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Comprehensive Evaluation of User-Centric Indicators for Digital Banking Implementation: A Case Study of Tejarat Internet Bank[1]

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Abstract:
Digital banking (DB) is becoming a popular choice for many customers who value convenience and efficiency. However, it is also important to evaluate how well Internet banks perform in terms of customer satisfaction. This study aims to comprehensively identify and evaluate suitable indicators for DB implementation to promote its acceptance among users. Both financial institutions and customers perceive Internet banking services as more convenient compared to conventional branch-based services.

Methods:
We employed two techniques: The Importance-Performance Matrix and the Analytical Hierarchy Process. The Importance-Performance Matrix helped us rank the identified factors according to their importance and urgency for improving the bank's performance. The analytical hierarchy process helped us compare and weigh the relative importance of various criteria and sub-criteria that affect the bank's performance.

Results:
According to our findings, the bank's performance was influenced by five factors: ease of use, privacy, speed, human resources, and technology. We also discovered that ease of use and privacy were the most urgent factors that required immediate attention from the bank. Therefore, we advise that Tejarat Internet Bank's services focus on enhancing security and ease of use as their top priorities to improve their performance.

Conclusions:
This paper introduces a novel perspective by switching the typical focus of online banking research from corporate entities to individual clients, Our investigation provides valuable insights useful for retail banking and banks that deal with corporate clients by extensively comparing and evaluating the unique requirements of these two consumer segments.

[1] The present article has been extracted from the thesis titled 'Evaluation of Internet Bank Indicators Using AHP Methods and Eisenhower Matrix (Case Study: TEJARAT Bank)'. The thesis was conducted under the supervision of Majid Afsharirad.

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1. Introduction

Due to the COVID-19 epidemic, banks were required more than ever to provide a seamless and secure online banking experience. Leaders of small and medium-sized enterprises (SMEs) have been actively engaged in a challenging battle to devise effective strategies for overcoming the crisis precipitated by the COVID-19 pandemic. Minority-owned SMEs have not only persevered but have also made substantial contributions to the burgeoning economy (Bartik et al., 2020). In light of the advent of technologies such as the Internet, broadband, social networks, data processing solutions, cloud computing, and digital transformations, these new customers have higher expectations of their bank and are looking for personalized products, and coverage of their daily needs. Among the array of online banking services prevalent in the financial sector presently, internet banking takes precedence (Almaiah et al., 2022; Namahoot & Laohavichien, 2018). With the increasing of internet usage and mobile devices, internet banking has emerged as a convenient and efficacious means for clients to manage their financial affairs (Namahoot & Laohavichien, 2018). To overcome this challenge, numerous financial institutions have commenced the utilization of analytical methodologies to assess the performance metrics of their internet banking services (Kaur et al., 2021; Seçme et al., 2009).

The digital transformation of banking encompasses a broad spectrum of services, including document digitization, electronic signatures for transactions, e-learning, teleconferencing, online trading platforms, digital stores, e-statements, and mobile payments. As customers progressively embrace these digital operations, novel solutions are emerging within this sector. Consequently, the banking industry is compelled to formulate innovative business models that accentuate all critical banking processes.

The adoption of digital banking (DB) is both necessary and inevitable. In light of the fact that DB will eventually overtake other service-oriented business models in this industry, banks should work to determine the infrastructure and procedures required for the creation and use of this new business model People are using DB for daily transactions more frequently as technology becomes more accessible. While some may view this as advantageous, it diverts users from their regular banking routine. So when it comes to DB services and goods, it is vital to comprehend the effective DB implementation indications. The primary objective of DB, similar, to banking is to meet the needs of customers. Nevertheless through the implementation of technologies and innovative concepts our aim is to simplify processes and enhance the efficiency of our services. It is essential to grasp customer preferences and requirements in order to deliver top notch services and ensure growth, in the banking industrys service delivery systems.

The analytic hierarchy process (AHP) is one such method that has gained popularity in the banking industry (Shamshur & Weill, 2019; Xi & Li, 2022). AHP is a technique that assists decision-makers in prioritizing and ranking

multiple criteria based on their relative importance. By applying AHP, banks can identify the most critical performance indicators of internet banking services and allocate resources in the best way possible. The Analytic Hierarchy Process (AHP) is one such method that has gained popularity within the banking industry (Shamshur & Weill, 2019; Xi & Li, 2022). AHP constitutes a technique that aids decision-makers in the prioritization and ranking of multiple criteria. Through the application of AHP, financial institutions can pinpoint the most pivotal performance indicators for internet banking services and optimize resource allocation accordingly. However, the growing competition in the banking industry has made it essential for banks to evaluate the performance of their internet banking services to ensure client satisfaction and loyalty (Abbasi et al., 2020). Evaluating internet banking performance is a complicated task that involves the assessment of multiple performance indicators such as security, support, ease of use, speed, and efficiency (Hu & Liao, 2011). The Importance Performance Matrix Analysis (IPMA) is a technique that measures a product's or service's quality based on its importance and performance, two crucial elements. The Urgent/Important Matrix and the Eisenhower Matrix are both names for a management tool that helps assess how important and satisfying different internet banking features are for users when they decide to use or not use them (Miranda,2010).

The successful implementation of DB depends on the acceptance of DB by customers, and the mechanisms for persuading them to use DB are important. Therefore, when evaluating the DB implementation indicators, special attention should be paid to the quality of electronic services provided to customers. Regarding the identification and prioritization of appropriate criteria for the successful implementation of DB, many research gaps remain. Indicators that take into account various aspects of DB, from customer behavior to technological infrastructure, require a comprehensive literature review, past practical experiences, emerging trends affected by Industry 4.0, expert opinions, and the like. For example, many efforts have been made in India, such as digital marketing campaigns and customer education, to drive customers toward DB, but due to the lack of identification of appropriate criteria for DB implementation and their accurate evaluation, these programs have failed (Patel, 2018). As a result, identifying and evaluating comprehensive indicators for the implementation of DB and examining efficient models is a crucial research area. This study evaluates these indicators and models based on a literature review, trends influenced by Industry 4.0, service quality theory, and experts' opinions. The proposed approach considers uncertainty in the decision-making environment and decision-makers' preferences when evaluating the DB implementation indicators and conventional models. Generally, the research and development, marketing, and digital transformation departments of banks are struggling with problems such as the lack of knowledge and information

resources needed to design a road map for the switch to DB, and the publication of scientific research on this issue is of great importance.
The contribution of this research can be summarized as follows:
Measuring and ranking the criteria and sub-criteria for DB implementation according to emerging trends and technological advances affected by Industry 4.0, service quality theory. Empirical studies can be conducted to investigate the effectiveness of different indicators and models across different conditions and sectors. This research would provide valuable insights into the indicators and models that are most successful in achieving the desired outcomes.

