

# Providing a model of the impact of open innovation on the competitive advantage of electronic services in the banking system: A Mathematical Approach

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## Abstract

The purpose of this research is to provide a model of the impact of open innovation on the competitive advantage of electronic services in the banking system (case study: Bank of Agriculture branches in Shiraz city). The statistical population included specialists and experts in the field of electronic services in the banking system of Shiraz Bank of Agriculture branches, who were selected as participants in the research using a targeted sampling approach. The data was collected by semi-structured interview method. In order to obtain the reliability and validity of the data, two methods of reviewing the participants and also reviewing the experts who were not participating in the research were used. The reliability of the model was evaluated using the Kappa index. The value of the Kappa index equal to 0.662 was calculated and it was placed at the level of valid agreement. Interviews and coding were analyzed using Maxqda software. Finally, based on the identified final criteria, the model derived from the foundation's data analysis method is presented. In the results of axial coding, 76 primary codes are grouped into 11 categories. The categories include banking marketing, electronic banking, market research, and human aspects of innovation, banking performance, organizational factors, banking technology, banking users and customers, external environment. The bank has been a competitive advantage of the bank and service innovation.

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## 1 Introduction

One of the requirements for the successful performance of organizations in today's competitive world is to have innovation and create a competitive advantage. One of the new models for innovation is the open innovation model<sup>1</sup>. The main goal of this research is to know the dimensions and components of open innovation and its impact on creating a competitive advantage of electronic services. In the current market economy, financial services and services must be dynamic, customer-oriented, accessible and compatible with the mobile lifestyle of consumers and merchants [2, 5, 30]. Today, financial services such as credit cards, money transfer equipment, and bill payment are provided by many retail stores, mobile operators, and some credit companies [10]. This issue increases the competition for providers.

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Financial services will be. In this way, the banking sector should try to ensure the satisfaction of consumers with unique services [20, 27]. Internet and mobile banking will reduce operational costs, competitive advantage and meet customer needs with differentiated value [8, 17]. The implementation and initiation of electronic banking are necessary to meet the operational, financial and behavioral needs of both service providers, for example, banks and service users [37]. In addition, customers should not be limited by hours and access. Be customer service advisors to complete daily banking tasks. With increasing concerns about high quality, low-cost, and reliable services in the regional and global economy, the importance of service innovation has increased beyond service industries and research organizations, as product service development has become a bottleneck. Efficient and high-quality services are important not only for the customer, but also for the product service providers. The service development process is important for innovative services, i.e. when designing a new service or adding value to an existing service offering. In the early stages of service development, where the interests and needs of various stakeholders are considered, there may be several challenges, such as considering the customer's perspective to engineer service agents and perform the task of supporting the maximization of business profits and Work. Hence, it is imperative to combine the needs for customer care and business perspectives and convert them into design requirements. In addition, even when service design requirements are established, there is a gap between service specifications and services provided [44]. Competitive advantage refers to the organization's ability to perform superiorly in relation to the industry in which it operates. Benefiting from superior performance means providing higher value to customers. Customers want goods and services that are better and at the same time cheaper. In the research literature, we know these two forms of value based on the three form of competitive advantage: 1- differentiation and 2- low cost 3- concentration. Leadership and being a leader in a competitive advantage is one of the prerequisites for success. According to Mr. Gersner, CEO of IBM, "the first producer is the best producer". In an established industry, each of the main competitors consider and maintain a special competitive advantage for themselves (differentiation 3) in order to take a share of the market and if they have proper name and logo management 4 and marketing, their market They stabilize. Quality, price, security and marketing are examples of these advantages. For example, in the automobile industry, Volvo emphasizes security, Benz emphasizes luxury and formality, American companies emphasize comfort, and Korean company Daewoo emphasizes cheapness and each has taken over a part of the market [41]. On the other hand, in researches related to competitive advantage, the dimensions considered for gaining competitive advantage have been mentioned, but it should be determined, based on what criteria banks in the banking industry can compete with their competitors in electronic banking. On the other hand, the nature of this competition and its principles can be much different than what bank managers imagine, and competitive patterns can originate from each of the dimensions and viewpoints examined. Considering that gaining a competitive advantage has been seen in the development of tools and equipment, it should be stated that a bank can be a pioneer in the banking industry by focusing on areas that are based on the needs and demands of customers and only on development the tools are not centralized. The commercial point of view, the globalization of trade, along with the decrease in the effectiveness of offline marketing, has prompted organizations and banks to change their plans in the direction of Internet marketing. Therefore, customers have become increasingly in favor of online transactions. As a result, customer participation will lead to the development of electronic services and, as a result, increased customer satisfaction, increased profitability, and customer loyalty, differentiation of electronic services and competitive advantages of the Bank of Agriculture. The innovative development of electronic services can also make it easier for customers to access the services they need and beyond. Failure to use customer participation will reduce customer satisfaction, decrease profitability, and lag behind in the competition from other banks (considering that caring customers know better than anyone what the weaknesses of the bank's services are) And if we do not consider the customers' point of view in the banking services, we have not used this capacity of the customers enough.) Failure to use the bank's competitive advantages can cause us to fall behind the competitors, the bank's profitability will decrease, and the customers will tend to the competitors. And also customers turning to the internet and virtual space means that if the Bank of Agriculture cannot attract and retain customers in this environment by using customer engagement tools, competitive advantages and third generation marketing tools, other competitors will do this. Will give There are several other service channels for the financial sector, such as traditional answering services, internet banking, telephone banking, and ATMs [31]. Considering that the banking system, like other industries, is always facing the challenges of innovation in products and services, and all industries are seeking to take advantage of innovation in their technology to develop their products and services, electronic banking relying on countless technological capacities. It is one of the effective ways to provide new banking services and products. Multiple and rapid developments in the payment system, using the most up-to-date technologies in the field of information technology such as RFID, NFC and... They redefine and present their base, and these tools provide value and competitive advantage for customers, and their creation and development are in accordance with the current and future needs and demands of the customer. According to their importance and position with the banks, customers can provide special competitive advantages. Considering that banks consider customers as their main partners, they use their opinions and suggestions as useful competitive advantages. Therefore, according to the rapid changes in the world of communication and information, the needs and

