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Designing a Customer-Oriented Decision-Making Framework Based on Information Technology and Customer Knowledge Management: A Case Study of Pegah Dairy Industries Company (Iran Dairy Industries)

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ABSTRACT

Integration of Information Technology and Customer Knowledge Management enables the transformation of massive data into strategic insights, facilitating precise and personalized decision-making based on real market needs. This intelligent approach enhances customer experience, ensures rapid responsiveness to changes in consumer behavior, reduces decision-making risk, and fosters sustainable loyalty and long-term competitive advantage. The present study aims to design a customer-centric decision-making framework integrating Information Technology and Customer Knowledge Management (CKM) in the dairy sector, using Pegah Dairy Industries of Iran as the case example. This research gathered insights from 15 senior management experts (with a minimum of 15 years of experience) at Pegah Dairy Industries Company to inform Interpretive Structural Modeling (ISM). Utilizing the ISM approach, a model was developed to improve Customer Knowledge Management (CKM) system performance by leveraging Information Technology. Using Interpretive Structural Modeling (ISM), the exploratory model revealed that the key factors for enhancing the customer-centric Customer Knowledge Management system performance, including increased productivity, improved innovation, and enhanced service quality, are situated at the primary level. These factors represent the most influential elements within the model. Situated at the second level are the Information Technology (IT) software and hardware components supporting customer-centric decisions. These include: IT software such as Customer Relationship Management (CRM) systems, Artificial Intelligence (AI) and Machine Learning (ML) platforms, Knowledge Management software, Project Management tools, and mobile applications; and IT hardware encompassing powerful servers, network storage, networking infrastructure, security hardware, and backup storage devices. The factors at this level influence the higher-level factors and are influenced by the lower-level factors. Furthermore, the Information Technology (IT) challenges for customer-centric decisions—comprising technological limitations, technology adoption barriers, information filtering, high costs, and misalignment with business objectives—are positioned at the third level.

Keywords: *Customer Knowledge Management, Customer Knowledge Management System Performance Improvement, Customer-Centric Decisions, Dairy Companies, Information Technology.*

1. Introduction

The contemporary business environment is characterized by intensified competition, rapid technological change, and an increasing shift toward customer-centric paradigms. Organizations are no longer able to rely solely on traditional product-oriented strategies; instead, they must continuously adapt to evolving customer expectations through data-driven and knowledge-based approaches. In this context, information technology (IT) has emerged as a foundational enabler of strategic transformation, facilitating the collection, storage, and analysis of vast volumes of customer data. The proliferation of digital technologies such as big data analytics, cloud computing, and artificial intelligence has significantly enhanced organizations' ability to monitor customer behavior in real time and respond with agility to market dynamics. However, the mere availability of data does not automatically translate into competitive advantage. The key challenge lies in transforming raw data into meaningful knowledge that can inform strategic decision-making processes (Kshetri et al., 2024; Usino et al., 2024; Yellanki, 2022).

In parallel with technological advancements, the concept of knowledge management has gained prominence as a critical organizational capability. Knowledge is widely recognized as a strategic resource that underpins innovation, operational efficiency, and long-term competitiveness. Within this paradigm, customer knowledge management (CKM) has emerged as an integrative framework that combines principles of knowledge management and customer relationship management to leverage customer-related insights more effectively. CKM emphasizes the systematic acquisition, dissemination, and utilization of knowledge "about," "for," and "from" customers, thereby enabling organizations to develop deeper relationships and deliver personalized value propositions. This approach transforms customers from passive recipients of products and services into active contributors to organizational learning and innovation processes (Camara, 2024; Larasati et al., 2025; Zahrawi et al., 2025).

The strategic importance of CKM is further reinforced by its direct impact on organizational performance outcomes. Empirical evidence suggests that effective customer knowledge management enhances innovation capability, improves service quality, and contributes to sustained competitive advantage. Organizations that successfully integrate customer knowledge into their strategic and operational processes are better positioned to anticipate market trends, tailor their offerings to customer preferences, and foster long-term loyalty. Moreover, CKM plays a crucial role in enabling growth-oriented strategies, such as growth hacking and customer-centric innovation, by providing actionable insights derived from customer data (Macca et al., 2025; Safari & Kazemi, 2024; Salem et al., 2024).

Despite its recognized importance, the implementation of CKM remains a complex and multifaceted challenge. One of the primary obstacles is the fragmentation of data across organizational silos, which hinders the development of a comprehensive and unified view of the customer. Additionally, organizations often struggle to align their technological infrastructure with knowledge management processes, resulting in inefficiencies and suboptimal decision-making. The integration of IT and CKM requires not only advanced technological capabilities but also appropriate organizational structures, cultural readiness, and strategic alignment. Without these enabling conditions, investments in technology may fail to yield the expected benefits (Alrahbi et al., 2022; Rahmania et al., 2024; Raudeliuniene et al., 2021).

The emergence of advanced technologies, particularly artificial intelligence and machine learning, has introduced new opportunities for enhancing CKM processes. These technologies enable organizations to analyze both explicit and tacit customer knowledge with unprecedented precision, uncover hidden patterns in customer behavior, and generate predictive insights that support proactive decision-making. Generative AI, in particular, has expanded the scope of marketing analytics by enabling the automation of complex data processing tasks and the creation of personalized customer experiences at scale. As a result, organizations can achieve higher levels of responsiveness, efficiency, and customer satisfaction (Kshetri et al., 2024; Yellanki, 2022).