2. Literature review

2.1. Theoretical Background

Internet banking has become more common in recent years due to its convenience and accessibility. Many studies have examined the relationship between internet banking and client satisfaction, highlighting the importance of a positive client experience in achieving client satisfaction. Measuring the quality of electronic services has become an important issue in relation to understanding the value of customers in the context of online service transactions. Service quality plays an important role in customer satisfaction, which can be directly evaluated and managed. FINTECH (financial technology) is defined as innovative financial services using new technology tools, such as big data, cloud computing, and mobile technology (Hu, 2019; Knewston, 2020). The correlation between technological development and financial innovation has been extensively studied from different perspectives by local and foreign scholars.
Customer satisfaction has significantly decreased as a result of the introduction of internet banking. Clients are now accustomed to the ease of online account access as mobile and internet-based banking become more common. There are several issues with using mobile devices as resource providers, including unstable wireless connections, limited energy capacity, and frequent location changes (Samani & Bashi, 2020). Clients are more satisfied as a result of this accessibility because they can make transactions and participate in banking activities at their leisure without having to go to a physical branch. According to surveys, customers who communicate with their banks through digital means are more satisfied than those who use traditional channels (Szopiński, 2016). Online banking enables clients to manage their accounts, pay bills, transfer money, and perform other banking functions without leaving their homes. Moreover, internet banking empowers banks to offer clients individualized services. Adaptability can enhance client satisfaction by enhancing customer engagement. Banks can use client data analysis to better understand their needs and tailor solutions to each individual client, increasing client satisfaction. Also, banks may provide better client care thanks to internet banking. Banks can quickly respond to client concerns by implementing chat bots or virtual assistants, enhancing the entire

client experience (Hsu & Lin, 2023). Faster response times and more efficient service can help increase client satisfaction levels. A study by Al-Masaeed et al. (2022) examined the factors that contribute to customer satisfaction in internet banking. The study found that factors such as website design, ease of use, security, and client service all had a significant impact on customer loyalty. In the following, some of the studies conducted in the field of service quality are reviewed, along with the theories used in them:

Omarini (2018) investigated the transformation of banking from traditional to digital and, finally, open banking. He pointed to the opportunities and possibilities of creating value through the use of new banking approaches in the form of open banking. Bouwman et al. (2018) examined the effect of digitalization, the internal capabilities of the organization and the ecosystem, and the external environment of the organization as influential factors in the use of new business models in the digital era and Industry 4.0. Sousa and Rocha (2019) examined the skills needed by employees to use and manage emerging technologies such as artificial intelligence, Internet of things, etc., in an organization. Liu et al. (2011) investigated the experiences of the CBC e-banking project and how to integrate two important management theories, namely resource-based theory and resourcefit, in order to exploit e-banking. They developed a framework with four main dimensions: external resource fit, internal resource fit, external capability fit, and internal capability fit. Additionally, they examined the eight critical factors necessary for the successful implementation of an electronic banking project through a real case study. Mbama and Ezepue (2018) examined the components of the customer experience of digital services in VK Bank. In their research, they proposed 15 hypotheses about the relationship between the quality of bank services and the experience, satisfaction, and loyalty of customers and the positive effects of DB on them. Kumar et al. (2020) investigated the challenges of creating ethical and sustainable operations in Indian manufacturing units using soft operational research methods, especially the decision-making trial and evaluation laboratory (DEMATEL). They first identified 15 challenges to sustainability in operations in manufacturing industries, and they then investigated the cause-and-effect relationships between them. According to a study conducted by (Munusamy et al., 2010), efficiency was identified as a significant factor impacting customer satisfaction in the banking industry. Efficiency is the most significant factor, followed by reducing the amount of time required for banking operations and limited errors.

This study (Alsmadi et al., 2022) also examines the various factors that affect digital banking, the challenges faced by digital banking, and the different modes of digital payment used by clients. (Kazai etal., 2021) using quantitative methods and questionnaires, the quality of mobile banking services in categorized banks was assessed as the first step in sustainable banking in Indonesia. This study utilized 16 dimensions of electronic service quality with 28 indicators to analyze

and provide recommendations to banks to enhance their electronic services. Another example of using AHP in internet banking is to help customers compare different banking products and services. For instance, customers can use AHP to evaluate different credit card offers based on criteria such as interest rates, annual fees, and rewards programs. By giving weights to each of these criteria, customers can prioritize their preferences and choose the credit card that best suits their needs (Katiyar & Badola, 2018). Santos (2003) examined service quality in e-commerce and its implementation on the Internet. A service quality model was proposed based on the determinants of service quality in the Internet world. Benlian etal (2011) investigated customers' views about software-as-a-service solutions through the lens of perceived quality and the decision to adopt and use them. They extracted and ranked the effective factors by reviewing the literature. At the end, they presented a conceptual model of SaaS.

Table 1. Internet Bank Acceptance Criteria

KPI	Definition	References
Confidentiality	Protecting customers' personal and financial information from unauthorized access or disclosure	(Fox et al., 2021; Gull et al., 2022)
Integrity	Ensuring the accuracy and completeness of customers' transactions and information	(Fox et al., 2021; Gull et al., 2022)
Availability	Ensuring that customers can access their accounts and perform transactions whenever they need to	(Fox et al., 2021; Gull et al., 2022)
Authentication	Verifying the identity of customers to prevent fraud and unauthorized access	(Fox et al., 2021; Gull et al., 2022)

Table 2. Digital Banking Sub – Criteria

KPI	Definition	References
User interface	The design and layout of internet banking platform	(Bach et al., 2018; Hewa et al., 2021)
Navigation	The ease with which customers can find and access the desired features and services	(Bach et al., 2018; Hewa et al., 2021)
Transaction process	The simplicity and intuitiveness of the process for performing transactions	(Bach et al., 2018; Hewa et al., 2021)

