

## Factors Underpinning Security and Privacy in the Development of Virtual Banking in Iran

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### Abstract

This study aimed to identify the factors affecting security and privacy in the development of virtual banking in Iran using a thematic pluralistic research methodology. First, the elements constituting cooperation were identified in a library study. Then, in-depth interviews were conducted with 20 scholars and academic experts to extract the elements and group them according to the theme analysis method. The output was the identification of 27 indicators in two main categories and six subcategories. The convergent and divergent validity methods were used to determine the validity whose results were optimal. The results show that the effectiveness of security and privacy in developing virtual banking in Iran depends on the development of a comprehensive plan and attention to the future needs of the banking system, which will create satisfaction. So, it is

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necessary to develop general policies for reforming the banking system in the future. Also, according to the experts, customers' satisfaction with the quality of the banking services, their trust in these services, and the ease of using them are the strengths of the virtual banking services and can be handled for attracting more customers and improving competitiveness in the virtual banking industry. On the other hand, customers' need for e-services in the modern world is unavoidable. In cyberspace, the e-services of banks have become one of the fastest and most valid ways of financial transactions whose key requirement is trust in these services.

**Keywords:** Banking industry of Iran, Identification of effective factors, Privacy, Security, Virtual banking

## **Introduction**

One of the most widely used organizations is banks and their services, especially the use of e-services round-the-clock (Abdallah and et al., 2021). With the prosperity of e-businesses and people's growing trust in e-purchase in cyberspace due to the closure of many commercial centers and the COVID-19 pandemic, the e-services of banks have become one of the fastest and most valid methods of doing daily works (Panayiotis and Anyfantak, 2020). Banks have always been trying to meet their customers' expectations and future needs. Information technology (IT) has contributed to improving performance and innovation in service delivery by facilitating communication with customers and increasing its speed and effectiveness (Rashmini and et al., 2020).

Presently, the Internet has provided a platform for performing commercial transactions and marketing, especially in banks. The e-services of the banks, as one of the new achievements of the information era, have radically transformed global trade and trade rules and have created enormous advantages for business methods. Online purchase becomes growingly economical and appropriate and allows customers to better compare price/quality. Consequently, customers have become more satisfied, so most people today prefer to make their purchases online (Denghua and et al., 2021).

Today, communities rely on computers and computerized networks more and more, and a good interactive environment has been provided for people's communication. Geographical distance and borderlines have lost their significance, and the expansion of modern communication, electronic, and Internet media have created a space that came to be known as virtual space (Muslim and et al., 2020). The virtual space is a global space – borderless and beyond time and place. Virtual banking is developed in cyberspace by which people can use e-services that mostly need e-payment by their computers, smartphones, and ATMs of the stores with no need to visit bank branches. As such, virtual banks form a new generation of banks that supply banking services and products to the public using the latest achievements of information and communication technology (ICT) and with no need for a physical/off-line branch (Lionello and et al., 2020). These banks are characterized by 24-hour access (at any time and place), convenience, availability, speed, and security (Farque & Kabir Biplop, 2016).

Virtual banking is a new field in cyberspace and the world of e-commerce with an excellent position to provide bank services. Although e-banking, Internet-based banking, and virtual banking are similar in some instances, they differ in others (Houshmandi and et al., 2020). In fact, virtual banking means the presence of banks in cyberspace in its general concept. This is inherently different from the services of Internet-based banking, mobile banking, bank cards, and generally, the services are known as e-banking. Since the Internet is the primary tool used in virtual banking, it might be claimed that virtual banking is the most advanced instance of Internet-based banking. Despite its genuine progress in using e-banking services over the last two decades, the banking industry of Iran is still far from the concept of virtual banking, so it is necessary to provide approaches and practices for promoting a paradigm for the adoption of virtual banking and facilitating growing tendency towards it (Hamilton, 2019).

The adoption of virtual banking requires that people be aware of its advantages. If people so far saved their money in banks, now they can save their time using virtual banks (Faruque & Kabir Biplob, 2016). Time is the most precious asset of humans, which cannot be recovered given the short lifecycle of humans on the earth. Some advantages that help adopt virtual banking are the alleviation of social issues such as intra-city and inter-city trips, which will reduce opportunity costs, the prosperity of virtual trade, and the release of banks from providing some services, which will allow them to develop new products. Despite these advantages, full-fledged virtual banking has not been adopted globally in the world. Some countries prefer a hybrid approach due to the barriers they face regarding full-fledged virtual banking (Kafil, 2020).