In addition to technological advancements, the role of big data analytics has become increasingly critical in shaping organizational decision-making processes. Big data technologies facilitate the integration of diverse data sources, enabling organizations to develop comprehensive customer profiles and gain deeper insights into customer needs and preferences. These insights, in turn, support more accurate forecasting, improved resource allocation, and enhanced strategic planning. However, the effective utilization of big data requires robust data governance frameworks and analytical capabilities, as well as the ability to translate analytical outputs into actionable strategies (Camara, 2024; Usino et al., 2024).

The relationship between knowledge management and organizational performance has been extensively examined in the literature. Studies indicate that knowledge management practices positively influence productivity, particularly when employees actively engage in knowledge sharing and utilization. Individual participation in knowledge management processes serves as a critical mediator that enhances the impact of knowledge management on organizational outcomes. This highlights the importance of fostering a knowledge-sharing culture and encouraging employee involvement in CKM initiatives (Firdaus et al., 2025).

Furthermore, the integration of IT and knowledge management extends beyond customer-related processes to encompass broader organizational functions, including supply chain management, environmental sustainability, and innovation. For instance, IT-enabled knowledge management systems have been shown to improve supply chain efficiency, enhance collaboration among stakeholders, and support the implementation of sustainable practices. Similarly, green knowledge management initiatives contribute to environmental performance by facilitating the adoption of eco-friendly technologies and practices. These findings underscore the versatility and strategic relevance of knowledge management in diverse organizational contexts (Bahramimianrood & Bathaei, 2021; Sahoo et al., 2023).

The successful implementation of CKM also depends on organizational capabilities related to information technology governance and infrastructure. Effective IT governance mechanisms ensure the alignment of technological investments with business objectives, thereby enhancing the performance of information systems and contributing to competitive advantage. In addition, the development of integrated IT infrastructures, including enterprise resource planning (ERP) systems and customer relationship management (CRM) platforms, enables organizations to streamline processes, improve data accessibility, and support informed decision-making (Jalilvand et al., 2023; Tajvidi & Ahmadi, 2020).

Another critical dimension of CKM is its role in facilitating innovation and customer-driven value creation. By leveraging customer knowledge, organizations can identify emerging trends, develop new products and services, and enhance the overall customer experience. This is particularly relevant in service-oriented sectors, where customer interactions serve as a primary source of knowledge and innovation. The ability to capture and utilize customer feedback effectively enables organizations to continuously refine their offerings and maintain a competitive edge in dynamic markets (Saarnilinna et al., 2024; Salem et al., 2024).

However, the adoption of CKM is not without challenges. Organizations must address issues related to technological limitations, high implementation costs, data quality, and resistance to change. Additionally, the alignment of CKM initiatives with organizational strategy is essential to ensure their effectiveness and sustainability. Failure to address these challenges may result in underutilization of technological capabilities and missed opportunities for value creation. Therefore, a comprehensive and integrated framework that aligns IT, CKM, and strategic objectives is necessary to guide organizations in their efforts to enhance decision-making and performance (Almhemis & Safari, 2025; Larasati et al., 2025).

In the context of developing economies and emerging markets, the importance of CKM is further amplified by the need to enhance competitiveness and adapt to rapidly changing market conditions. Organizations in these contexts often face resource constraints and infrastructural challenges, making it imperative to adopt efficient and innovative approaches to knowledge management. The integration of IT and CKM provides a viable pathway for overcoming these challenges and achieving sustainable growth. Empirical studies highlight the positive impact of CKM on business performance in such environments, emphasizing its role as a strategic enabler of organizational success (Robati & Enkar, 2022; Zahrawi et al., 2025).

Moreover, the increasing digitalization of business processes has transformed the nature of customer interactions, creating new opportunities for knowledge acquisition and utilization. Digital platforms and social networks enable organizations to engage with customers in real time, gather valuable feedback, and co-create value through collaborative processes. This shift toward digital engagement underscores the need for organizations to develop advanced CKM capabilities that can effectively leverage digital technologies and data sources (Camara, 2024; Raudeliuniene et al., 2021).

The dairy industry, as a dynamic and competitive sector, presents a unique context for examining the integration of IT and CKM. Characterized by perishable products, fluctuating demand, and evolving consumer preferences, the industry requires agile and informed decision-making processes. The adoption of IT-enabled CKM systems can significantly enhance the ability of dairy companies to monitor customer behavior, optimize production and distribution processes, and develop innovative products that align with consumer needs. In this context, the design of a customer-oriented decision-making framework becomes essential for improving organizational performance and achieving sustainable competitive advantage.

In summary, the integration of information technology and customer knowledge management represents a critical strategic imperative for organizations seeking to enhance decision-making, innovation, and competitive performance. While significant progress has been made in understanding the individual roles of IT and knowledge management, there remains a need for comprehensive frameworks that effectively integrate these dimensions and address the associated challenges. Therefore, this study aims to design a customer-oriented decision-making framework based on information technology and customer knowledge management in the dairy industry.

