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Developing a Qualitative Model of Modern Banking Service Innovation Based on Customer Knowledge Management

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Abstract

The present study aims to develop a qualitative model of modern banking service innovation grounded in customer knowledge management. Given the exploratory and multidimensional nature of the research topic, thematic analysis was employed to identify, interpret, and organize the principal components and dimensions of the proposed model. This method, by emphasizing the extraction of latent conceptual patterns from the scholarly literature, enables the formulation of a coherent, systematic, and evidence-based framework and provides a robust foundation for achieving a deeper understanding of the mechanisms influencing banking service innovation. To collect and select the relevant scientific literature, the Scopus, Web of Science, and Google Scholar databases were utilized. In the initial stage, an extensive search of these databases resulted in the identification of 198 articles. Following a rigorous review of titles, abstracts, and keywords, 32 articles were deemed eligible for coding and qualitative analysis. The data analysis process was conducted using MAXQDA software through systematic coding and theme extraction procedures. The findings of the thematic analysis revealed that the qualitative model of modern banking service innovation based on customer knowledge management is structured around five core elements. These elements include smart technological infrastructures and capabilities, customer knowledge management processes, innovation in the design and delivery of banking services, value co-creation and knowledge-based customer interactions, and environmental dynamics and institutional requirements of banking innovation. The interaction of these elements provides a coherent framework for the development of banking service innovation and can serve as a practical foundation for banking managers and decision-makers in enhancing customer experience, strengthening competitive advantage, and achieving sustainable innovation.

Keywords: Innovation; Modern Banking; Modern Banking Services; Customer Knowledge Management

1. Introduction

The banking industry is undergoing one of the most profound transformations in its modern history, driven by rapid technological advancement, intensifying competition, and the increasing sophistication of customer expectations. Traditional banking models, which were primarily product-centric and transaction-focused, are no longer sufficient for sustaining competitiveness in contemporary financial markets. Instead, banks are now compelled to adopt innovation-driven strategies that prioritize customer value creation, service differentiation, and knowledge-based decision-making. In this context, modern banking service innovation has emerged as a central strategic imperative for financial institutions seeking sustainable growth, customer loyalty, and long-term competitiveness (Bratianu et al., 2022; Wang & Xu, 2018; Xie et al., 2020).



One of the most influential drivers of this transformation is the increasing recognition of customers as critical knowledge assets rather than merely passive recipients of services. Customer interactions generate vast volumes of data related to preferences, behaviors, needs, expectations, and experiences, which, when effectively captured and analyzed, provide invaluable insights for strategic planning and service development (Hosseini et al., 2022; Kong & Ibrahim, 2019; Nguyen & Harrison, 2018). Consequently, customer knowledge management has evolved into a core organizational capability that enables banks to design, personalize, and continuously refine their service offerings in alignment with dynamic market demands (Acheampong et al., 2023; Al-Dmour et al., 2020; Salunke et al., 2019).

The integration of customer knowledge management with service innovation processes represents a fundamental shift in banking logic from product-based competition toward experience-based competition. Modern banking customers no longer evaluate financial institutions solely based on price or accessibility; rather, they increasingly assess banks according to the quality, relevance, personalization, and seamlessness of the services provided across multiple channels (Abubakr & Kalifa, 2025; Ngo et al., 2023; Sofiyabadi et al., 2020). This shift has intensified the importance of leveraging customer knowledge not only for operational efficiency but also for the strategic design of innovative services that enhance customer experience and perceived value (Ahinful et al., 2024; Zahrawi et al., 2025).

Advances in digital technologies have further amplified the strategic significance of customer knowledge management in banking. The proliferation of mobile banking, internet banking, fintech platforms, artificial intelligence, machine learning, and big data analytics has created unprecedented opportunities for banks to collect, process, and utilize customer knowledge at scale (Aspiranti et al., 2023; Diener & Špaček, 2021; Li et al., 2025). These technologies enable banks to perform real-time analytics, predict customer needs, personalize service offerings, detect fraud, optimize internal processes, and support managerial decision-making with high precision (Bhat & Gupta, 2024; Wang, 2022; Yang et al., 2024). However, the mere availability of advanced technologies does not automatically translate into innovation outcomes. Without a coherent framework that systematically integrates technological capabilities with customer knowledge processes and organizational practices, banks often fail to fully exploit the innovative potential of their digital investments (Barb, 2023; Edeh et al., 2022).

The increasing complexity of the competitive landscape further reinforces the necessity of innovation in modern banking services. Banks today face competition not only from traditional financial institutions but also from fintech startups, digital platforms, big technology companies, and decentralized financial systems, all of which are capable of delivering highly customized and user-friendly financial solutions (Bhat & Gupta, 2024; Nguyen & Nguyen, 2024; Zahrawi et al., 2025). This competitive pressure has significantly shortened product life cycles, raised customer expectations, and heightened the demand for continuous service innovation (Taghizadeh et al., 2017; Xin et al., 2021; Zhan et al., 2019). In such an environment, the ability to systematically manage customer knowledge becomes a decisive source of competitive advantage and organizational resilience (Grassi et al., 2022; Kor et al., 2021).

Despite the growing recognition of the importance of customer knowledge management for banking innovation, existing research reveals several conceptual and practical gaps. Many prior studies have examined customer knowledge management and service innovation as separate domains, without sufficiently explaining the dynamic interactions between knowledge processes, technological infrastructures, organizational practices, and environmental forces in shaping modern banking service innovation (Hasanvand et al., 2022; Stefanelli & Manta, 2022). Moreover, the majority of empirical investigations have relied on quantitative models that capture only limited dimensions of this complex phenomenon, thereby overlooking the deeper mechanisms, relationships, and contextual factors that underlie successful innovation in banking services (Ahmadir & Safari, 2022; Bratianu et al., 2022).

The inherently multifaceted and context-dependent nature of banking service innovation necessitates methodological approaches capable of capturing complexity, interdependence, and processual dynamics. Qualitative inquiry, particularly through systematic analysis of existing knowledge and empirical evidence, offers unique advantages for uncovering latent patterns, conceptual structures, and explanatory frameworks that remain inaccessible through purely quantitative methods (Silva, 2015; Tseng et al., 2021). Thematic analysis, in this regard, provides a rigorous and flexible methodology for



synthesizing diverse strands of knowledge and constructing comprehensive conceptual models grounded in empirical and theoretical evidence (Acheampong et al., 2023; Aspiranti et al., 2023).