Table 3. Trends Studies In Banking Industry

Emerging trends of Industry 4.0	Definition	Approaches
Digital banking	Refers to using different types of technology, including internet banking, mobile banking and other technological trends, in the form of open banking, etc.	Fuzzy expert system
		MCDM methods
Mobile banking	Refers to the execution of transactions on the basis of mobile and Internet-based technology (Chong, 2013).	ISM
E-banking	Refers to conducting transactions remotely on the Internet (Siam, 2006)	MCDM methods
		A fuzzy set qualitative comparative analysis (fsQCA)
		Fuzzy MCDM
Internet banking	Refers to conducting financial transactions on banking websites through the Internet (Thulani et al., 1970)	AHP–ELECTRE method
		Fuzzy MCDM

2.3. Internet Banking Criteria

2.3.1. Privacy

Privacy is a vital factor in internet banking services, as clients need to trust that their personal and financial information is safe (Nazaritehrani & Mashali, 2020). privacy, strict control over financial transactions and people's assets, and finally, increasing security should be considered when applying the new trends of digital transformation in every industry. It refers to the protection of the privacy and non-distributable data of customers (Büyüközkan etal.,2020). In general, trust is dependent on confidence in the other party to the transaction, and when the customer is transacting online, factors such as expected performance and competence and availability lead to an increase in trust (Mukherjeet,2003). In the era of digital transformation, providers encrypt data. This approach is performed by using the specific architecture and rules and policies of each of the digital trends.

2.3.2. Human resource

Human resources are among the main resources of the organization that empower the organization in developing the skills, capabilities, behaviors and attitudes of its employees to achieve its goals (Collins, 2003). Having a workforce familiar with IT knowledge and skills, IT management, professional computer coding and programming, ability to analyze data, and ability in security topics and the like is an important prerequisite for entering the digital age. Having a workforce with

effective and talented skills will lead to increased productivity and competitive advantages for the organization (Chryssolouris etal., 2013).

2.3.3. Ease of use

Clients are more likely to adopt and stick with internet banking services if they find them easy to use (Ezzi, 2014). The design of the web application, the availability of services, and the website navigation all affect how simple it is to use the internet banking system. The relationship between perceived usefulness and intention to use DB is insignificant, as is that between perceived self-efficacy and intention to use DB. In addition, due to recent changes in the world, the COVID-19 pandemic may act as a significant determinant of applicable practices to formulate strategies to improve banking services, increase the acceptance of DB by employees, and make changes to the traditional working processes.

2.3.4. Technology

In the era of Industry 4.0, interfaces are embedded in the form of codes and computing kits in artifacts and other objects so that it is possible to display and present information to users in different digital forms. Customers and users have expectations of any service. It is important to fulfill their needs at each stage and to pay attention to their behaviors in order to improve the functional ability of the service (Tansley etal., 2003). By decreasing the number of physical branches and workers needed to serve clients, online banking can assist banks in lowering operational costs. Banks may be able to manage transactions and accounts electronically, without having to physically interact with clients, with the help of a comprehensive internet banking system. Today, banks provide services to their customers using their own APIs. Instead of developing their own APIs, many banks collaborate with third parties and provide them with their customer data to improve the bank's platforms.

2.3.5. Speed

Speed is another important indicator of internet banking services, as clients expect their transactions to be processed quickly (Nazaritehrani & Mashali, 2020). For instance, countries that have superior digital infrastructure, such as smartphones and high-speed internet access, generally have higher adoption rates for internet banking. Likewise, banks with simple and straightforward digital banking interfaces might draw more clients than those with complicated and challenging platforms. Mobile computing is a computing paradigm designed for workers who travel outside the boundaries of their organizations or for any other people traveling outside their homes (Salehnia et al., 2014). In the era of digital transformation, the integration and redesign of technological trends for setting contracts, managing assets, obtaining licenses and ensuring transparent financial transactions will lead to advantages such as high agility and increased data security.

3. Research Methodology

In this section, the proposed method to determine the importance of each of the implementation criteria for DB is explained. Industry 4.0 and DB are modern concepts, and scientists have not yet fully mastered modern concepts scientifically. Uncertainty in decision-making in new fields has always been a challenge for decision-makers and experts in different fields.

3.1. AHP

Operation research is the academic branch to which Multi-Criteria Decision Making (MCDM) or Multi-Criteria Decision Analysis (MCDA) belongs. This approach allows for the holistic study of a given problem. Analytic Hierarchy Processes bring us models and methods when decisions must be made in an uncertain environment harmonizing between several dimensions and perspectives (Daim & Kocaoglu, 2016). Subscribers of online banking might utilize the Analytic Hierarchy Process (AHP) to decide more wisely about their financial dealings. AHP is an approach of making judgments that enable users to rank and select various possibilities in accordance with a number of criteria (Saaty, 1988). Helping consumers choose the best investment opportunities based on their financial objectives and asset allocation is one example of how AHP is used in internet banking. Users can examine several financing options based on factors including projected return, risk tolerance, and time horizon for investments. Clients can use AHP to assign weights to each of these factors, demonstrating their relative importance and helping them make more informed choices regarding investments. The Hierarchical Decision Model breaks a mission or decision into a multi-level set of components and decisions. The model subsequently calculates the judgments using the following logic of mathematics (Kocaoglu, 2008): Once the structure of the model is defined, it requires the input of subject matter experts who provide their subjective assessments on each level of the model's hierarchy using a pair-wise comparison methodology.

$$M = \sum_{K=1}^{K} \sum_{jk=1}^{Jk} Pk \times CJk \times DJk$$

M= Maturity Score
K= Number of Perspectives
J = Number of Criteria
P_K = Weight of Perspective
C_{jk} = Relative importance of criterion (jth) for Perspective (kth)
D_{jk}= Desirability value of criterion (jth) for Perspective (kth)

In this method, experts in the field are tasked to decide how the requirements are doing right now in relation to the model's goals. By implementing the Analytic Hierarchy Process (AHP) method and ranking the questions on a scale of 1 to 9, users are asked to rank each of the criteria (indicators) and sub-criteria in order of

priority. AHP is a helpful tool for Internet banking users who want to make educated decisions regarding their financial activities, to sum up. Clients may organize their preferences and evaluate multiple choices via AHP, which improves performance and enhances customer satisfaction (Rodriguez et al., 2012).