The factors underpinning the reduction of the tendency towards any phenomenon in cyberspace include negative experience, symbolic inconsistency, and ideological inconsistency (Eleonora, 2021). So, it is revealed that the poor performance of a brand develops an undesirable image in consumers, and this is what the concept of symbolic inconsistency deals with.

Today, organizations pursue attracting and retaining more customers. The performance perceived by customers from a brand is a major construct in shaping brand loyalty and ensuring the viability of an organization (Hart and et al., 2013). Organizations and companies

can promote a positive product/brand image in customers by increasing the utility of their services, products, facilities, and store atmosphere and exploit it as a competitive advantage (Vincent & Balabanis, 2021).

To succeed in the competitive industry of virtual banking, banks need to provide high-quality e-banking services to their customers, which needs determining indicators for the assessment of the quality of their e-banking services by customers, e.g., security and the preservation of privacy. In today's competitive world, the close similarity of services to one another and the high sensitivity and very low flexibility of customers have made banks and credit institutions seek persistent absolute competitive advantage to ensure their survival (Moradi & Sanayei, 2020).

The banking industry of Iran is on the verge of dramatic developments and radical reforms so that big steps are to be taken to promote these service-providing systems by considering these indicators. The development trend of the banking industry will set a different perspective for it. In this regard, there are various approaches, but the point shared by all perspectives is the enhancement of security and privacy to facilitate the process of virtual banking adoption (Houshmandi and et al., 2020). Incentive schemes will help bank customers and employees develop and adopt virtual banking. Since no comprehensive research has been conducted on the use of virtual banking in Iran consistent with local conditions, it can be said that the present study is one of the first works in this field, which is the innovation and novelty of the research. So, it is necessary to identify the factors influencing security and privacy in the development of virtual banking in Iran. The key question is 'What are the factors underpinning security and privacy in the development of virtual banking in Iran?'

### **Method**

Given the research goal, which was to study the effect of security and privacy preservation on the development of virtual banking in Iran, the research adopted the theme analysis method. So, different data collection methods were used in different phases.

### **Identification of factors**

In this phase, data were collected by reviewing the relevant articles

and books and interviewing experts to identify the factors. Given the open-ended question, criteria were required for the inclusion of the articles and other works to ensure the good formation of the research. These criteria were important as they would provide filters for excluding irrelevant data. For a piece of work to be included in the systematic review of the literature, firstly it should be published in a peer-reviewed journal, secondly, it should be published within years 2016-2021, and thirdly it should influence the research goals either operationally or conceptually. Since concepts and ideas in the field of management develop very fast, the articles older than 14 years were excluded because they might create bias at the results. It should, however, be noted that in addition to the articles selected based on the above criteria, some articles published in less prestigious journals or presented in conferences were also included to achieve more comprehensive access to the relevant literature. The articles were searched in Emeraldinsight, Scencedirect, Springer, and Google Scholar. A sound strategy should be adopted at the search phase to identify potential writings for the literature review. At the next step of the identification phase, in-depth interview sessions were conducted with experts and scholars to complete the information and enrich the theoretical literature. Comprehensive interviews or purposeful dialogues are a well-known method in qualitative research that is increasingly used for data collection.

### **Model design phase**

This phase aimed to determine content codes and find out their relationships.

### **Evaluation phase**

In the second step, using the data collected from the interviews and other existing data, as well as instruments like a questionnaire, quantitative data were collected about the studied phenomenon. In this step, the collected data were analyzed using the statistical technique, and the research's final model was tested by statistical methods such as structural equation modeling (SEM) and path analysis. To this end, the partial least squares SEM (PLS-SEM) was used. This method is described below. Therefore, the research used a pluralistic mixed (qualitative-quantitative) design. Since the research was conducted in

three phases, the elements constituting the model were firstly identified by a library study. Then, in-depth interviews were carried out with 20 academic scholars and experts to localize the factors and identify other factors influencing the model. The statistical population of the qualitative phase was composed of all banking and academic experts selected by the purposive sampling technique. In the quantitative phase, it was composed of 384 bank customers in Mashhad sampled by the simple randomization technique. The theme analysis method was used to extract and group the elements. Eventually, the proposed model was tested by PLS-SEM.

### Findings

To investigate the effect of security and privacy preservation on the development of virtual banking in Iran, which was the research goal, 40 articles were identified by a systematic review. They were then subjected to content analysis to extract the factors and constituents of the factors influencing the adoption of virtual banking in Iran's banking industry as expressed in the theoretical literature. At this step, some experts were interviewed to complete the factors and localize them. After the content analysis of the interviews, other elements underpinning the research model were collected.