In parallel, the growing emphasis on co-creation and customer participation in service design has transformed the role of customers from passive consumers to active partners in innovation processes. Contemporary banking innovation increasingly relies on collaborative value creation, whereby customers contribute ideas, feedback, experiences, and knowledge that directly shape the development and refinement of banking services (Ngo et al., 2023; Xie et al., 2020; Zhan et al., 2019). This shift further underscores the necessity of developing systematic mechanisms for capturing, organizing, analyzing, and applying customer knowledge across organizational functions (Al-Dmour et al., 2022; Manohar et al., 2019; Wang, 2022).

Furthermore, regulatory requirements, data privacy concerns, and ethical considerations impose additional constraints and responsibilities on banks in managing customer knowledge and deploying innovative services. Compliance with domestic banking regulations, international financial standards, and data protection frameworks must be balanced with the strategic pursuit of innovation and competitive differentiation (Al-Dmour et al., 2022; Edeh et al., 2022; Nguyen & Nguyen, 2024). Consequently, any comprehensive model of modern banking service innovation must incorporate not only technological and organizational factors but also environmental dynamics and institutional requirements (Bratianu et al., 2022; Hasanvand et al., 2022).

Taken together, the literature clearly indicates that modern banking service innovation is not the outcome of isolated technological investments or ad hoc managerial initiatives. Rather, it emerges from the systematic alignment of customer knowledge management processes, intelligent technological infrastructures, organizational learning mechanisms, and environmental adaptation capabilities (Grassi et al., 2022; Li et al., 2025; Salunke et al., 2019). Yet, despite the growing body of research in this domain, the field still lacks an integrative, qualitative, and evidence-based framework that comprehensively explains how these elements interact to produce sustained innovation in modern banking services (Barb, 2023; Kor et al., 2021; Stefanelli & Manta, 2022).

This conceptual deficiency limits both theoretical advancement and managerial practice. Without a coherent model, banking executives and policymakers struggle to design coordinated strategies that effectively leverage customer knowledge for innovation, allocate resources efficiently, and navigate the rapidly evolving financial ecosystem (Ahinful et al., 2024; Ahmadir & Safari, 2022; Yang et al., 2024). Consequently, there is a pressing need for research that synthesizes existing knowledge, identifies core dimensions, and constructs a robust qualitative model capable of guiding strategic decision-making and operational implementation in modern banking contexts (Acheampong et al., 2023; Zahrawi et al., 2025).

The aim of this study is to develop and validate a qualitative model of modern banking service innovation based on customer knowledge management.

2. Methods and Materials

In terms of purpose, this study is classified as an applied–developmental research, as it seeks to develop a qualitative model for modern banking service innovation based on customer knowledge management, and its findings can be directly utilized to improve banks’ policies, processes, and strategic decision-making. In terms of nature and approach, the present study is qualitative and, by emphasizing in-depth explanation of concepts, relationships, and mechanisms influencing banking service innovation, aims to extract the main components and dimensions of the model from empirical data and the scientific literature. This approach enables a more comprehensive understanding of the phenomenon under investigation and is appropriate for topics characterized by conceptual complexity and contextual embeddedness. In terms of research design, the present study was conducted within the framework of thematic analysis, which is recognized as a rigorous and well-established method in qualitative research. By focusing on the identification of latent patterns and themes within the data, this method provides the necessary foundation for constructing a coherent conceptual model. The selection of this research type and qualitative approach is consistent with the exploratory nature of the subject and the necessity of extracting the components of modern banking service innovation based on customer knowledge management, thereby enabling the development of an evidence-based model grounded in the realities of the banking industry.



In this study, the Scopus, Web of Science, and Google Scholar databases were used to collect and select the scientific literature related to modern banking service innovation based on customer knowledge management. For article selection, the procedure proposed by Silva (2015) was employed. At this stage, an extensive search of the aforementioned databases was conducted, resulting in the identification of 198 sources, including original research articles, review articles, and conference papers. After careful examination of titles, abstracts, and keywords, 32 articles were selected for coding and qualitative analysis, as illustrated in Figure 1.

In the qualitative phase of the study, the objective was to identify and analyze the factors influencing the implementation of modern banking service innovation based on customer knowledge management. Thematic analysis was used for qualitative data analysis, which comprised open coding, axial coding, and selective coding (Strauss & Corbin, 1998). During open coding, concepts are identified and their attributes and dimensions are extracted from the data, and data and phenomena are categorized into conceptual labels. This stage provides the necessary foundation for the initial organization of data and the identification of key categories. In the axial coding stage, the categories derived from open coding are refined and differentiated. In this process, one category is selected as the central axis of analysis, and other categories are systematically related to it. Subsequently, from among the set of categories, those with the greatest relevance to the final analysis are selected. Selective coding represents the final stage of analysis and is conducted at a higher level of abstraction, in which the relationships among the categories are explicated. This stage enables the integration of data and the identification of the core category, forming the basis for the development of the qualitative model of banking service innovation based on customer knowledge management. The data analysis process was conducted using MAXQDA software through systematic coding and theme extraction procedures.