3.2. Importance-Satisfaction Matrix (Eisenhower Matrix)

The Importance Performance Matrix Analysis (IPMA) is an approach that measures the quality of a good or service by considering two highly significant factors: importance and performance. This approach takes advantage of a four-segment plot, each of which shows a distinct ratio of importance to performance. To make use of the tool, information is gathered about the value and effectiveness of the good or service in many different contexts. Numerous market research techniques can be used to obtain this data. In doing so, it gives a more comprehensive understanding of how well an item or service fulfills the requirements and desires of customers (Mansouri Rad & Bagherian, 2023; Miranda et al., 2010). The Eisenhower Matrix and the Urgent/Important Matrix are two titles for a management tool that helps in evaluating how significant and satisfying certain Internet banking features are for users when they choose to utilize or not use them. Both of these titles have the same meaning and are compatible. The processes for utilizing the Importance-Satisfaction Matrix to evaluate the acceptance of internet banks in a survey are as follows:

3.2.1. Identification of Attributes

The first step is to find out the different attributes or features of internet banking that clients care about. This can be done by reviewing the existing literature or using open-ended questions in a survey to collect responses from clients.

3.2.2. Importance and Satisfaction Scaling

Importance and Satisfaction Scaling: Customers are asked to rate how important and satisfying each attribute is using a Likert scale. The scale goes from “1-Not important” to “5-Very important” for importance and “1-Very dissatisfied” to “5-Very satisfied” for satisfaction.

3.2.3. Construct Matrix

After getting all the responses, we can construct the Importance-Satisfaction Matrix by plotting each attribute on a two-dimensional graph. On the horizontal axis, we plot how important each attribute is, and on the vertical axis, we plot how satisfying it is. Then we have four quadrants that show different users’ responses.

3.2.4. Interpret Quadrants

Interpret the four quadrants based on the outcomes obtained. The most significant and pressing issues can be found in these quadrants I and II, as well as the greatest opportunity for development. Quadrants I and II are usually the areas that need the most improvement. On the other hand, quadrants III and IV are areas might not need as much attention or help as the second quadrant. However,

this does not mean that these areas can be can be ignored or dismissed because, in the grand scheme of things, they still need to be retained or developed.

Quadrant I: High Importance, Low Satisfaction: These attributes require immediate attention, and banks must make efforts to boost satisfaction levels in this quadrant.

Quadrant II: High Importance, High Satisfaction: This area represents significant strengths where the organization has successfully met all customer needs and satisfied their requirements. Resource allocation has been efficient. Therefore, by continuing the current strategy, it can effectively retain and maintain successful customers.

Quadrant III: Low Importance, High Satisfaction: This quadrant represents features and services that have low importance but high performance levels, and customers are satisfied with their performance. In this area, in order to prevent resource waste, managers should be cautious about efforts beyond expectations.

Quadrant IV: Low Importance, Low Satisfaction: The evaluation metrics in this quadrant, due to their low significance and limited customer satisfaction, do not rank as the organization's top priority for enhancement and improvement. These points, characterized as indifferent, are best addressed through negligence and minimal investment.

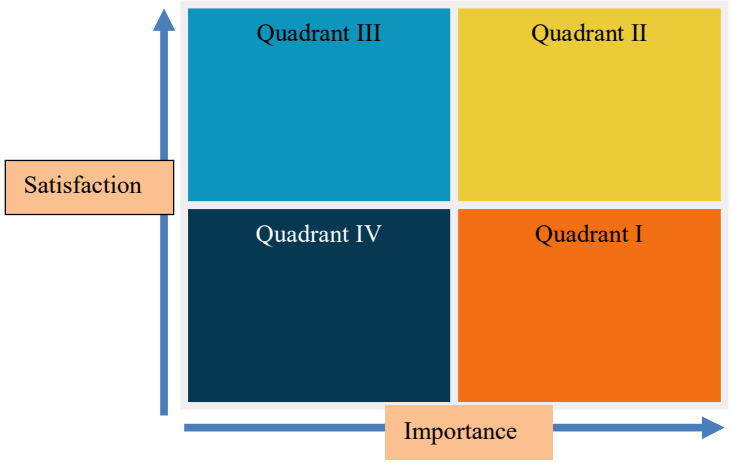


Figure 1. Importance – Performance Matrix

4. Data

To gather information, we first held group sessions with experts in the field to identify the relevant indicators. Next, in order to rank the appropriate criterias and sub-criterias, we transmitted a questionnaire to responders. All respondents had to use Tejarat Bank's internet banking services at least once in the past three months. The sample size was 108, based on the Cochran formula. It was

determined that the questionnaire was valid because Cronbach's alpha was greater than 0.7. Table 5 shows the exact Cronbach's alpha value.

Table 4. CRONBACH'S ALPHA

Cronbach's alpha	0.88

Source: Research findings

5. Resualt

"In the context of the COVID-19 pandemic, these indicators primarily focus on assessing the benefits and limitations of problem-solving efforts. However, the effectiveness of such measures may vary depending on the specific needs of clients and organizational priorities. It is crucial to periodically assess and modify these indicators in response to changing conditions and feedback from customers to guarantee the continuous relevance and productivity of departmental services. The paper examines the differences between the Analytic Hierarchy Process (AHP) and the Importance-Satisfaction Matrix, two decision-making techniques for assessing Internet banking indicators. Their effectiveness, consistency, and integrity are evaluated in the framework of electronic banking. The research's conclusions provide significant knowledge to the body of knowledge for both professionals and investigators, enhancing the ongoing discussion of measuring frameworks and methodologies for the deployment of virtual banking services. The first step in our study is to determine the main requirements and the related secondary criteria from the questionnaire. The Analytic Hierarchy Process (AHP) method will be used to assess the importance of each sub-criteria. The questionnaire's main criteria are : privacy, human resources, ease of use, speed, and technology. There are certain sub-criteria that apply to all of these major criteria. The "availability of tutorials and user guides" and the "user-friendly interface with clear navigation" are two examples of sub-criteria under the "ease of use" criterion. The order of priority of each sub-criteria will be facilitated by the use of a consistent rating scale. The AHP comparison matrix will then be revised with evaluations for each sub-criteria using the predetermined scale. The calculated numerical values will be shown.