2. Methods and Materials

This research is "applied" in terms of its objective, and in terms of its nature and method, it falls under "exploratory mixed-methods" research, developed with a focus on the case study of Iran Dairy Industries Company (Pegah). In the qualitative phase, to identify the fundamental components of a customer-centric decision-making framework, the strategy of literature review and in-depth semi-structured interviews with experts (managers with over 15 years of experience) was employed. Using purposive and snowball sampling methods, after conducting 15 interviews, "theoretical saturation" was achieved. After extracting the initial codes, the Content Validity Ratio (CVR) index was used to validate and screen the components. Subsequently, to explain the network of causal relationships and the layering of variables, the "Interpretive Structural Modeling" (ISM) methodology, along with the MICMAC (Mutual Influence and Dependency) analysis, was utilized to extract the hierarchical structure of the model. Finally, in the quantitative phase of the research, the designed model was explained and fitted with the participation of the statistical population of experts and employees of Pegah Company to provide a comprehensive and operational framework for enhancing knowledge-based decision-making in the dairy industry.

3. Findings and Results

In the data analysis process of this research, a combination of methods including Content Validity Ratio (CVR), Interpretive Structural Modeling (ISM), and Structural Equation Modeling (SEM) was used. The expert panel in this study consisted of 15 qualified specialists who, in addition to the interview stage, participated in the process of developing the ISM matrices. In the first step, to screen the extracted components and ensure their necessity, the CVR index was utilized. In this stage, a specialized questionnaire based on a three-point Likert scale (including options: "Essential," "Useful but not essential," and "Not essential") was provided to the experts. Based on Lawshe's standard table, for a panel of 15 experts, the numerical cut-off of 0.49 was set as the acceptance criterion; meaning, only the items that achieved a score higher than this cut-off were confirmed as final components and entered into the subsequent analysis stages (structural modeling). The detailed results of this evaluation are presented in Table 1.

Table 1

CVR value for each factor

No.	Factor	CVR	Results	Dimensions	CVR	Results
1	Technological Limitations	0.73	Approved	IT challenges in customer-oriented decision making	0.76	Approved

2	Technology acceptance	0.87	Approved			
3	Information filtering	0.6	Approved			
4	High costs	0.87	Approved			
5	Misalignment with business objectives	0.73	Approved			
6	Customer Relationship Management (CRM) systems	0.87	Approved	IT software factors in customer-oriented decision making	0.81	Approved
7	databases	0.47	Rejected			
8	Analytical tools	0.33	Rejected			
9	Artificial intelligence and machine learning	1	Approved			
10	Knowledge management software	1	Approved			
11	Project management tools	1	Approved			
12	Mobile applications	1	Approved			
13	Powerful servers	1	Approved	IT hardware factors in customer-oriented decision making	0.89	Approved
14	Network storage systems	1	Approved			
15	Cloud storage systems	0.47	Rejected			
16	Network infrastructures	1	Approved			
17	Security hardware	1	Approved			
18	Backup storage devices	0.87	Approved			
19	Increased productivity	1	Approved	Improving the performance of customer knowledge management system	0.87	Approved
20	Enhanced innovation	1	Approved			
21	Improved service quality	1	Approved			
22	Decision-making effectiveness	0.47	Rejected			

As specified in table above, 18 factors were approved by experts in the form of 2 dimensions. Therefore, these 18 factors are used to " design decision - making framework based on information and customer knowledge management in dairy industry: case study of pegah dairy industry company".

Table 2

Final factors for designing the model

No.	Factor	CVR	Results	Dimensions	CVR	Results
1	Technological Limitations	0.73	Approved	Challenges of information technology for customer-centric decision making	0.76	Approved
2	Technology acceptance	0.87	Approved			
3	Information filtering	0.6	Approved			
4	High costs	0.87	Approved			
5	Misalignment with business objectives	0.73	Approved			
6	Customer Relationship Management (CRM) systems	0.87	Approved	IT software factors in customer-oriented decision making	0.97	Approved
7	Artificial intelligence and machine learning	1	Approved			
8	Knowledge management software	1	Approved			
9	Project management tools	1	Approved			
10	Mobile applications	1	Approved			
11	Powerful servers	1	Approved	IT hardware factors in customer-oriented decision making	0.97	Approved
12	Network storage systems	1	Approved			
13	Network infrastructures	1	Approved			
14	Security hardware	1	Approved			
15	Backup storage devices	0.87	Approved			
16	Increased productivity	1	Approved	Improving the performance of customer knowledge management system	1	Approved
17	Enhanced innovation	1	Approved			
18	Improved service quality	1	Approved			

Step one: identifying factors related to the problem

The method for selecting the factors was explained comprehensively in the previous section. Therefore, these 18 factors are used for designing a customer-centric decision-making framework based on information technology and customer knowledge management in the dairy industry: a case study of Pegah Dairy Industries Company (Iran Dairy Industries Company).

Step Two: Formation of the Structural Self-Interaction Matrix

After identifying the factors, the ISM questionnaire was designed and distributed among experts. The experts examined these factors pairwise and determined the relationships between them using the following symbols:

V: If factor i influences factor j

A: If factor j influences factor i

X: If factors i and j influence each other mutually

O: If there is no relationship between factors i and j

The results obtained from the questionnaires regarding the factors under study are presented in Table 3.

Step Three: Formation of the Initial Reachability Matrix

The initial reachability matrix is obtained by converting the Structural Self-Interaction Matrix (SSIM) into a binary matrix (0 and 1). In order to replace the four symbols in Table 4 with the numbers 0 and 1 and derive the initial reachability matrix, the following rules are applied:

1. If the entry (i, j) in the Structural Self-Interaction Matrix is V, then in the initial reachability matrix the entry (i, j) becomes 1 and the entry (j, i) becomes 0.