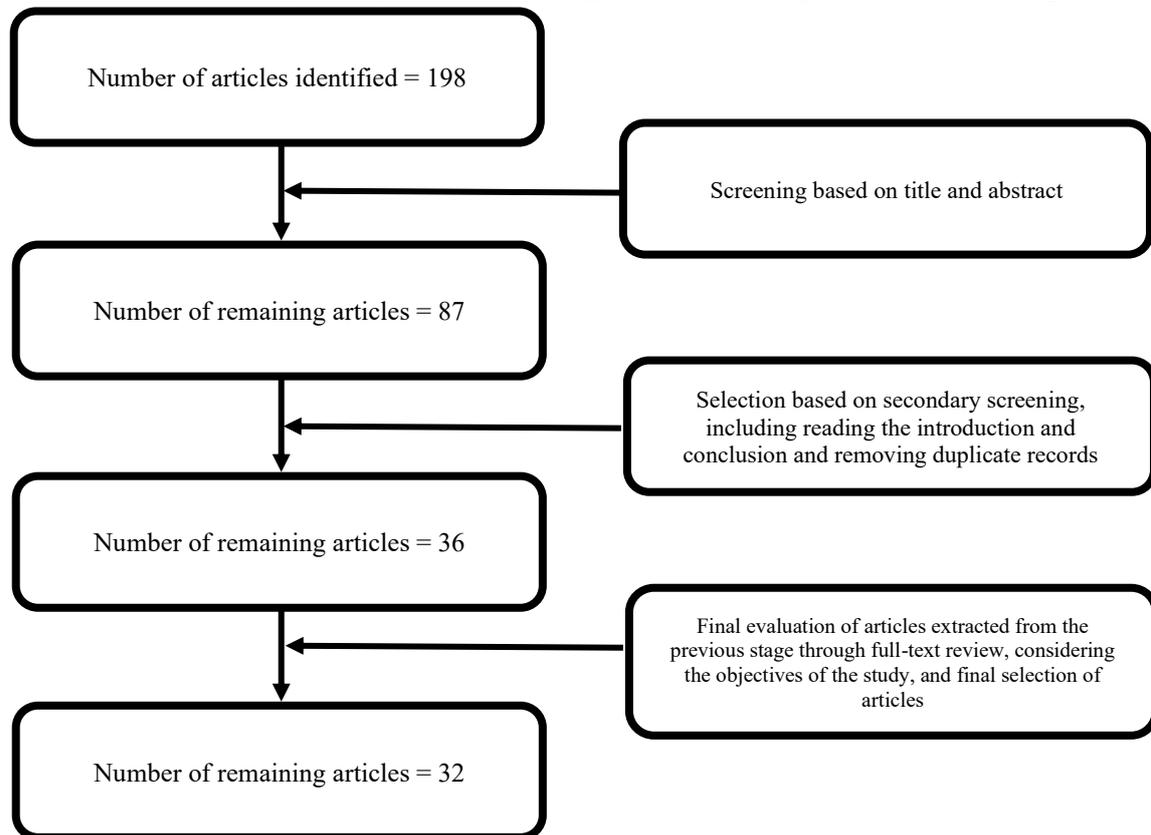


Figure 1. Article Selection Process

3. Findings and Results

In this section, based on the reviewed sources, the basic themes were first extracted. These themes were then classified into organizing themes according to their conceptual commonalities. The coding process was carried out such that, in the first step, the basic themes were identified through a systematic review of the research literature, and in the next step, they were grouped

under organizing themes through conceptual aggregation and comparison. Accordingly, the basic themes extracted from the literature review are presented in Table 1.

Table 1. Basic Theme Coding

Basic Theme	Sources	Basic Theme	Sources
Need to provide differentiated and value-creating services	Wang & Xu (2018); Al-Dmour et al. (2020); Xie et al. (2020)	Prioritization of services based on customer value	Taghizadeh et al. (2017); Wen et al. (2020); Ahinful et al. (2024); Bhat & Gupta (2024)
Processing large volumes of banking data	Edeh et al. (2022); Wen et al. (2020)	Analysis of customer opinions and suggestions	Zahrawi et al. (2025)
Identification of customer behavioral patterns	Yasmeen et al. (2019); Hosseini et al. (2022)	Regular and transparent reporting to regulatory bodies	Al-Dmour et al. (2020); Xie et al. (2020); Bratianu et al. (2022)
Protection of customer data confidentiality and privacy	Al-Dmour et al. (2022); Hosseini et al. (2022)	Personalization of communication channels	Ngo et al. (2023); Abubakr & Kalifa (2025)
Application of data mining algorithms	Edeh et al. (2022); Li et al. (2025)	Forecasting future customer needs and preferences	Yasmeen et al. (2019); Bratianu et al. (2022); Ahinful et al. (2024)
Providing customer-specific recommendations	Sofiyabadi et al. (2020); Wen et al. (2020)	Analysis of customer interaction and transaction history	Grassi et al. (2022); Barb (2023)
Adjustment of services based on customers' financial behavior	Al-Dmour et al. (2020); Ngo et al. (2023)	Integration of fintech services into banking systems	Yasmeen et al. (2019); Bhat & Gupta (2024)
Establishment of shared organizational knowledge repositories	Wang & Xu (2018); Salunke et al. (2019)	Facilitation of knowledge flow among banking units	Nguyen & Harrison (2018); Al-Dmour et al. (2022)
Extraction of decision-support insights from data	Acheampong et al. (2023); Li et al. (2025)	Documentation of customer-related experiences	Zhan et al. (2019); Barb (2023)
Design of customized service packages	Xin et al. (2021); Nguyen & Nguyen (2024)	Exchange of data and knowledge with ecosystem partners	Xie et al. (2020); Diener & Spacek (2021)
Interpretation of data to improve customer experience	Xie et al. (2020); Hosseini et al. (2022)	Creation of a holistic customer view	Nguyen & Harrison (2018); Grassi et al. (2022)
Improvement of customer access to banking services	Edeh et al. (2022); Hosseini et al. (2022)	Promotion of a knowledge-sharing culture	Diener & Spacek (2021)
Alignment of customer experience across multiple channels	Zhan et al. (2019); Wen et al. (2020)	Adaptation of services to the customer life cycle	Kong & Ibrahim (2019); Li et al. (2025)
Development of mobile and internet banking	Wang & Xu (2018); Salunke et al. (2019)	Increased pressure for innovation and response speed	Abubakr & Kalifa (2025)
Collaboration with startups and fintech firms	Xin et al. (2021); Ngo et al. (2023)	Development of joint innovative services	Diener & Spacek (2021); Bratianu et al. (2022)
Integration of physical and digital channels	Wang & Xu (2018); Al-Dmour et al. (2020)	Recording customer profile information and preferences	Nguyen & Nguyen (2024); Ahinful et al. (2024); Li et al. (2025)
Increasing satisfaction through customized services	Sofiyabadi et al. (2020); Hosseini et al. (2022)	Establishment of interactive platforms for co-creation	Wang & Xu (2018); Zahrawi et al. (2025)
Real-time analysis of customer data	Zhan et al. (2019); Li et al. (2025)	Easy access to customer knowledge	Nguyen & Harrison (2018); Abrar et al. (2022)
Flexibility in banking service design	Xie et al. (2020); Li et al. (2025)	Reduction of decision risk through customer knowledge	Al-Dmour et al. (2022); Bratianu et al. (2022)
Focus on perceived customer value	Salunke et al. (2019); Ngo et al. (2023)	Identification of service weaknesses and improvement opportunities	Salunke et al. (2019); Xie et al. (2020)
Use of customer knowledge in policy design	Acheampong et al. (2023)	Intelligent support for managerial decisions	Abrar et al. (2022); Barb (2023)
Data-driven decision making based on customer analytics	Kong & Ibrahim (2019); Hosseini et al. (2022)	Identification of explicit and latent customer needs	Al-Dmour et al. (2022); Bhat & Gupta (2024)
Recording and analyzing digital interaction data	Al-Dmour et al. (2020); Ngo et al. (2023)	Collection of direct and indirect customer feedback	Wang & Xu (2018); Diener & Spacek (2021); Ahinful et al. (2024); Bratianu et al. (2022)
Strengthening customer participation in service processes	Xin et al. (2021); Ngo et al. (2023)	Use of feedback for innovative service design	Grassi et al. (2022); Bratianu et al. (2022)
Management of legal and compliance risks	Xie et al. (2020); Wang (2022)	Production of customized and value-creating services	Zhan et al. (2019); Wang (2022)
Integration of structured and unstructured data	Aspiranti et al. (2023); Zahrawi et al. (2025)	Competition with traditional and digital banks	Nguyen & Harrison (2018); Nguyen & Nguyen (2024)