Table 5. Prioritization Of Criteria

KPI	Rank
Human resource (K1)	5
Speed (K2)	3
Ease of use (K3)	1
Privacy (K4)	2
Technology (K5)	4

Source: Research findings

Table 6: Prioritization Of Sub-Criteria (Speed)

Speed	Quick loading times for the internet banking platform	4
	Speedy access to account information and transaction history.	5
	Fast internet banking login via a one-time password.	3
	Swift response times for customer queries and requests.	1
	Rapid execution of one-time password (OTP) verification.	2

Source: Research findings

Table 7: Prioritization Of Sub-Criteria (Human Resource)

Human Resource	Availability of skilled and trained customer support representatives. (1554)	4
	Quick response time.	1
	Efficient handling of customer inquiries and problem resolution.	2
	Adequate staffing levels to meet customer demands.	3

Source: Research findings

Table 8: Prioritization Of Sub-Criteria (Privacy)

Privacy	Detection and prevention of fraudulent activities.	2
	Use of one-time password and hardware token to enhance security.	4
	Use of two-factor authentication: personal static password + one-time SMS password.	3
	Compliance with data protection and privacy regulations.	1

Source: Research findings

Table 9: Prioritization Of Sub-Criteria (Ease Of Use)

Ease of use	Intuitive design for customers of all age groups	1
	Customizable dashboard and preferences.	3
	Availability of tutorials and user guides	4
	User-friendly interface with clear navigation.	2
	Accessibility features for users with disabilities.	5

Source: Research findings

Table 10: Prioritization Of Sub-Criteria (Technology)

Technology	Robust and secure online banking platform.	4
	Compatibility with various devices and operating systems.	1
	Data security measures and protection against cyber threats	5
	Integration with other banking systems (e.g., core banking).	2
	Regular software updates and maintenance.	3

Source: Research findings

According to the opinions of the participants and experts, the final prioritization of the main criteria for DB implementation was obtained as K3 > K4 > K2 > K5 > K1. Ease of use was considered the most important criterion for implementing and improving the quality of DB services. The role of human resources has

changed in the era of digital transformation. The ranking of "Human Resources" as number 5 in the list of indicators for implementing digital banking during COVID-19 may reflect the perception that technology and automation can partially compensate for some human resource needs in the digital banking sector.

After reviewing previous studies, such as one conducted by Suhaimi et al (2018) that examined the factors influencing the acceptance of DB in Malaysia, it is clear that the primary determinant is perceived ease of use. The relationship between perceived usefulness and intention to use DB is insignificant, as is that between perceived self-efficacy and intention to use DB. In addition, due to recent changes in the world, the COVID-19 pandemic may act as a significant determinant of applicable practices to formulate strategies to improve banking services, increase the acceptance of DB by employees, and make changes to the traditional working processes(Shahabi & Nasri, 2021).Shaikh et al. (2017) emphasized the importance of regulatory and digital laws to prevent threats, risk of fraud, hacking, and cyber-attacks. On the other hand, third-party operational law and cooperative regulation (to respect privacy and prevent data disclosure) will definitely lead to greater economic security for users and financial organizations. In addition, having easy and convenient access to account information in any place and at any time can lead to the improvement of the digital experience of customers and consequently improve the relationship between customers and banks. Therefore, customizing banking platforms and portals so that customers can meet their financial needs through self-service capability will increase customer satisfaction (Githuku & Kinyuru, 2018). A study by Al-Masaeed et al. (2022) examined the factors that contribute to client satisfaction in internet banking. The study found that factors such as website design, ease of use, security, and client service all had a significant impact on client satisfaction.

After ranking the main criteria and relevant sub-criteria, it is now time to construct the satisfaction importance matrix. Now we will evaluate the different parts of this matrix in more detail.

Quadrant 1:

This quadrant has points that are very important but not satisfying. There is a direct link between electronic banking and customer satisfaction such that improving the quality of service with online banking also improves customer satisfaction. Low consumer satisfaction with internet banking services provides an opportunity for investment to meet the high customer satisfaction-focused objectives electronic banking. Therefore, directors can seize these opportunities quickly and utilize them to their advantage, developing their organization.

Quadrant 2:

Shows the successful result of every careful and effective decision-making process The services provided in this quadrant best achieve both significant and

satisfying characteristics. By following to their previous methods, managers can take proactive measures to maintain and achieve the primary goals of customer engagement.

Quadrant 3:

In this quadrant, all points act as a warning signal for managers. Even though they have low importance, These criteria have managed to attain a high level of consumer satisfaction despite their modest priority. Although the fact that the satisfaction indicator is always measured, the desired indicator's significance should not be dismissed. As a result, there will be tremendous resource waste as a result of these conflicts.

Quadrant 4:

According to Figure 5-1, all points located in this quadrant show poor performance in terms of the two key and basic factors of this matrix – namely importance and satisfaction. According to the outcome of the questionnaire, both criteria obtain poor scores. It's necessary to keep in mind that while these factors might be taken into account when managers are making decisions about the examination of desired plans, they do not necessarily need to be given priority.

To connect the importance-satisfaction matrix with the results of ranking using the AHP method, you can follow below steps.

- ❖ Rate the importance of each of the criteria that matter to you using the AHP method, and then calculate the importance-satisfaction matrix for each sub-criterion.
- ❖ Calculate the total ranked scores for each sub-criterion in the importance-satisfaction matrix.

Compare the total ranked scores with the importance of each sub-criterion in the importance-satisfaction matrix and identify a subset of sub-criteria that have the most impact on satisfaction. By following the steps outlined above, you can present your results in a way that is easy to understand. Providing more information on the methods used, such as evaluating importance with the AHP method and calculating the importance-satisfaction matrix, will allow readers to better analyze the results.