**Table 1. The open and selective codes extracted for the identification of factors influencing security and privacy preservation in the development of virtual banking in Iran (an integration of the expert opinions and articles)**

Main category	Selective code	Article text (open code)	Previous researchers	Interviewer
Customer privacy	Management skills	Adoption of transformational management in virtual banking	A1, A2	All experts
		Having the ability to properly evaluate the performance of employees	A2, A11, A26	
		Knowledge documentation in virtual banking		4, 10, 14, 16, 18, 19
		Having critical thinking in virtual banking	A10, A17, A28	All experts
		Problem-solving skills in virtual banking	A7, A14	6, 8, 11, 14, 15, 19

Main category	Selective code	Article text (open code)	Previous researchers	Interviewer
		Support and enhancement of creativity in virtual banking	A13, A16	
	Customer information confidentiality	Securely storing information		4, 7, 8, 15, 17, 19, 20
		Dealing with fake sites	A8, A14, A18, A20	All experts
		Developing an information platform using MIS	A7, A12, A25, A28	2, 3, 5, 9, 10, 13, 19
		Using up-to-date technology to increase speed and accuracy		6, 8, 12, 14, 16
	Fast responsiveness	Easy access of employees to organizational information	A14, 16	
		Employee access to information technologies and systems	A2, A16, A30	3, 6, 11, 15, 17
		Access to up-to-date hardware technologies	A4, A5, A21	1, 5, 8, 9, 10, 16, 20
		Access to the virtual network as a source of knowledge		All experts
	Information security	Hardware infrastructure	Existence of technological and modern equipment in virtual banking	A25, A26
Existence of technological infrastructure in virtual banking			A3, A14	2, 4, 5, 8, 13, 20
Use of up-to-date and genuine software			A15, A30	7, 8, 14, 16, 17
Awareness and understanding of complex issues in virtual banking			A11	
Holding educational workshops for employees in virtual banking			A24	3, 11, 14, 17
Software infrastructure		Ensuring that virtual banking goals are achievable		10, 11, 12, 15
		Internet bandwidth and filtering		2, 8, 15, 16, 18
		Using strong antivirus	A25	4, 8, 12, 16
		Keeping customer data in secure dashboards	A14, A15	4, 5, 7, 10, 13



Main category	Selective code	Article text (open code)	Previous researchers	Interviewer
	Employees' capabilities	Awareness and understanding of complex issues in virtual banking	A26	1, 5, 13, 16, 20
		Ability to communicate and transfer knowledge to other colleagues	A11	1, 5, 14, 18
		Adaptability to different conditions in virtual banking	A11	2, 3, 5, 7
		Employees' attempt to reinforce personal characteristics	A14, A27	

The validity of the research instrument was measured by a convergent validity technique (the AVE index). According to Table 2, the convergent validity index implies that the subcategories of causal conditions, contextual conditions, structural conditions, strategies, and consequences are optimally valid. The values of Cronbach's alpha and composite reliability show the high measurement accuracy of the subcategory instruments and their high reliability. Also, the total coefficient of Cronbach's alpha was estimated at 0.85 for the model concept in this questionnaire.

**Table 2. The validity and reliability of the factors influencing security and privacy in development of virtual banking in Iran**

Main category	Subcategory	Convergent validity	Reliability	
		AVE	Cronbach's alpha	Composite reliability
Customer privacy	Management skills	0.7975	0.9223	0.8834
	Customer information confidentiality	0.7588	0.7054	0.7820
	Fast responsiveness	0.7713	0.8310	0.7936
Information security	Hardware infrastructure	0.9209	0.9626	0.9168
	Software infrastructure	0.8876	0.8946	0.8324
	Employees' capabilities	0.7008	0.8940	0.8655

**Table 3. The factor loadings of the subcategories and indicators of the factors influencing security and privacy in development of virtual banking in Iran**

Major dimension	Minor dimension	Factor loading	Critical value	P	Subcategory	Factor loading	Critical value	P
Customer privacy	Management skills	0.89	10.91	0.0001	X1	0.84	14.5	0.0001
					X2	0.72	10.54	0.0001
					X3	0.72	6.3	0.0001
					X4	0.91	9.22	0.0001
					X5	0.83	8.66	0.0001
	Customer information confidentiality	0.84	13.87	0.0001	X6	0.70	6.7	0.0001
					X7	0.67	5.84	0.0001
					X8	0.70	5.3	0.0001
					X9	0.94	8.62	0.0001
					X10	0.98	18.5	0.0001
	Fast responsiveness	0.80	7.33	0.0001	X11	0.72	13.3	0.0001
					X12	0.62	2.12	0.0001
					X13	0.85	3.46	0.0001
					X14	0.99	3.45	0.0001
Information security	Hardware infrastructure	0.83	4.46	0.001	X15	0.84	9.12	0.0001
					X16	0.7	8.52	0.0001
					X17	0.86	10.6	0.0001
					X18	0.68	6.6	0.0001
					X19	0.77	7.65	0.0001
	Software infrastructure	0.91	6.17	0.0001	X20	0.93	8.96	0.0001
					X21	0.28	0.85	0.0001
					X22	0.99	1.49	0.0001
					X23	0.91	6.5	0.0001
	Employees' capabilities	0.86	4.43	0.0001	X24	0.77	4.63	0.0001
					X25	0.80	4.76	0.0001
					X26	0.72	3.33	0.0001
					X27	0.85	4.09	0.0001