2. If the entry (i, j) in the Structural Self-Interaction Matrix is A, then in the initial reachability matrix the entry (i, j) becomes 0 and the entry (j, i) becomes 1.

3. If the entry (i, j) in the Structural Self-Interaction Matrix is X, then in the initial reachability matrix the entry (i, j) becomes 1 and the entry (j, i) becomes 1.

4. If the entry (i, j) in the Structural Self-Interaction Matrix is O, then in the initial reachability matrix the entry (i, j) becomes 0 and the entry (j, i) becomes 0.

Table 4 presents the Structural Self-Interaction Matrix.

Table 3

Initial Reachability Matrix

No.	Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Technological Limitations	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Technology acceptance	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	Information filtering	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	High costs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Misalignment with business objectives	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	Customer Relationship Management (CRM) systems	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1
7	Artificial intelligence and machine learning	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1
8	Knowledge management software	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1
9	Project management tools	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1
10	Mobile applications	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1
11	Powerful servers	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
12	Network storage systems	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
13	Network infrastructures	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
14	Security hardware	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
15	Backup storage devices	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
16	Increased productivity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
17	Enhanced innovation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
18	Improved service quality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1

Step Four: Formation of the Final Reachability Matrix

After obtaining the initial reachability matrix, the secondary relationships among the factors are examined. A secondary relationship exists when, if factor i leads to factor j and factor j leads to factor k, then factor i should also lead to factor k. If this condition is not reflected in the initial reachability matrix, the matrix must be revised and the missing relationships added. This process is referred to as the transitivity check or making the initial reachability matrix consistent.

In this step, all secondary relationships among the factors were examined; however, no additional secondary relationships were identified. Therefore, the final reachability matrix is the same as the initial reachability matrix. In this matrix, the driving power and dependence of each factor are also indicated. The driving power of a factor is obtained by summing the number of factors it influences, including itself. Similarly, the dependence of a factor is calculated by summing the number of factors that influence it, including the factor itself.

Table 4

Final Reachability Matrix

No.	Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Influence
1	Technological Limitations	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
2	Technology acceptance	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
3	Information filtering	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
4	High costs	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
5	Misalignment with business objectives	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
6	Customer Relationship Management (CRM) systems	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1	8
7	Artificial intelligence and machine learning	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1	8
8	Knowledge management software	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1	8
9	Project management tools	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1	8
10	Mobile applications	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1	8
11	Powerful servers	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	8
12	Network storage systems	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	8
13	Network infrastructures	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	8
14	Security hardware	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	8
15	Backup storage devices	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	8
16	Increased productivity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3
17	Enhanced innovation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3
18	Improved service quality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3
	Dependence	5	5	5	5	5	10	10	10	10	10	10	10	10	10	10	18	18	18	-

Step Five: Determining the Relationships and Leveling of Factors

In this step, using the reachability matrix, the reachability set and antecedent set are first identified, and then their intersection is determined for each factor.

• Reachability set: this set includes the factor itself and the factors it influences. It can be identified by the "1" entries in the corresponding row of the matrix.

• Antecedent set: this set includes the factor itself and the factors that influence it. It can be identified by the "1" entries in the corresponding column of the matrix.

After identifying the reachability and antecedent sets, their intersection is determined for each factor. Factors whose reachability set and intersection set are identical are placed at the highest level of the hierarchy in the Interpretive Structural Modeling (ISM) framework.

To determine the elements of the next level of the system, the factors identified at the highest level are removed from the calculations in the corresponding table. The procedure for determining the next level is then repeated in the same manner as for identifying the highest level. This process continues until the components of all levels of the system are determined.

Table 5

Leveling (First Iteration)

Factors	Output set	Input set	Common set	Level
1	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	1,2,3,4,5	1,2,3,4,5	
2	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	1,2,3,4,5	1,2,3,4,5	

3	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	1,2,3,4,5	1,2,3,4,5	
4	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	1,2,3,4,5	1,2,3,4,5	
5	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	1,2,3,4,5	1,2,3,4,5	
6	6,7,8,9,10,11,12,13,14,15,16,17,18	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	
7	6,7,8,9,10 ,16,17,18	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	
8	6,7,8,9,10 ,16,17,18	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	
9	6,7,8,9,10 ,16,17,18	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	
10	6,7,8,9,10 ,16,17,18	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	
11	11,12,13,14,15,16,17,18	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	
12	11,12,13,14,15,16,17,18	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	
13	11,12,13,14,15,16,17,18	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	
14	11,12,13,14,15,16,17,18	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	
15	11,12,13,14,15,16,17,18	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	
16	16,17,18	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	16,17,18	1
17	16,17,18	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	16,17,18	1
18	16,17,18	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18	16,17,18	1

As shown in the table above, the reachability sets of factors 16, 17, and 18 are completely identical. Therefore, these factors are placed at the first level as dependent factors. Accordingly, they are removed from the table in order to continue the leveling process. The next table presents the second iteration of the leveling process.