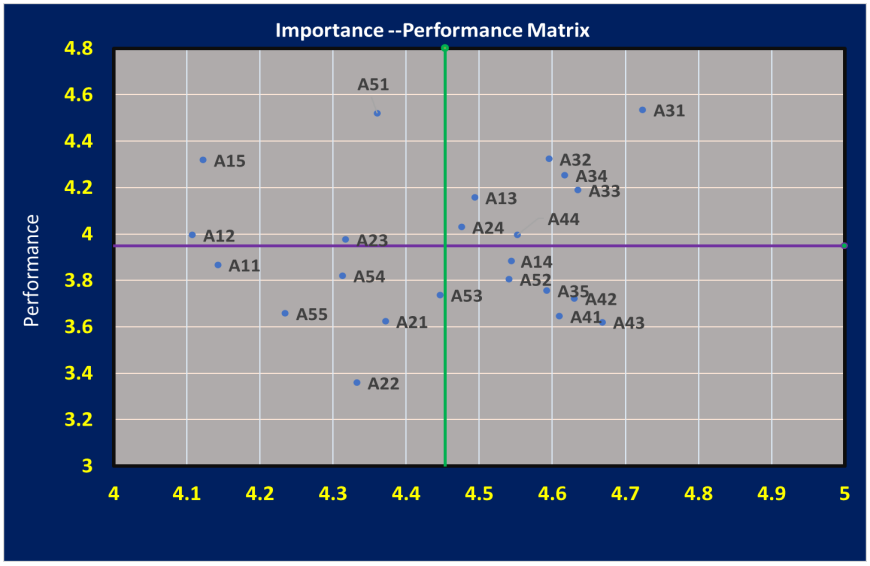


Figure 2. Importance - Performance Analysis

6. Conclusion and Recommendations

The results of this research for implementing DB show that ease of use and privacy are the most important criteria that affect customer satisfaction. According to the evaluation of TEJARAT Internet Bank Services carried using the methodology known as AHP. The majority of the bank's services, according to the importance-performance Matrix approach, fall into the "important and urgent" quadrant, necessitating immediate attention and action. However, the services' performance investigation reveals a number of areas that need improvement, including quick response times for customer queries and requests, quick internet banking activation without entering bank workplaces, and swift internet banking authentication. The findings presented imply that even while the bank has focused on the correct requirements for service evaluation and identified immediate issues, some areas still have room for improvement.DB represents a strategic approach that can be aligned with the goals and processes of policymakers and regulators. In addition, this research provides guidance for managers in developing appropriate strategies for the implementation of DB and highlights the importance of appropriate indicators and models in this regard. The COVID-19 pandemic may act as a significant determinant of applicable practices to formulate strategies to improve banking services, increase the acceptance of DB. Regarding the identification and prioritization of appropriate criteria for the successful implementation of DB.

This study ran through limitations. First, the unique setting in which the study was conducted may restrict the generalizability of its findings. various geographical areas, financial institutions, banks, and policymakers may have different opinions and practices when it comes to DB. In addition, gathering thorough and trustworthy data on DB design and its consequences turned out to be a difficult challenge. The evaluation of the sustainability and long-term viability of the DB metrics and models was made more difficult by the dynamic nature of technology and the constantly changing digital ecosystem. The fuzzy group MCDM approach used in this study had limitations of its own, such as the subjectivity of making choices and potential biases in expert judgments, which must also be acknowledged. Understanding these restrictions sets the stage.

It's also important to take into account how DB architecture will be impacted by modern innovations like cloud computing, blockchain, big data, biometrics, and artificial intelligence. It is essential to understand how these technologies can be successfully included into DB systems to improve productivity, security, and customer satisfaction. Further studies could additionally take into account additional approaches for assessing the indicators and concepts of DB implementation. A more comprehensive understanding of the efficiency and dependability of the suggested indicators and prioritized models may be acquired by evaluating the outcomes produced using various approaches with the results of this research. many research gaps remain. Indicators that take into account various aspects of DB, from customer behavior to technological infrastructure, require a detailed literature review, past practical experiences, emerging trends affected by Industry 4.0 and expert opinions. The suggested technique is a systematic one that will help managers set priorities and analyze the most beneficial requirements for DB implementation. However, by following to these policy implications, TEJARAT Bank may significantly improve its electronic financial services. First, the bank should concentrate on making expenditures on cutting-edge security methods like hardware tokens and two-factor authentication to boost security in order to increase the reliability of its services. According to a study by Raza et al. (2020), the use of contemporary security procedures, such as biometric authentication, has been found to significantly increase customer satisfaction with online banking services. Furthermore, TEJARAT Internet Bank should think about improving the user interface and experience of its smartphone app and webpage to make them quicker and client-friendly.

References:

1. Raza, S. A., Umer, A., Qureshi, M. A., & Dahri, A. S. (2020). Internet banking service quality, e-customer satisfaction and loyalty: the modified e-SERVQUAL model. *TQM Journal*, *32*(6), 1443–1466. https://doi.org/10.1108/TQM-02-2020-0019/FULL/HTML.

2. Al-Masaeed, S., Al Nawayseh, M. K., AlFawwaz, B. M., Maqableh, M., Alnabhan, M., Masa'deh, R., & AL-Shatnawi, A. (2022). Factors Affecting Consumers' Intention to Use Mobile Ride Hailing Services in Developing Countries. *International Journal of Interactive Mobile Technologies*, *16*(11), 207–223. https://doi.org/10.3991/IJIM.V16I11.30579.

3. Githuku, W.A.; Kinyuru, R.N. Digital banking and customer relationship in banking industry in Kenya. Int. Acad. J. Hum. Resour. Bus. Adm. 2018, 3, 14–32.

4. Seçme, N. Y., Bayrakdaroğlu, A., & Kahraman, C. (2009). Fuzzy performance evaluation in Turkish Banking Sector using Analytic Hierarchy Process and TOPSIS. *Expert Systems with Applications*, *36*(9), 11699–11709. https://doi.org/10.1016/J.ESWA.2009.03.013.

5. Miranda, F. J., Chamorro, A., Murillo, L. R., & Vega, J. (2010). An Importance-Performance Analysis of Primary Health Care Services: Managers vs. Patients Perceptions. *Journal of Service Science and Management*, *03*(02), 227–234. https://doi.org/10.4236/JSSM.2010.32028.

6. Suhaimi, A.I.H.; Hassan, M.S.B.A. Determinants of branchless digital banking acceptance among generation Y in Malaysia. In Proceedings of the 2018 IEEE Conference on e-Learning, e-Management and e-Services (IC3e), Langkawi, Malaysia, 21–22 November 2018; IEEE: New York, NY, USA, 2018; pp. 103–108.

7. Nasri, W. Acceptance of internet banking in Tunisian banks: Evidence from modified utaut model. Int. J. E-Bus. Res. (IJEBR) 2021, 17, 22–41.

8. Shahabi, V.; Azar, A.; Razi, F.F.; Shams, M.F.F. Simulation of the effect of COVID-19 outbreak on the development of branchless banking in Iran: Case study of Resalat Qard–al-Hasan Bank. Rev. Behav. Financ. 2020, 13, 85–108.