Emergence of innovative actors and fintechs	Xie et al. (2020); Barb (2023)	Compliance with domestic banking regulations	Al-Dmour et al. (2022)
Compliance with international regulations and financial standards	Edeh et al. (2022); Wang (2022)	Active customer–bank interaction on online platforms	Abrar et al. (2022); Bhat & Gupta (2024)
Leveraging customer knowledge for product development	Al-Dmour et al. (2020); Hosseini et al. (2022)	Rapid response to customer requests and inquiries	Nguyen & Harrison (2018); Xin et al. (2021)
Co-creation of services with customer participation	Xie et al. (2020); Ngo et al. (2023)	Knowledge sharing between customer and bank	Kong & Ibrahim (2019); Tseng et al. (2021)
Improving service alignment with customer lifestyle	Wen et al. (2020); Abubakr & Kalifa (2025)	Use of conversational tools and chatbots for interaction	Xie et al. (2020); Aspiranti et al. (2023)
Systematic classification of customer information	Sofiyabadi et al. (2020); Tseng et al. (2021)	Creation of integrated service platforms	Ahinful et al. (2024); Abubakr & Kalifa (2025)
Establishment of customer knowledge databases	Acheampong et al. (2023)	Ensuring security and sustainable access to services	Abrar et al. (2022); Bratianu et al. (2022)
Integration of transactional and behavioral data	Salunke et al. (2019); Aspiranti et al. (2023)	Compliance with professional ethics and social responsibility	Manohar et al. (2019); Nguyen & Nguyen (2024)
Secure and controlled access to customer data	Manohar et al. (2019); Tseng et al. (2021); Diener & Spacek (2021); Hosseini et al. (2022); Ngo et al. (2023)	Personalization of financial services and offers	Manohar et al. (2019); Xin et al. (2021); Bhat & Gupta (2024)
Intelligent analytics and reporting based on customer knowledge	Wang (2022); Ngo et al. (2023)	Improvement of internal banking process efficiency	Grassi et al. (2022); Bratianu et al. (2022)
Detection of fraud and potential risks	Kong & Ibrahim (2019)	Real-time updating of customer information	Zahrawi et al. (2025)
Customer participation in testing new services	Manohar et al. (2019); Tseng et al. (2021)	Support for data analytics and knowledge management	Wen et al. (2020); Tseng et al. (2021)
Automation and optimization of banking processes	Kong & Ibrahim (2019); Zahrawi et al. (2025)	Development of mobile and internet banking	Abrar et al. (2022); Ngo et al. (2023)
Use of customer feedback in service design	Tseng et al. (2021); Wang (2022)	Continuous updating of stored knowledge	Al-Dmour et al. (2022); Barb (2023)
Aggregation of customer information from multiple sources	Nguyen & Harrison (2018); Tseng et al. (2021)	Transparency in service provision and communication	Sofiyabadi et al. (2020); Bhat & Gupta (2024)
Information systems support for managerial decision-making	Edeh et al. (2022); Acheampong et al. (2023); Bhat & Gupta (2024)	Enhancement of customer security and privacy	Nguyen & Nguyen (2024)
Rapid and effective response to customer problems	Acheampong et al. (2023); Bhat & Gupta (2024)	Responsiveness to societal expectations in service innovation	Xin et al. (2021); Bratianu et al. (2022)
Leveraging external innovations in banking	Salunke et al. (2019); Wang (2022)	Extraction of social and digital data	Al-Dmour et al. (2020); Barb (2023)
Acquisition of innovative ideas from customers	Tseng et al. (2021); Aspiranti et al. (2023)	Collection of transactional and behavioral data	Yasmeen et al. (2019); Aspiranti et al. (2023)
Emergence of digital and intelligent technologies	Diener & Spacek (2021); Acheampong et al. (2023); Bhat & Gupta (2024)	Use of surveys and feedback forms	Abrar et al. (2022); Aspiranti et al. (2023); Acheampong et al. (2023); Bhat & Gupta (2024)
Simplification and redesign of banking processes	Al-Dmour et al. (2022)	Changes in customer behavior in financial markets	Nguyen & Nguyen (2024)
Reduction of service delivery time	Al-Dmour et al. (2022); Aspiranti et al. (2023)	Analysis of innovative trends and market opportunities	Acheampong et al. (2023); Bhat & Gupta (2024)
Use of automation in service delivery	Manohar et al. (2019); Zahrawi et al. (2025)	Introduction of new payment and investment tools	Yasmeen et al. (2019); Wang (2022)
Preservation of data integrity and quality	Acheampong et al. (2023); Aspiranti et al. (2023)	Predictive analysis of customer behavior and needs	Nguyen & Harrison (2018); Kong & Ibrahim (2019); Bhat & Gupta (2024); Zahrawi et al. (2025)
Creation of a positive image and public trust in the bank	Grassi et al. (2022); Barb (2023)		

Based on the literature review conducted, a total of 101 basic themes were identified. In the subsequent stage, these themes were categorized into 22 organizing themes according to their conceptual similarities and interrelationships. The first stage of the coding process, namely open coding, focuses on identifying and classifying data into concepts; however, in practice, it is not feasible to separate the coding stages in a fully discrete manner. In this process, efforts were made to ensure that the extracted concepts were as comprehensive as possible and encompassed all relevant indicators and associated themes.