Table 6

Leveling (Second Iteration)

Factors	Output set	Input set	Common set	Level
1	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	1,2,3,4,5	1,2,3,4,5	
2	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	1,2,3,4,5	1,2,3,4,5	
3	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	1,2,3,4,5	1,2,3,4,5	
4	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	1,2,3,4,5	1,2,3,4,5	
5	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	1,2,3,4,5	1,2,3,4,5	
6	6,7,8,9,10,11,12,13,14,15	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	2
7	6,7,8,9,10	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	2
8	6,7,8,9,10	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	2
9	6,7,8,9,10	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	2
10	6,7,8,9,10	1,2,3,4,5,6,7,8,9,10	6,7,8,9,10	2
11	11,12,13,14,15	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	2
12	11,12,13,14,15	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	2
13	11,12,13,14,15	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	2
14	11,12,13,14,15	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	2
15	11,12,13,14,15	1,2,3,4,5, 11,12,13,14,15	11,12,13,14,15	2

As shown in the table above, the reachability sets of factors 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 are completely identical. Therefore, these factors are placed at the second level. Accordingly, they are removed from the table to continue the leveling process. The next table presents the third iteration of the leveling process.

Table 7

Leveling (Third Iteration)

Factors	Output set	Input set	Common set	Level
1	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3
2	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3
3	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3
4	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3
5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	3

As shown in the table above, the reachability sets of factors 1, 2, 3, 4, and 5 are completely identical. Therefore, these factors are placed at the third level as driving (influential) factors. Accordingly, they are removed from the table, and as a result, the leveling process is completed.

Step Six: Development of the Final Model

At this stage, based on the levels of the factors and the final reachability matrix, an initial model is constructed. By removing the transitive links from the initial model, the final model is obtained. Consequently, the ISM model derived from the factors influencing the improvement of customer knowledge management system performance is illustrated in 'Figure 1'.

Figure 1

Initial ISM Model

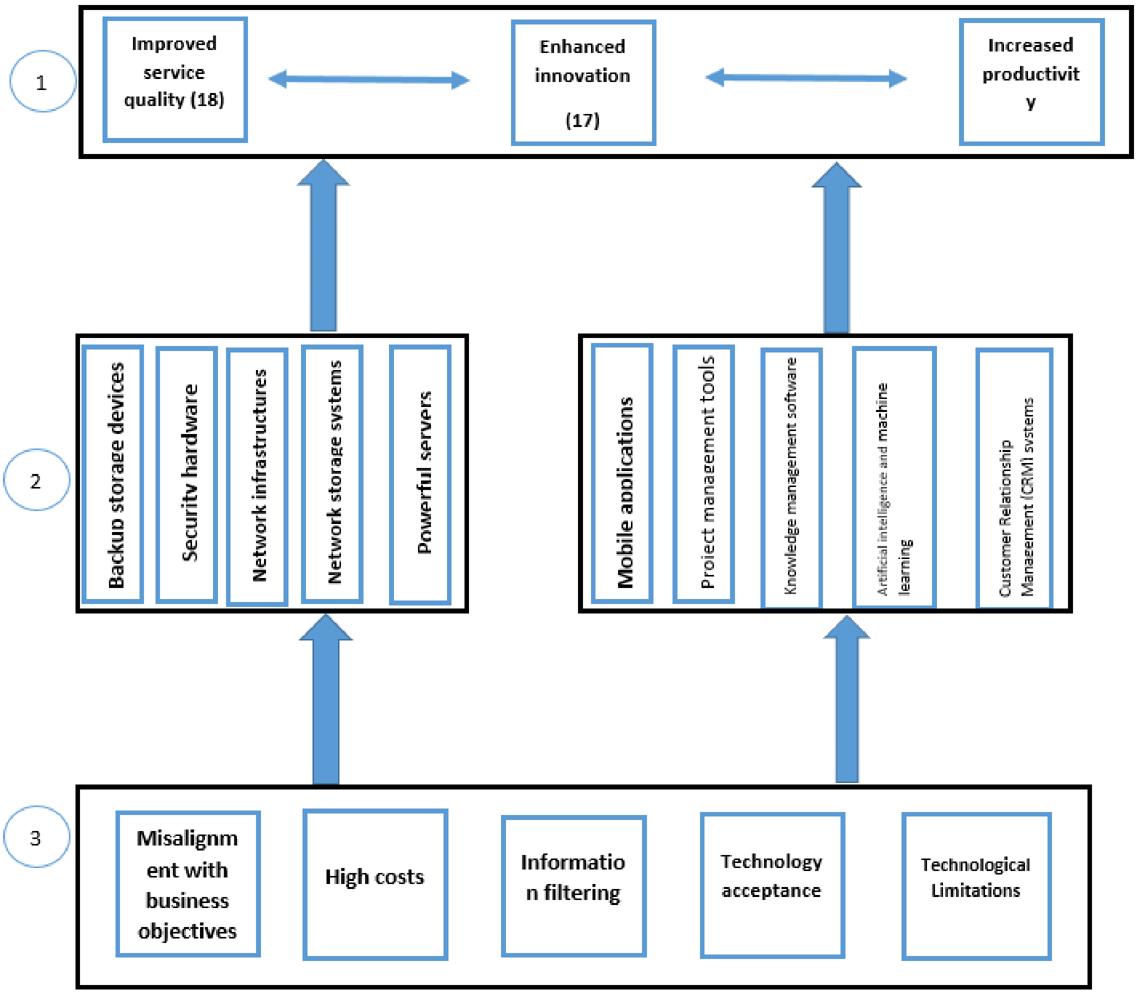
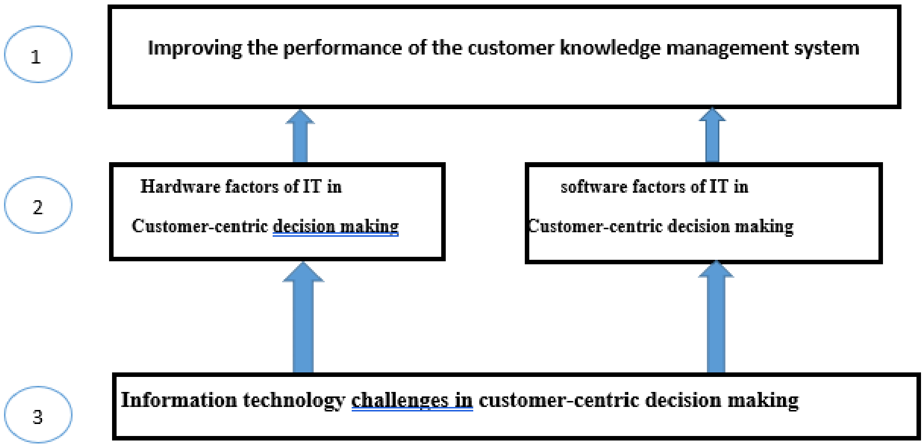