9. Mansouri Rad, H., & Bagherian, B. (2023). Importance-performance analysis (IPA) of banking factors affecting the improvement of business environment and prevention of corporate bankruptcy through the IPA model. *Int. J. Nonlinear Anal. Appl*, *14*, 2008–6822. https://doi.org/10.22075/ijnaa.2022.26860.3429

10. Miranda, F. J., Chamorro, A., Murillo, L. R., & Vega, J. (2010). An Importance-Performance Analysis of Primary Health Care Services: Managers vs. Patients Perceptions. *Journal of Service Science and Management*, *03*(02), 227–234. https://doi.org/10.4236/JSSM.2010.32028

11. Rodriguez, R. M., Martinez, L., & Herrera, F. (2012). Hesitant fuzzy linguistic term sets for decision making. *IEEE Transactions on Fuzzy Systems*, *20*(1), 109–119. https://doi.org/10.1109/TFUZZ.2011.2170076

12. Saaty, T. L. (1988). What is the Analytic Hierarchy Process? *Mathematical Models for Decision Support*, 109–121. https://doi.org/10.1007/978-3-642-83555-1_5

13. Chen, Hongyi & Kocaoglu, D.F. (2008). A sensitivity analysis algorithm for hierarchical decision models. European Journal of Operational Research. 185. 266-288. 10.1016/j.ejor.2006.12.029.
14. Salehnia, M., Saki, M., Eshaghi, A., & Salehnia, N. (2014). A Model of E-Loyalty and Word-Of-Mouth based on e-trust in E-banking services (Case Study: Mellat Bank). *New Marketing Research Journal Special Issue*, 101–114.
15. Nazaritehrani, A., & Mashali, B. (2020). Development of E-banking channels and market share in developing countries. *Financial Innovation*, *6*(1), 1–19. https://doi.org/10.1186/S40854-020-0171-Z/TABLES/5
16. Tansley, R., Bass, M., Stuve, D., Branschofsky, M., Chudnov, D., McClellan, G., & Smith, M. (2003). The DSpace institutional digital repository system: current functionality. In *2003 Joint Conference on Digital Libraries, 2003. Proceedings.* (pp. 87-97). IEEE.
17. Ezzi, S. W. (2014). A Theoretical Model for Internet Banking: Beyond Perceived Usefulness and Ease of Use. Archives of Business Research, 2(2), 31–46. https://doi.org/10.14738/ABR.22.184
18. Collins, C.J. and Clark, K.D. (2003) Strategic Human Resource Practices, Top Management Team Social Networks, and Firm Performance: The Role of Human Resource Practices in Creating Organizational Competitive Advantage. Academy of Management Journal, 46, 740-751.http://dx.doi.org/10.2307/30040665.
19. Chryssolouris, G. (2013). *Manufacturing systems: theory and practice*. Springer Science & Business Media.
20. Mukherjee, S. and Benson, T. (2003) The Determinants of Poverty in Malawi, 1998. World Development, 31, 339-358. http://dx.doi.org/10.1016/S0305-750X(02)00191-2.
21. Chong, A.Y.-L. Predicting m-commerce adoption determinants: A neural network approach. Expert Syst. Appl. 2013, 40, 523–530.
22. Siam, A.Z. Role of the electronic banking services on the profits of Jordanian banks. Am. J. Appl. Sci. 2006, 3, 1999–2004.
23. Hewa, T., Ylianttila, M., & Liyanage, M. (2021). Survey on blockchain based smart contracts: Applications, opportunities and challenges. *Journal of Network and Computer Applications*, *177*, 102857. https://doi.org/10.1016/J.JNCA.2020.102857
24. Fox, G., Clohessy, T., van der Werff, L., Rosati, P., & Lynn, T. (2021). Exploring the competing influences of privacy concerns and positive beliefs on citizen acceptance of contact tracing mobile applications. *Computers in Human Behavior*, *121*, 106806. https://doi.org/10.1016/J.CHB.2021.106806
25. Gull, H., Saeed, S., Iqbal, S. Z., Bamarouf, Y. A., Alqahtani, M. A., Alabbad, D. A., Saqib, M., Qahtani, S. H. Al, & Alamer, A. (2022). An Empirical Study of Mobile Commerce and Customers Security Perception in Saudi Arabia. *Electronics 2022, Vol. 11, Page 293*, *11*(3), 293. https://doi.org/10.3390/ELECTRONICS11030293
26. Benlian, A.; Koufaris, M.; Hess, T. Service quality in software-as-a-service: Developing the SaaS-Qual measure and examining its role in usage continuance. J. Manag. Inf. Syst. 2011, 28, 85–126.

27.Katiyar, R., & Badola, S. (2018). Modelling the barriers to online banking in the Indian scenario: an ISM approach. *Journal of Modelling in Management*, *13*(3), 550–569. https://doi.org/10.1108/JM2-01-2018-0006/FULL/XML
28.Santos, J. E-service quality: A model of virtual service quality dimensions. Manag. Serv. Qual. Int. J. 2003, 13, 233–246.
29.Alsmadi, A. A., Shuhaiber, A., Alhawamdeh, L. N., Alghazzawi, R., & Al-Okaily, M. (2022). Twenty Years of Mobile Banking Services Development and Sustainability: A Bibliometric Analysis Overview (2000–2020). *Sustainability 2022, Vol. 14, Page 10630*, *14*(17), 10630. https://doi.org/10.3390/SU141710630
30.Munusamy, J., Chelliah, S., & Mun, H. W. (2010). *Service Quality Delivery and Its Impact on Customer Satisfaction in the Banking Sector in Malaysia*.
31.Sousa, M.J.; Rocha, Á. Digital learning: Developing skills for digital transformation of organizations. Future Gener. Comput. Syst. 2019, 91, 327–334.
32.Liu, D.; Chen, S.; Chou, T. Resource fit in digital transformation. Manag. Decis. 2011, 49, 1728–1742.
33.Mbama, C.I.; Ezepue, P.O. Digital banking, customer experience and bank financial performance: UK customers' perceptions. Int. J. Bank Mark. 2018, 2, 230–255.
34.Omarini, A.E. Banks and FinTechs: How to develop a digital open banking approach for the bank's future. Int. Bus. Res. 2018, 11, 23–36.
*35.*Bouwman, H.; Nikou, S.; Molina-Castillo, F.J.; de Reuver, M. The impact of digitalization on business models. Digit. Policy Regul. Gov. 2018, 20, 105–124.
*36.*Kumar, R.; Singh, R.K.; Dwivedi, Y.K. Application of industry 4.0 technologies in SMEs for ethical and sustainable operations: Analysis of challenges. J. Clean. Prod. 2020, 275, 124063.
37.Mbama, C.I.; Ezepue, P.O. Digital banking, customer experience and bank financial performance: UK customers' perceptions. Int. J. Bank Mark. 2018, 2, 230–255.
38.Hu, Y. C., & Liao, P. C. (2011). Finding critical criteria of evaluating electronic service quality of Internet banking using fuzzy multiple-criteria decision making. *Applied Soft Computing Journal*, *11*(4), 3764–3770. https://doi.org/10.1016/J.ASOC.2011.02.008.
39.Samani, Z. N., & Bashi, M. R. K. (2020). Reliable resource allocation and fault tolerance in mobile cloud computing. *Journal of Information Systems and Telecommunication (JIST) Vol. 2 96*, *2*(26), 96. https://doi.org/10.7508/JIST.2019.02.002.
40.Szopiński, T. S. (2016). Factors affecting the adoption of online banking in Poland ☆. *Journal of Business Research*. https://doi.org/10.1016/j.jbusres.2016.04.027.
41.Hsu, C. L., & Lin, J. C. C. (2023). Understanding the user satisfaction and loyalty of customer service chatbots. *Journal of Retailing and Consumer Services*, *71*, 103211. https://doi.org/10.1016/J.JRETCONSER.2022.103211
42.Abbasi, B. N., Umer, M., Sohail, A., Tang, J., Ullah, I., & Abbasi, H. (2020). Service quality, customer satisfaction and loyalty in banking sector of Pakistan.