Table 2. Organizing Theme Coding

Organizing Theme	Basic Themes	Organizing Theme	Basic Themes
Customer data analysis and interpretation	Identifying customer behavioral patterns; Forecasting future customer needs and preferences; Analyzing customer interaction and transaction histories; Extracting decision-relevant insights from data; Interpreting data to improve customer experience	Collecting and analyzing customer feedback	Collecting direct and indirect feedback; Analyzing customer comments and suggestions; Identifying weaknesses and opportunities for service improvement; Using feedback to design innovative services
Knowledge sharing and transfer within the organization	Establishing shared organizational knowledge repositories; Facilitating knowledge flows among banking units; Documenting customer-related experiences; Promoting a knowledge-sharing culture	Two-way interactions through digital channels	Active customer-bank engagement on online platforms; Rapid response to customer requests and inquiries; Using conversational tools and chatbots for interaction; Recording and analyzing data derived from digital interactions; Strengthening customer participation in service processes
Leveraging customer knowledge in decision-making	Data-driven decision-making based on customer analytics; Using customer knowledge in policy design; Prioritizing services based on customer value; Reducing decision risk through customer knowledge; Intelligent support for managerial decisions	Knowledge-based joint value creation	Co-creating services with customer participation; Leveraging customer knowledge for product development; Knowledge sharing between customer and bank; Producing customized and value-creating services
Customer-needs-based service design	Identifying explicit and latent customer needs; Adapting services to the customer life cycle; Flexibility in banking service design; Focus on perceived customer value; Improving service fit with customer lifestyle	Legal requirements and regulatory compliance	Compliance with domestic banking laws; Compliance with international regulations and financial standards; Managing legal and compliance risks; Protecting customer data confidentiality and privacy; Regular and transparent reporting to regulatory bodies
Big data analytics and advanced data mining	Processing large volumes of banking data; Using data mining algorithms; Integrating structured and unstructured data; Real-time customer data analytics	Competitive intensity in the banking industry	Competition with traditional and digital banks; Emergence of innovative actors and fintechs; Need to provide differentiated and value-creating services; Increased pressure for innovation and response speed
Personalization of banking products and services	Providing customer-specific recommendations; Adjusting services based on customers' financial behavior; Designing customized service packages; Personalizing communication channels; Increasing satisfaction through customized services	Interaction with the fintech ecosystem and emerging actors	Collaboration with startups and fintech firms; Integration of fintech services into banking systems; Exchanging data and knowledge with ecosystem partners; Developing joint innovative services; Leveraging external innovations in banking
Development of digital and omnichannel service channels	Integration of physical and digital channels; Improving customer access to banking services; Aligning customer experience across channels; Developing mobile and internet banking	Technological and financial market transformations	Emergence of digital and intelligent technologies; Changes in customer behavior in financial markets; Introduction of new payment and investment tools; Analysis of innovative trends and market opportunities
Innovation in service delivery processes	Simplification and redesign of banking processes; Reducing service delivery time; Using automation in service delivery	Acquisition and collection of customer knowledge	Collecting transactional and behavioral data; Recording customer profile information and preferences; Using surveys and feedback forms; Extracting social and digital data
Customer participation in service design	Receiving innovative ideas from customers; Using customer feedback in service design; Customer participation in testing new services; Establishing interactive platforms for co-creation	Digital infrastructures and smart banking platforms	Developing mobile and internet banking; Establishing integrated service platforms; Ensuring security and sustained access to services; Supporting data analytics and knowledge management; Automating and optimizing banking processes
Storage and organization of customer knowledge	Establishing customer knowledge databases; Systematic classification of customer information; Continuous updating of stored knowledge; Easy access to customer knowledge; Preserving data integrity and quality	Social expectations and public trust	Transparency in service delivery and communication; Compliance with professional ethics and social responsibility; Enhancing customer security and privacy; Rapid and effective response to customer problems; Building a positive image and public trust in the bank; Responsiveness to societal expectations in service innovation
Integrated customer information systems	Aggregating customer information from multiple sources; Integrating transactional and behavioral data; Creating a holistic customer view; Real-time updating of customer information; Information systems support for managerial decision-making; Secure and controlled access to customer data; Enabling intelligent analytics and customer-knowledge-based reporting	Application of artificial intelligence and machine learning	Predictive analysis of customer behavior and needs; Personalization of financial services and offers; Detection of fraud and potential risks; Improving internal banking process efficiency

In the next stage, given the large number of extracted concepts, it was necessary to organize the organizing themes within broader structures referred to as overarching themes. For this purpose, after examining and comparing the basic themes and



organizing themes, these concepts were aggregated at higher levels of abstraction and classified into overarching themes. The results of this stage of analysis are presented in Table 3.

Table 3. Overarching Theme Coding

Overarching Theme	Organizing Themes
Smart technological infrastructures and capabilities	Integrated customer information systems; Big data analytics and advanced data mining; Digital infrastructures and smart banking platforms; Application of artificial intelligence and machine learning
Customer knowledge management processes	Acquisition and collection of customer knowledge; Storage and organization of customer knowledge; Customer data analysis and interpretation; Knowledge sharing and transfer within the organization; Leveraging customer knowledge in decision-making
Innovation in the design and delivery of banking services	Customer-needs-based service design; Personalization of banking products and services; Development of digital and omnichannel service channels; Innovation in service delivery processes
Value co-creation and knowledge-based customer interactions	Customer participation in service design; Collecting and analyzing customer feedback; Two-way interactions through digital channels; Knowledge-based joint value creation
Environmental dynamics and institutional requirements of banking innovation	Legal requirements and regulatory compliance; Competitive intensity in the banking industry; Interaction with the fintech ecosystem and emerging actors; Technological and financial market transformations; Social expectations and public trust

Subsequently, in Figure 2, the research model—the qualitative model of modern banking service innovation based on customer knowledge management—is presented.