demands of customers on the one hand, and the efforts of monetary and financial institutions to increase profitability and increase the market and customer share, on the other hand, it has become mandatory to provide online, easy and low-cost services. Although monetary and financial institutions try to create and apply new competitive advantages, this success will not be achieved unless the customer is at the top of decision-making and feels satisfied. If the customer is able to be a partner with the bank can be effective in providing competitive advantages and service innovations. The scope of banking activities can include all levels of branch services, card readers, bank websites, bank electronic banking, and job and organizational duties of bank employees, regional, national and international. If the employees of a bank are not up-to-date in terms of scientific, practical, banking and customer-oriented methods and do not have the necessary knowledge, it will cause the bank to be unprofitable, lagging behind competitors and not meeting the needs of customers, lack of innovation and creativity, and lack of progress in electronic banking. , lagging behind the global banking world, the inability to use internet marketing, as well as the decrease of customers of that bank, and as a result, that bank will be closed.

## 2 Theoretical foundations and research background

### 2.1 Open innovation and electronic banking services

Most industries have been affected in different ways by e-commerce and the banking industry. In the midst of these technological changes, it is obvious that banks and other financial institutions in developed markets have undergone these changes [18]. During the last three decades, the expansion of information and communication technology has created new developments in the financial industry [26]. From the consumer's point of view, these new technologies provide new multi-channel modes with electronic intermediaries to analyze and make decisions about financial management [26]. Internet banking, as a financial innovation and intermediary tool, has increased significantly over the past decades, and in 2010, approximately 36% of households and 82% of companies in the European Union used Internet banking services. This shows a significant increase in the use of internet banking services. If these proportions in 2004, only 16% of households and 66% of companies have used Internet services. The main reason for the growth of internet banking services is that it can lead to lower costs and increased profits of banks. While in addition to increasing the wealth of customers, it causes ease and speed in doing things. Oni and Esaz [36] showed that e-banking services as a distribution channel allow banks to easily open accounts, transfer funds online, and this online function at any time. It is associated with low costs compared to traditional banking, which leads to more efficient banks. In today's competitive environment, internet banking services provide an efficient and reliable online framework for optimizing relationships between companies. Whereas in the past, companies had to go to bank branches or through the bank's management, provide the basis for doing the transaction. Today, the Internet has created online communication between companies and banks, which has led to the management of cash flow, receipts and payments of claims [7]. Internet banking allows customers to carry out financial transactions (such as transferring funds, making payments make calculations) through the Internet, at different times and places. It seems that banks allocate the most motivation for Internet banking channels in the logistics system of financial resources [3].