Figure 2

Final ISM Model



Step Seven: Analysis of Driving Power and Dependence (MICMAC Analysis)

At this stage, the factors are classified into four groups. The first group includes ‘autonomous factors (Region 1)’, which have weak driving power and weak dependence. These factors are relatively disconnected from other factors and have limited relationships with them.

The second group consists of ‘dependent factors (Region 2) ‘, which have ‘low driving power but high dependence’.

The third group includes ‘linkage factors (Region 3) ‘. These factors possess ‘both high driving power and high dependence’. In fact, any action taken on these factors will lead to changes in other factors.

The fourth group comprises ‘independent factors (Region 4)’. These factors have ‘high driving power and low dependence’. Factors with high driving power are generally referred to as ‘key factors’. Clearly, such factors are placed in either the ‘independent’ or ‘linkage’ categories.

The ‘driving power’ and ‘dependence’ of each factor are obtained by summing the “1” entries in each ‘row’ and ‘column’ of the matrix. Based on these values, the ‘driving power–dependence diagram’ is plotted.

Using the data obtained in ‘Step Four’, the studied factors can be categorized into the following four groups based on their driving power over other factors and their dependence on other factors:

• Autonomous factors: Factors with minimal dependence and driving power.

• Dependent factors: Factors that are highly dependent on other factors.

• Linkage factors: Factors that have a two-way relationship with other factors.

• Independent (driving) factors: Factors that exert significant influence on other factors.

To determine the coordinates of each factor in the ‘MICMAC matrix’, the ‘driving power’ and ‘dependence’ values of each factor are used. These values are derived from the ‘final reachability matrix’.

Table 8

Driving Power and Dependence of Each Factor

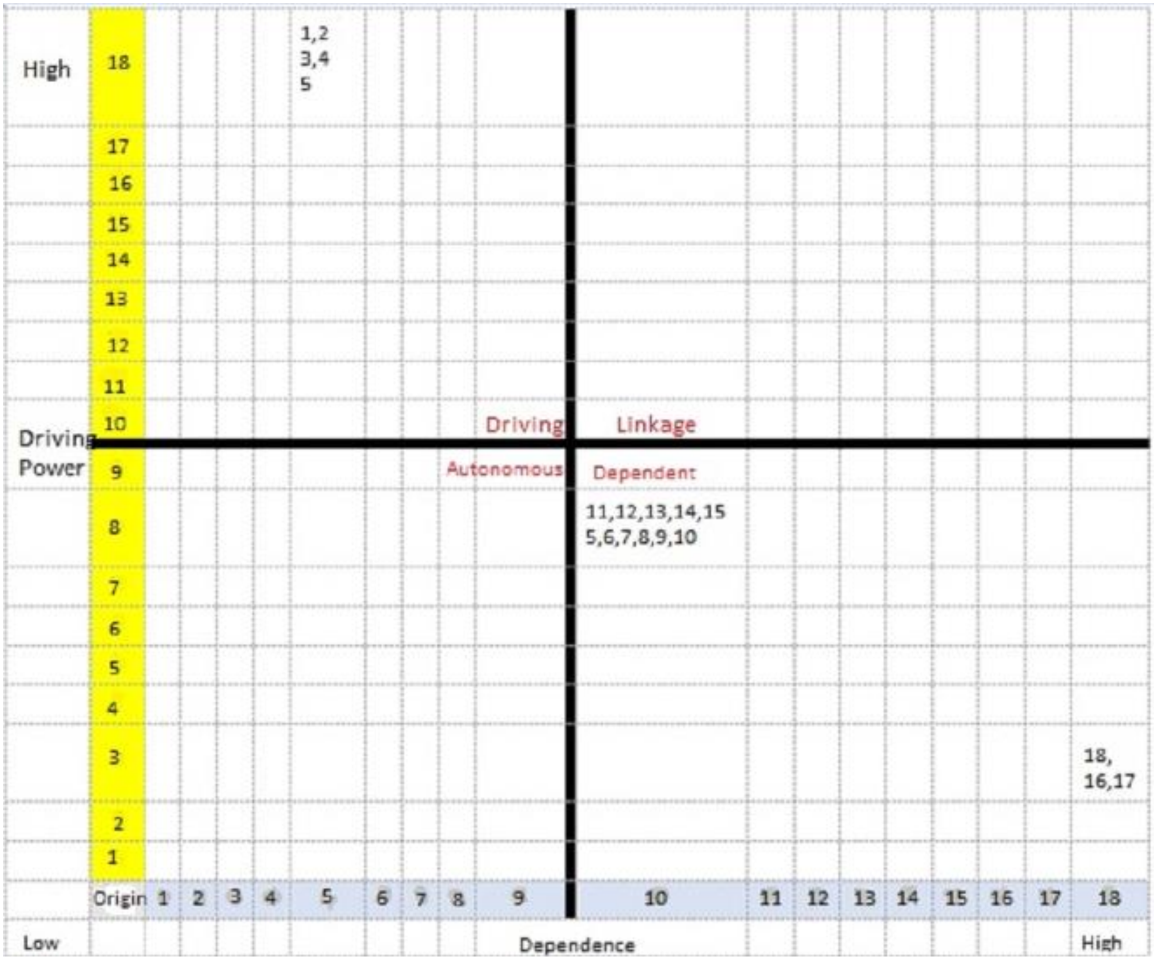
No.	Factors	Dependence	Influence
1	Technological Limitations	5	18
2	Technology acceptance	5	18
3	Information filtering	5	18
4	High costs	5	18
5	Misalignment with business objectives	5	18
6	Customer Relationship Management (CRM) systems	10	8
7	Artificial intelligence and machine learning	10	8
8	Knowledge management software	10	8
9	Project management tools	10	8
10	Mobile applications	10	8
11	Powerful servers	10	8