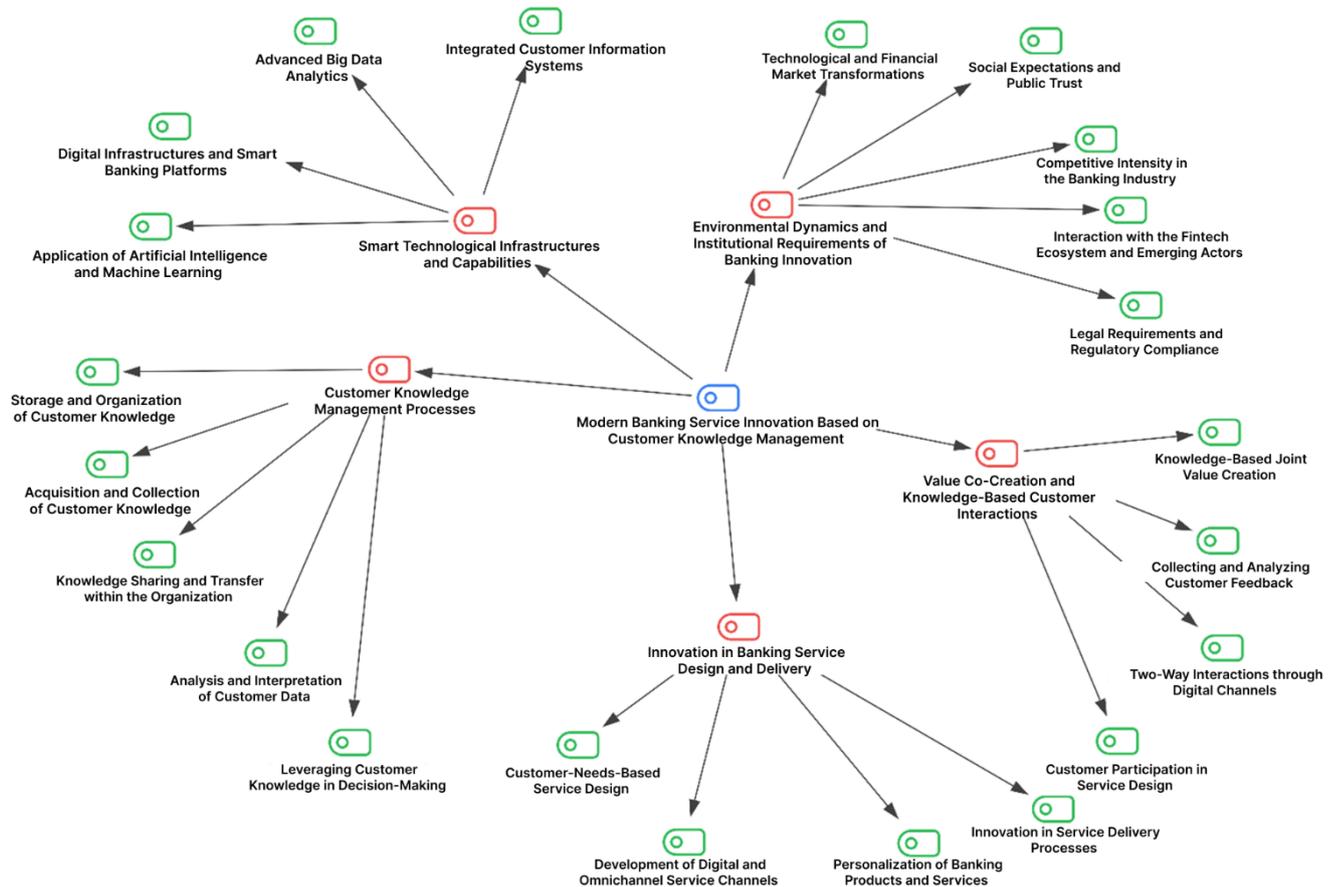


Figure 2. Research Model

4. Discussion and Conclusion

The findings of the present study resulted in the development of a comprehensive qualitative model of modern banking service innovation based on customer knowledge management, structured around five overarching dimensions: smart technological infrastructures and capabilities; customer knowledge management processes; innovation in the design and delivery of banking services; value co-creation and knowledge-based customer interactions; and environmental dynamics and institutional requirements of banking innovation. The configuration of these dimensions confirms that banking service



innovation is not a single-dimensional technological phenomenon but rather a systemic and interdependent process shaped by technological, organizational, relational, and environmental forces. This result is strongly aligned with prior research emphasizing the necessity of integrating digital capabilities with knowledge processes and organizational learning to generate sustainable innovation in financial services (Bratianu et al., 2022; Wang & Xu, 2018; Xie et al., 2020).

The centrality of smart technological infrastructures and capabilities in the proposed model demonstrates that advanced digital platforms, integrated information systems, big data analytics, artificial intelligence, and machine learning function as foundational enablers of modern banking innovation. These infrastructures provide the technical capacity to capture, store, process, and transform vast volumes of customer data into actionable knowledge, enabling predictive analytics, service personalization, fraud detection, and managerial decision support. This finding corresponds closely with earlier studies which argue that intelligent technologies significantly enhance banks' ability to anticipate customer needs, improve service quality, and accelerate innovation cycles (Aspiranti et al., 2023; Diener & Špaček, 2021; Li et al., 2025; Wang, 2022). The results further reinforce the assertion that technological investment alone is insufficient unless it is strategically embedded within organizational knowledge processes and service design mechanisms (Barb, 2023; Edeh et al., 2022).

The prominence of customer knowledge management processes in the model highlights the strategic role of systematically acquiring, organizing, analyzing, sharing, and applying customer knowledge across the organization. The findings indicate that banks which effectively institutionalize customer knowledge processes achieve superior alignment between service offerings and evolving customer expectations, thereby strengthening customer satisfaction, loyalty, and competitive positioning. This outcome is consistent with extensive literature emphasizing customer knowledge as a strategic organizational resource that drives innovation, value creation, and market responsiveness (Acheampong et al., 2023; Al-Dmour et al., 2020; Kong & Ibrahim, 2019; Nguyen & Harrison, 2018; Salunke et al., 2019). Moreover, the integration of customer knowledge into managerial decision-making reduces strategic uncertainty and enhances the quality of policy formulation and service development, confirming previous empirical evidence (Grassi et al., 2022; Hosseini et al., 2022; Kor et al., 2021).

Another significant contribution of the model lies in its articulation of innovation in the design and delivery of banking services as a multidimensional construct encompassing customer-needs-based service design, personalization, omnichannel development, and continuous process innovation. The findings indicate that innovation emerges not merely from new product development but from ongoing refinement of service processes, delivery channels, and customer experiences. This supports existing research demonstrating that customer-centric design, service flexibility, and personalization are key drivers of customer perceived value and market differentiation in modern banking environments (Abubakr & Kalifa, 2025; Ahinful et al., 2024; Ngo et al., 2023; Sofiyabadi et al., 2020). The strong emphasis on omnichannel integration and digital service channels further aligns with prior studies highlighting the necessity of seamless service experiences across physical and digital touchpoints (Nguyen & Nguyen, 2024; Xin et al., 2021; Zhan et al., 2019).

