve competitiveness in the market.

Establishment of Intelligent Networks: Through these networks, businesses can share information and experiences with other enterprises, fostering industry-wide growth and development.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

Acknowledgments

Authors thank all participants who participate in this study.

Conflict of Interest

The authors report no conflict of interest.

Funding/Financial Support

According to the authors, this article has no financial support.

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