12	Network storage systems	10	8
13	Network infrastructures	10	8
14	Security hardware	10	8
15	Backup storage devices	10	8
16	Increased productivity	18	3
17	Enhanced innovation	18	3
18	Improved service quality	18	3

Using the coordinates of the factors presented in the above table, the 'MICMAC matrix' is constructed ('Figure 3').

Figure 3

MICMAC Matrix



As illustrated in the MICMAC matrix (Figure 3), 'Factors 1, 2, 3, 4, and 5' are located in the 'driving (independent) region'. These factors exhibit 'high driving power and low dependence', indicating their fundamental and influential role in the system.

In contrast, Factors 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18 fall within the 'dependent region'. These factors have 'low driving power but high dependence' on other factors, meaning that their performance is largely influenced by changes in the driving factors.

At this point, the 'interpretive structural modeling (ISM) process' for designing a customer-oriented decision-making framework based on information technology and customer knowledge management in the dairy industry: a case study of Pegah Dairy Industries Company is completed.

4. Discussion and Conclusion

The findings of the present study provide a structured and hierarchical understanding of how information technology (IT) and customer knowledge management (CKM) interact to shape customer-oriented decision-making in the dairy industry. The results derived from Interpretive Structural Modeling (ISM) reveal a three-level structure in which the ultimate outcomes—namely increased productivity, enhanced innovation, and improved service quality—are positioned at the highest level as dependent variables. This indicates that these outcomes are not directly controllable but are instead the result of the interaction of underlying technological and organizational factors. This finding is consistent with prior research emphasizing that CKM significantly enhances organizational performance outcomes, particularly innovation capability and service excellence, by transforming customer insights into actionable strategies (Macca et al., 2025; Zahrawi et al., 2025). The positioning of these performance indicators as dependent variables suggests that organizations must focus on strengthening foundational capabilities rather than expecting immediate performance improvements from isolated interventions.

The second level of the model, comprising IT software and hardware components, plays a mediating and enabling role in the system. Elements such as Customer Relationship Management (CRM) systems, artificial intelligence (AI), knowledge management software, and supporting infrastructure (e.g., servers and network systems) were identified as critical enablers of customer-centric decision-making. These findings align with existing literature that highlights the transformative role of digital technologies in facilitating knowledge acquisition, processing, and dissemination. For instance, the integration of AI and big data analytics enables organizations to analyze large volumes of customer data, identify behavioral patterns, and generate predictive insights that support personalized decision-making (Kshetri et al., 2024; Usino et al., 2024). Similarly, the role of CRM systems as platforms for capturing and managing customer interactions has been widely documented as a key driver of CKM effectiveness and organizational responsiveness (Camara, 2024). The present study reinforces these findings by demonstrating that technological tools act as a bridge between strategic challenges and performance outcomes, highlighting their central role in operationalizing CKM processes.

At the foundational level, the study identifies IT-related challenges—such as technological limitations, technology acceptance, information filtering, high costs, and misalignment with business objectives—as the most influential (driving) factors in the model. These factors exhibit high driving power and low dependence, indicating that they exert a significant impact on all other components of the system. This finding is particularly important, as it underscores that the success of CKM initiatives depends less on the availability of advanced technologies and more on the organization's ability to manage structural and strategic challenges effectively. This result is consistent with previous studies that emphasize the importance of organizational readiness, strategic alignment, and cultural acceptance in the successful implementation of knowledge management systems (Almhemis & Safari, 2025; Larasati et al., 2025). In particular, the issue of technology acceptance has been identified as a critical determinant of IT adoption, as resistance from employees can significantly hinder the utilization of technological tools and reduce their effectiveness (Alrahbi et al., 2022).