The model also underscores the strategic importance of value co-creation and knowledge-based customer interactions. The results reveal that contemporary banking innovation increasingly depends on active customer participation in service design, feedback generation, and collaborative problem-solving. Customers are no longer passive recipients but essential partners in the innovation process, contributing experiential knowledge that directly informs service improvement and development. This finding is consistent with service-dominant logic and prior empirical research emphasizing co-creation as a core mechanism of competitive advantage in knowledge-intensive service industries (Manohar et al., 2019; Ngo et al., 2023; Tseng et al., 2021; Xie et al., 2020). The emergence of digital platforms, interactive tools, and real-time communication technologies further strengthens this collaborative innovation dynamic (Aspiranti et al., 2023; Wang, 2022).

Equally important, the inclusion of environmental dynamics and institutional requirements in the model reflects the complex external context within which banking innovation unfolds. The findings confirm that regulatory frameworks, competitive pressures, technological evolution, fintech ecosystems, social expectations, and public trust substantially shape banks' innovation strategies and capabilities. This result is consistent with prior research emphasizing that banking innovation must simultaneously satisfy regulatory compliance, data privacy obligations, ethical standards, and market competitiveness (Al-Dmour et al., 2022; Bratianu et al., 2022; Edeh et al., 2022; Hasanvand et al., 2022). Moreover, the growing influence of



fintech firms and digital platforms intensifies innovation pressure and necessitates strategic collaboration, as observed in previous studies (Bhat & Gupta, 2024; Yang et al., 2024; Zahrawi et al., 2025).

Taken together, the proposed model advances the literature by providing an integrative framework that captures the systemic interdependencies among technology, knowledge, service innovation, customer engagement, and environmental forces. Unlike many prior studies that examine isolated components of banking innovation, this research demonstrates that sustainable innovation emerges from the coordinated alignment of these dimensions. This holistic perspective addresses long-standing conceptual gaps identified in the literature regarding the fragmented treatment of customer knowledge management and service innovation (Ahmadir & Safari, 2022; Barb, 2023; Stefanelli & Manta, 2022). The qualitative nature of the model further contributes to theoretical advancement by revealing deep structural relationships and dynamic mechanisms that are often obscured in purely quantitative investigations (Acheampong et al., 2023; Silva, 2015; Tseng et al., 2021).

From a theoretical standpoint, the study reinforces the view that banking innovation constitutes a socio-technical system in which human knowledge, digital technologies, organizational processes, and institutional environments co-evolve. The findings support contemporary innovation theories that emphasize co-creation, learning, and dynamic capabilities as central drivers of organizational competitiveness (Grassi et al., 2022; Kor et al., 2021; Li et al., 2025). By explicitly incorporating customer knowledge as a strategic core of the innovation system, the model extends existing frameworks and provides a richer conceptualization of how modern banking institutions generate sustainable value in turbulent markets.

This study is subject to several limitations. First, the model was developed through qualitative thematic analysis of existing literature rather than primary empirical field data, which may limit the extent to which contextual nuances of specific banking environments are fully captured. Second, the reliance on published academic sources may introduce publication bias, potentially overlooking practical insights from industry practitioners and internal organizational reports. Third, although the model provides comprehensive conceptual coverage, it does not empirically test causal relationships among its components, which constrains generalizability and predictive power.

Future research should empirically validate the proposed model using mixed-methods designs, incorporating large-scale quantitative surveys and in-depth case studies across diverse banking contexts. Longitudinal studies would be particularly valuable for examining how customer knowledge management capabilities and innovation outcomes evolve over time. Comparative research across different regulatory environments and financial systems could further refine the model and identify contextual contingencies that influence innovation effectiveness.

For practitioners, the findings highlight the importance of establishing integrated digital infrastructures, institutionalizing customer knowledge management processes, and embedding co-creation mechanisms within service design strategies. Banking executives should invest in advanced analytics, cross-functional knowledge-sharing systems, and collaborative platforms that actively engage customers in innovation activities. Policymakers and regulators should simultaneously support innovation while ensuring robust governance frameworks that maintain trust, data security, and ethical standards in the evolving digital banking ecosystem.

Ethical Considerations

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

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Conflict of Interest

The authors report no conflict of interest.