International Journal of Management & Entrepreneurship Research, *1*(1), 1–8. https://doi.org/10.51594/IJMER.V1I1.1
43. Shamshur, A., & Weill, L. (2019). Does bank efficiency influence the cost of credit? *Journal of Banking and Finance*, *105*, 62–73. https://doi.org/10.1016/j.jbankfin.2019.05.002.
44. Kaur, S. J., Ali, L., Hassan, M. K., & Al-Emran, M. (2021). Adoption of digital banking channels in an emerging economy: exploring the role of in-branch efforts. *Journal of Financial Services Marketing*, *26*(2), 107. https://doi.org/10.1057/S41264-020-00082-W.
45. Almaiah, M. A., Al-Rahmi, A. M., Alturise, F., Alrawad, M., Alkhalaf, S., Lutfi, A., Al-Rahmi, W. M., & Awad, A. B. (2022). Factors influencing the adoption of internet banking: An integration of ISSM and UTAUT with price value and perceived risk. *Frontiers in Psychology*, *13*, 4811. https://doi.org/10.3389/FPSYG.2022.919198/BIBTEX.
46. Namahoot, K. S., & Laohavichien, T. (2018). Assessing the intentions to use internet banking: The role of perceived risk and trust as mediating factors. *International Journal of Bank Marketing*, *36*(2), 256–276. https://doi.org/10.1108/IJBM-11-2016-0159
47. Bartik, A. W., Bertrand, M., Cullen, Z., Glaeser, E. L., Luca, M., & Stanton, C. (2020). The impact of COVID-19 on small business outcomes and expectations. *Proceedings of the national academy of sciences*, *117*(30), 17656-17666.
48. Benlian, A.; Koufaris, M.; Hess, T. Service quality in software-as-a-service: Developing the SaaS-Qual measure and examining its role in usage continuance. J. Manag. Inf. Syst. 2011, 28, 85–126.
49. Rodriguez, R. M., Martinez, L., & Herrera, F. (2012). Hesitant fuzzy linguistic term sets for decision making. *IEEE Transactions on Fuzzy Systems*, *20*(1), 109–119. https://doi.org/10.1109/TFUZZ.2011.2170076.
50. Nasri, W. Acceptance of internet banking in Tunisian banks: Evidence from modified utaut model. Int. J. E-Bus. Res. (IJEBR) 2021, 17, 22–41.
51. Shahabi, V.; Azar, A.; Razi, F.F.; Shams, M.F.F. Simulation of the effect of COVID-19 outbreak on the development of branchless banking in Iran: Case study of Resalat Qard–al-Hasan Bank. Rev. Behav. Financ. 2020, 13, 85–108.

ارزیابی جامع شاخص های کاربر محور برای پیاده سازی بانکداری دیجیتال: مطالعه موردی بانک اینترنتی تجارت

چکیده:

بانکداری دیجیتال (DB) به دلیل اهمیت و کارایی، به یکی از انتخاب‌های محبوب برای بسیاری از مشتریان تبدیل شده است. با این حال، ارزیابی کیفیت عملکرد بانک‌های اینترنتی از نظر رضایت مشتری نیز حائز اهمیت است. این مطالعه قصد دارد شاخص‌های مناسب برای اجرای بانکداری دیجیتال را به طور جامع شناسایی و ارزیابی کند تا پذیرش آن در بین کاربران را ترویج دهد.

روش‌ها:

در این پژوهش از دو تکنیک استفاده شده است: ماتریس اهمیت–عملکرد و فرآیند تحلیل سلسله مراتبی. ماتریس اهمیت–عملکرد به ما کمک کرد تا عوامل شناسایی شده را بر اساس اهمیت و فوریت آنها برای بهبود عملکرد بانک رتبه‌بندی کنیم. فرآیند تحلیل سلسله مراتبی به ما کمک کرد تا اهمیت نسبی معیارها و زیرمعیارهای مختلف که بر عملکرد بانک تأثیر می‌گذارند را با هم مقایسه و رتبه بندی کنیم.

نتایج:

یافته‌های پژوهش نشان می‌دهد که عملکرد بانک تحت تأثیر پنج عامل قرار دارد: سهولت استفاده، امنیت، سرعت، منابع انسانی و فناوری. همچنین نتایج حاکی از آن است که سهولت استفاده و امنیت، شاخص‌هایی هستند که نیاز به توجه فوری بانک دارند. بنابراین، پیشنهاد می‌کنیم که خدمات بانک اینترنتی تجارت بر ارتقاء امنیت و سهولت استفاده به عنوان اولویت‌های اصلی خود برای بهبود عملکردشان تمرکز کنند.

نتیجه‌گیری:

این مقاله با تغییر تمرکز معمول تحقیقات بانکداری آنلاین از موجودیت‌های شرکتی به مشتریان حقیقی، دیدگاه نوآورانه‌ای را معرفی می‌کند. تحقیقات ما اطلاعات ارزشمندی را ارائه می‌دهد که برای بانکداری خرده‌فروشی و بانک‌هایی که با مشتریان شرکتی سر و کار دارند با مقایسه و ارزیابی نیازهای منحصر به فرد این دو بخش مصرف کننده، مفید است.