The strong influence of IT challenges on higher-level factors also highlights the importance of aligning technological initiatives with organizational objectives. Misalignment between IT strategies and business goals can lead to inefficiencies, resource wastage, and suboptimal decision-making. This finding is supported by research indicating that IT governance mechanisms play a crucial role in ensuring that technological investments contribute to organizational performance and competitive advantage (Tajvidi & Ahmadi, 2020). Furthermore, the identification of high costs as a key challenge reflects the financial constraints associated with implementing and maintaining advanced IT systems, particularly in industries with tight profit margins such as dairy production. This underscores the need for careful planning and prioritization of technological investments to maximize their impact.

Another significant finding of the study is the role of CKM in enhancing innovation and productivity. The results indicate that effective CKM systems contribute to the development of innovative products and services, as well as improvements in operational efficiency. This is consistent with prior research demonstrating that knowledge management practices positively influence knowledge worker productivity and organizational performance, particularly when supported by active participation and engagement from employees (Firdaus et al., 2025). Additionally, the study's findings align with research on green knowledge management, which highlights the role of knowledge acquisition and utilization in driving innovation and improving organizational outcomes (Sahoo et al., 2023). These findings collectively suggest that CKM serves as a critical mechanism for translating customer insights into tangible performance improvements.

The importance of knowledge sharing and collaboration within the organization is also evident from the results. The integration of knowledge management software and communication technologies facilitates the dissemination of customer knowledge across different organizational units, enabling more informed and coordinated decision-making. This finding is supported by studies indicating that IT-enabled knowledge management systems enhance information flow, collaboration, and organizational learning, thereby improving overall performance (Bahramimianrood & Bathaei, 2021; Raudeliuniene et al., 2021). In this context, the role of IT extends beyond data management to encompass the creation of a knowledge-driven organizational culture that supports continuous learning and innovation.

The study also highlights the significance of digital transformation in shaping customer-oriented decision-making processes. The integration of digital technologies with CKM systems enables organizations to engage with customers more effectively, gather real-time feedback, and adapt their strategies accordingly. This is particularly relevant in the dairy industry, where consumer preferences are rapidly evolving and require timely and accurate responses. The findings are consistent with research emphasizing the role of digitalization in enhancing customer knowledge management and improving decision-making capabilities (Camara, 2024; Yellanki, 2022). By leveraging digital technologies, organizations can develop more agile and responsive decision-making frameworks that align with dynamic market conditions.

Furthermore, the study underscores the importance of customer knowledge as a strategic resource for achieving competitive advantage. The ability to extract, analyze, and utilize customer knowledge enables organizations to differentiate themselves in competitive markets and create unique value propositions. This finding aligns with previous research demonstrating that CKM contributes to sustainable competitive advantage by enhancing customer satisfaction, loyalty, and long-term relationships (Salem et al., 2024; Zahrawi et al., 2025). In the context of the dairy industry, where product differentiation is often limited, the effective use of customer knowledge becomes a critical factor in maintaining market share and achieving growth.

Overall, the findings of this study contribute to the existing literature by providing a comprehensive framework that integrates IT and CKM in the context of customer-oriented decision-making. The hierarchical structure of the model offers valuable insights into the interrelationships among different factors and highlights the importance of addressing foundational challenges to achieve desired outcomes. By identifying the key drivers and enablers of CKM performance, the study provides a roadmap for organizations seeking to enhance their decision-making capabilities and achieve sustainable competitive advantage.

The present study is subject to several limitations that should be considered when interpreting the findings. First, the research is based on a case study of a single organization within the dairy industry, which may limit the generalizability of the results to other industries or contexts. Second, the use of Interpretive Structural Modeling relies on expert judgments, which, although valuable, may introduce subjectivity into the analysis. Third, the study focuses primarily on organizational and technological factors, without explicitly considering the role of external environmental variables such as market dynamics and regulatory conditions. Finally, the cross-sectional nature of the study limits the ability to examine changes over time and assess the long-term impact of IT and CKM integration.

Future research should aim to address these limitations by expanding the scope of investigation to include multiple organizations and industries, thereby enhancing the generalizability of the findings. Longitudinal studies could provide valuable insights into the dynamic relationships among IT, CKM, and organizational performance over time. Additionally, future studies may explore the role of moderating variables such as organizational culture, leadership style, and human capital in influencing the effectiveness of CKM initiatives. The integration of advanced analytical methods, such as system dynamics modeling and machine learning techniques, could also contribute to the development of more robust and predictive frameworks for customer-oriented decision-making.

From a practical perspective, organizations should prioritize the alignment of IT strategies with business objectives to ensure the effective implementation of CKM systems. Managers should focus on addressing foundational challenges such as technology acceptance and organizational readiness, as these factors have a significant impact on the success of technological initiatives. Investing in advanced IT infrastructure, including AI and data analytics tools, can enhance the organization's ability to generate actionable insights from customer data. Furthermore, fostering a culture of knowledge sharing and collaboration is essential for maximizing the benefits of CKM and improving decision-making processes. By adopting a holistic approach that integrates technological, organizational, and strategic dimensions, organizations can enhance their competitiveness and achieve sustainable growth in dynamic market environments.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were considered.

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