In line with innovation in Internet banking services, in the literature of financial innovation, there is a wide range of theories presented by different experts. These theories include: Schumpeter's innovation theory, financial innovation theory due to constraints, law innovation theory, transaction cost innovation theory, and allocation innovation theory [6]:

**Schumpeter's innovation theory:** Schumpeter [26] believes that entrepreneurs can be independent inventors with research and development engineers in large companies whose innovation creates new profitable opportunities that expand the flow of income and on the one hand cause invention and innovation and On the other hand, it causes entrepreneurship.

**Theory of financial innovation due to constraint:** American economist, Silber [42] proposed the theory of financial innovation due to constraint. This theory refers to the maximization of profit of financial institutions due to financial innovation, that there are limitations in the process of pursuing and maximizing profit in an organization (including external causes such as policies, internal causes such as organizational management and leadership style).

**Laws Innovation Theory:** Asila et al. [4] developed this innovation theory from an economic perspective. This theory suggests that financial innovation is closely related to social regulation, and this change of regulation has a significant influence and has a reciprocal relationship with economic regulation. This theory has expanded the scope of financial innovation and is considered as the origin of financial innovation.

**Transaction cost innovation theory:** Hicks [21] presented this theory. They stated that the dominant factor for the development of financial innovation is the reduction of transaction costs, and in fact, financial innovation is the

response to technological progress that reduces transaction costs, and the reduction of transaction costs can bring financial innovation and improve financial services.

Allocation Innovation Theory: Desai and Lu [14] presented this theory, which represents a method that can lead to the integration of financial markets. According to the theory of allocative innovation, microscopic financial innovation models have been developed. According to Longizou (2007), financial innovation can be as new products (eg, mortgage loans, adjustable rates, index mutual funds), new services (eg, online trading, internet banking), new production processes (eg, electronic records). Securities, credit score), or new organizational forms (for example, a new type of electronic securities exchange, internet banks), considered [6].

Financial innovations are at the center of the debate about how future global financial systems will be shaped. Before the financial crisis of 2007-2009, the prevailing view was that financial innovation was good for the financial system. The experience of the crisis has led to a re-evaluation of this view. Many policymakers currently argue that the use of financial innovations should be limited or banned. There are general concerns about financial innovation, which, while a useful tool in normal economic conditions, amplifies shocks in times of crisis. This concern is justified and depends on why and how financial innovation is applied in financial systems. For example, innovation in financial institutions' systems has improved risk measurement and risk control, which may protect the system against negative shocks. However, financial innovation can also encourage financial risk-taking in institutions, it depends on the level of access to financial innovation and create more vulnerability in times of crisis [34].

The purely internal view of innovation has increasingly declined, as recent literature has highlighted the merits of acquiring external knowledge and moved away from internal R&D to acquire innovation. To cope with the increasing complexity of innovation, research collaboration provides access to resources, which companies cannot produce internally. It allows companies to develop valuable knowledge assets through joint efforts with business partners. Therefore, the role of learning from external sources as a key resource, to obtain new valuable ideas, for the innovative process, has attracted a lot of attention [13].

It introduces "open innovation" as part of an emerging consolidation regime that includes new organizational-level strategies, new forms of corporate networks, and a capital-labor relationship. Open innovation is generally different from a new approach to innovation: innovation through external knowledge [15].

Open innovation (OI) has emerged as a popular concept among scientists and practitioners. "Open innovation is a paradigm that assumes that firms can use external ideas as well as internal ideas and internal and external routes to market as firms seek to advance their technology [22]."

In an environment that is considered increasingly competitive and innovative, the perspective of partnership and cooperation in the field of innovation has disappeared. In particular, in innovation management, the phenomenon of open innovation is increasingly being paid attention to. This is a research field that is undergoing rapid development, which can be proven by the increasing number of scientific publications and special issues in journals; However, OI research has only just begun. Furthermore, research on open innovation is complex. OI has many aspects and is a multi-level phenomenon, and major gaps arise on how to integrate such innovations. It brings different fields and different levels of analysis and calls for more efforts. It is for theory development. Furthermore, OI is an inherently dynamic process and therefore, research needs to incorporate dynamic elements. On the one hand, identifying key variables and factors affecting open innovation is still a research challenge. Openness to innovation can include several attributes, such as risk, feedback, transactions and contributions, governance, partners, and training. In addition, it is important to understand the structures and processes that open innovation at the organizational level, knowledge management strategies as well as the human side. On the other hand, understanding key aspects is not enough. It is also important to understand the concepts of open innovation in performance and distinct levels of analysis, such as organizational performance, innovation performance and OI efficiency. The impact of open innovation on innovation performance and organizational performance is still a controversial issue, and the concept of its efficiency is new in the literature. It is difficult to measure the impact of innovation openness on internal innovation and economic actions [32].