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References

- Abubakr, K., & Kalifa, W. (2025). The Impact of Sustainability Knowledge Sharing on Service Innovation in Libyan Banks: The Mediating Role of Intellectual Capital and Organizational Learning. *Sustainability*. <https://doi.org/10.3390/su17083545>
- Acheampong, S., Pimonenko, T., & Lyulyov, O. (2023). Sustainable Marketing Performance of Banks in the Digital Economy: The Role of Customer Relationship Management. *Virtual Economics*. [https://doi.org/10.34021/ve.2023.06.01\(2\)](https://doi.org/10.34021/ve.2023.06.01(2))
- Ahinfu, A., Mensah, A., Koomson, S., Cobblah, C., Takyi, G., & Kwarteng, A. (2024). Achieving banking industry innovation performance using total quality management: an empirical study. *The TQM Journal*. <https://doi.org/10.1108/tqm-10-2023-0327>
- Ahmadir, R., & Safari, H. (2022). The impact of knowledge-based leadership on company performance, considering the mediating role of customer knowledge management and innovation quality. *Dynamic Management and Business Analysis*, 2(4), 13-20. <https://doi.org/10.61838/dmbaj.2.4.2>
- Al-Dmour, A., Al-Dmour, R., & Rababeh, N. (2020). The impact of knowledge management practice on digital financial innovation: the role of bank managers. *VINE Journal of Information and Knowledge Management Systems*. <https://doi.org/10.1108/vjikms-01-2020-0006>
- Al-Dmour, H., Alsfour, F., Al-Dmour, R., & Saifan, N. (2022). The Role of Marketing Knowledge Management in Enhancing Digital Financial Innovation in Commercial Banks: Empirical Study. *International Journal of Knowledge Management*, 18, 1-19. <https://doi.org/10.4018/ijkm.291094>
- Aspiranti, T., Ali, Q., & Amaliah, I. (2023). Big Data Analytics to Support Open Innovation Strategies in Banks. *Risks*. <https://doi.org/10.3390/risks11060106>
- Barb, R. (2023). LEAN INNOVATION AND AGILE INNOVATION: METHODS OF CREATING ADDED VALUE TO CUSTOMERS IN THE BANKING INDUSTRY. *Revista Economică*. <https://doi.org/10.56043/reveco-2023-0023>
- Bhat, I., & Gupta, S. (2024). Impact of e-service innovation on e-service delivery, trust and loyalty: a study of Indian retail banking. *VINE Journal of Information and Knowledge Management Systems*. <https://doi.org/10.1108/vjikms-10-2022-0340>
- Bratianu, C., Stănescu, D., & Mocanu, R. (2022). The mediating role of customer knowledge management on the innovative work behavior and product innovation relationship. *Kybernetes*, 52, 5353-5384. <https://doi.org/10.1108/k-09-2021-0818>
- Diener, F., & Špaček, M. (2021). Digital Transformation in Banking: A Managerial Perspective on Barriers to Change. *Sustainability*. <https://doi.org/10.3390/su13042032>
- Edeh, F., Zayed, N., Nitsenko, V., Brezhnieva-Yermolenko, O., Negovska, J., & Shtan, M. (2022). Predicting Innovation Capability through Knowledge Management in the Banking Sector. *Journal of Risk and Financial Management*. <https://doi.org/10.3390/jrfm15070312>
- Grassi, L., Figini, N., & Fedeli, L. (2022). How does a data strategy enable customer value? The case of FinTechs and traditional banks under the open finance framework. *Financial Innovation*, 8. <https://doi.org/10.1186/s40854-022-00378-x>
- Hasanvand, R., Islamobolchi, A., Ghabadi Lemoqi, T., & Sahat, S. (2022). Designing a customer service customization model in the banking industry using grounded theory (Case study: Bank Mellat). *Dynamic Management and Business Analysis*, 4(1), 1-16. <https://doi.org/10.61838/dmbaj.171>
- Hosseini, M., Abdolvand, N., & Harandi, S. (2022). Two-dimensional analysis of customer behavior in traditional and electronic banking. *Digital Business*. <https://doi.org/10.1016/j.digbus.2022.100030>
- Kong, Y., & Ibrahim, M. (2019). Service innovation, service delivery and customer satisfaction and loyalty in the banking sector of Ghana. *International Journal of Bank Marketing*. <https://doi.org/10.1108/ijbm-06-2018-0142>
- Kor, B., Wakkee, I., & Sijde, P. (2021). How to promote managers' innovative behavior at work: Individual factors and perceptions. *Technovation*. <https://doi.org/10.1016/j.technovation.2020.102127>
- Li, S., Yang, M., Um, K., & Kang, M. (2025). Knowledge absorption from customers and its interplay with supplier adaptability for better operational and innovation performance. *Journal of Manufacturing Technology Management*. <https://doi.org/10.1108/jmtm-12-2024-0712>
- Manohar, S., Mittal, A., & Marwah, S. (2019). Service innovation, corporate reputation and word-of-mouth in the banking sector. *Benchmarking: An International Journal*. <https://doi.org/10.1108/bij-05-2019-0217>
- Ngo, N., Tansuchat, R., Cu, P., Mau, T., Kohda, Y., & Huynh, V. (2023). A Customer-Driven Evaluation Method for Service Innovation in Banking. *IEEE Access*, 11, 68139-68152. <https://doi.org/10.1109/access.2023.3292123>
- Nguyen, H., & Harrison, N. (2018). Leveraging customer knowledge to enhance process innovation. *Business Process Management Journal*, 25, 307-322. <https://doi.org/10.1108/bpmj-03-2017-0076>
- Nguyen, N., & Nguyen, N. (2024). Creativity and service innovation in the banking sector: The role of knowledge acquisition and knowledge provision. *Journal of General Management*. <https://doi.org/10.1177/03063070231225601>
- Salunke, S., Weerawardena, J., & McColl-Kennedy, J. (2019). The central role of knowledge integration capability in service innovation-based competitive strategy. *Industrial Marketing Management*. <https://doi.org/10.1016/j.indmarman.2018.07.004>
- Silva, M. (2015). A systematic review of Foresight in Project Management literature. *Procedia Computer Science*, 64, 792-799. <https://doi.org/10.1016/j.procs.2015.08.630>
- Sofiyabadi, J., Valmohammadi, C., & Ghadam, A. (2020). Impact of Knowledge Management Practices on Innovation Performance. *Ieee Transactions on Engineering Management*. <https://doi.org/10.1109/tem.2020.3032233>
- Stefanelli, V., & Manta, F. (2022). Digital Financial Services and Open Banking Innovation: Are Banks Becoming 'invisible'? *Global Business Review*. <https://doi.org/10.1177/09721509231151491>
- Taghizadeh, S., Rahman, S., & Hossain, M. (2017). Knowledge from customer, for customer or about customer: which triggers innovation capability the most? *Journal of Knowledge Management*, 22, 162-182. <https://doi.org/10.1108/jkm-12-2016-0548>
- Tseng, M., Bui, T., Lan, S., Lim, M., & Mashud, A. (2021). Smart product service system hierarchical model in banking industry under uncertainties. *International Journal of Production Economics*, 240. <https://doi.org/10.1016/j.ijpe.2021.108244>
- Wang, J. (2022). Research on the Impact of Customer Participation in Virtual Community on Service Innovation Performance- The Role of Knowledge Transfer. *Frontiers in psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.847713>
- Wang, X., & Xu, M. (2018). Examining the linkage among open innovation, customer knowledge management and radical innovation. *Baltic Journal of Management*, 13, 368-389. <https://doi.org/10.1108/bjbm-04-2017-0108>



- Xie, L., Guan, X., Cheng, Q., & Huan, T. (2020). Using customer knowledge for service innovation in travel agency industry. *Journal of Hospitality and Tourism Management*, 45, 113-123. <https://doi.org/10.1016/j.jhtm.2020.08.001>
- Xin, X., Miao, X., Chen, Q., & Shang, T. (2021). User participation, knowledge management capability and service innovation: e-commerce enterprises in the digital age. *Asia Pacific Journal of Marketing and Logistics*. <https://doi.org/10.1108/apjml-10-2020-0724>
- Yang, M., Wider, W., Xiao, S., Jiang, L., Fauzi, M., & Lee, A. (2024). Unveiling current and future trends in customer banking experience research: a bibliometric analysis. *Kybernetes*. <https://doi.org/10.1108/k-11-2023-2251>
- Zahrawi, A., Khashashneh, S., & Althunibat, A. (2025). The impact of customer knowledge management on innovation capability and business performance: Evidence from Jordanian financial services. *International Journal of Innovative Research and Scientific Studies*. <https://doi.org/10.53894/ijirss.v8i3.7401> Page | 12
- Zhan, Y., Tan, K., & Huo, B. (2019). Bridging customer knowledge to innovative product development: a data mining approach. *International Journal of Production Research*, 57, 6335-6350. <https://doi.org/10.1080/00207543.2019.1566662>