According to Table 3, the convergent and divergent validity implies that the convergent and divergent validity of the underpinning subcategories is optimal for identifying the factors influencing security and privacy in the development of virtual banking in Iran. In general, it can be stated that the effect of security and privacy on the development of virtual banking in Iran depends on having a comprehensive plan and paying attention to future banking needs, which will be satisfactory. So, all-inclusive policies should be developed to reform the future banking system. According to the experts, customers' satisfaction with the quality of the banking

services, their trust in these services, and the ease of using them are the strengths of the virtual banking services and can be leveraged for attracting more customers and improving competitiveness in the virtual banking industry. On the other hand, customers' need for e-services in the modern world is unavoidable. In cyberspace, the e-services of banks have become one of the fastest and most valid ways of financial transactions whose key requirement is trust in these services.

### **Discussion and Conclusion**

After a review of the literature and interviews with 20 experts to identify the factors underpinning security and privacy in the development of virtual banking in Iran, 27 indicators were identified in two main categories and six subcategories. Based on the results of qualitative content analysis, all open codes are of high significance. Our results and the reports of previous researchers show that the factors influencing security and privacy in the development of virtual banking are mostly related to dissatisfaction with past experiences.

Since little research has been conducted in Iran on the factors affecting security and privacy in the development of virtual banking and most researches have emphasized information security in Internet-based banking and e-banking, the results showed that the factors underpinning security and privacy in banking create a safe environment for bank operations and enable the enhancement of the quality of services. Therefore, to develop security and preserve privacy, these variables should be reinforced to increase demand for the development of modern banking, especially virtual banking. The main achievement of this research is that bank managers and officials have not considered these two research topics, i.e., security and privacy, yet. Lionello and et al. (2020) state that virtual banks are a new generation of banks that use the latest achievements of ICT with no need for a physical branch to supply the public with diverse banking services and products. Also, according to Houshmandi and et al. (2020), virtual banking is a new platform in cyberspace and the world of e-commerce, which is in an excellent position to provide bank services. Daneshfar (2020) believes that virtual banking is a kind of e-banking and even some suggest that it is a blend of e-banking and conventional banking.

To enhance the role of and develop the functions of development

and academic centers with an emphasis on the organized connection of the centers with non-governmental institutions, it is recommended to focus on wisdom-based development and the establishment of decision support systems for the adoption of virtual banking to minimize its weaknesses and grasp its opportunities. It also increases interactions to open up new horizons and help understand people's cultures. In addition to the economic, social, political, and cultural dimensions of globalization, virtual banking allows increasing foreign investment attraction (direct and indirect) and expansion of the gross product. Virtual banking needs to be managed to increase its positive effects and avoid its negative impacts. In this regard, the recognition of these impacts from different perspectives can lay the ground for the development and effective planning in Iran. In addition, the use of banking management experts' opinions is the most important economic impact of this scheme.

Many countries have adopted easy mechanisms to motivate people's participation in the virtual banking process. Encouraging people's active participation in the design process and publicizing the virtual banking process allow diversifying the spatial structure and the composition of different economic activities. As such, the needs of various groups are satisfied. So, people should see the consequences and effects of virtual banking in their everyday lives, and this progress will contribute to people's economic development. However, the sustainable adoption of virtual banking requires solving the problems of organizational strategies, including the development of a strategic plan for the participation of the private sector and the use of controlling and assessment tools to ensure the effectiveness of team working in banking along with creating a trustworthy and honest working climate among customers to improve the personal and interpersonal communications of contributors.

It is therefore recommended to

- implement information security management standards in banks,
- use up-to-date technologies in banks,
- create the option of fast search in cyberspace for easy access,
- develop smart software for reporting for the sake of network security in Internet-based banking systems,
- provide technological equipment in organizations to allow easy delivery of services by Internet-based banking,
- use the successful services of other banks,

hold knowledge-enhancement training workshops for employees,  
and  
to an expert group to continually monitor the servers and antivirus  
applications of the bank.

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