Open innovation and competitive advantage Survival is the goal of every organization. Based on a perspective based on resource limitations, increasing competition is one of the strategies for organizational sustainability. Organizational sustainability may be a source of opportunity for companies that becomes a factor for competitive performance [16]. Considering the importance of innovation in business, most companies are in the initial stages of the innovation process. Innovation helps companies stand out from their competitors. There is an argument that companies that destroy the process of creativity and innovation in the organization, reduce the probability of their survival. If business owners believe in the development of their activities, they should use the necessary investments to develop their activities, and in the meantime, there is a relationship between innovation and the possibility of exit (bankruptcy) [40].

Today, many researchers believe that the psychological capital of organizations can provide them with a sustainable competitive advantage. On the other hand, the presence and continuity of organizations in today's global markets is the development and application of new ideas and their practical application in the market. One of the new paradigms of innovation in the organization that leads to the competitiveness of companies is the paradigm of open innovation. In this paradigm, there can be constructive interaction with outside organizations, including competitors, at all stages of the innovation process [23].

Since competitive advantage is the main indicator of strategic research and most organizational researchers have considered it equivalent to organizational performance in order to operationalize this concept [31]. Competitive advantage helps to create and maintain companies over time and can be considered as the core of success or failure of companies compared to competitors. Competitive advantage is a unique advantage that helps companies to achieve higher efficiency in an industry. Achieving a competitive advantage leads to the competitive dynamics of companies [28].

Competitive advantage is a set of unique capabilities of an economic unit that allows it to penetrate the desired markets and provide superiority over its competitors. To define the competitive advantage of an economic unit, the management should make a complete assessment of the internal and external environment of the unit. When a manager can find a strength within his economic enterprise that is compatible with market needs and creates a relative advantage in the market, it can be said that he has achieved a competitive advantage [45]. It should be noted that companies can have a competitive advantage over their competitors in terms of technology, management and marketing. Having a competitive advantage for an economic enterprise is not a necessary condition; but this feature makes it possible for the company to follow its own economic path and limit the possibility of imitating competitors. In this case, it will gain a better position in the market. If other competitors do not have a specific competitive advantage to deal with, their survival in the field of competition will be uncertain. Based on the competitive advantage model, a competitive strategy carries out offensive or defensive measures in order to create a suitable position in the industry so that it can succeed in the competition of its business environment and thus increase the return of its capital faster and the rate of return. Herr, (2015). Competitive advantage can be assessed by analyzing sources of advantage such as market position, company resources, or evaluating competitive results and efforts, through market share performance or stability. While competition in companies tends to create profitability, companies can achieve high profitability through maintaining a sustainable competitive advantage [33].

In line with electronic banking, open innovation and competitive advantage, Juchim et al. [17] in examining incentives and measuring the performance of open innovation methods, found that independence and individual motivation are facilitators of internal and external networks for open innovation activities. Or, in addition to individual motivation, the mobilization of resources and collective efforts will lead to the successful implementation of innovation processes. Also, company strategies are a direct factor for people's enthusiasm for collective efforts. Chen et al. [9] in the study of service innovation in the Malaysian banking industry towards a sustainable competitive advantage through environmental and social practices showed that the bank is moving towards a sustainable competitive advantage through environmentally and socially responsible business practices. River the findings of this article have a role in the strategic planning of banking institutions with the aim of optimizing the allocation of resources to ensure sustainable growth. Chen et al. [9] in the study of achieving a sustainable competitive advantage in China's smart grid industry by using suitable mediators of open innovation showed that the integration of different technologies and intermittent changes in power supply and demand through the smart grid system to it is increasingly possible. Innovations in technologies and systems such as smart meters, energy control and communication systems are needed for the scaling and industrialization of smart grids, while Chinese companies still have a lot of room for improvement. This has stimulated questions about the role of innovation intermediaries, whose task is to engage with different types of partners to obtain new ideas and resources from the external environment. With the help of open innovation, Chinese companies in the smart grid industry can achieve a lot in the development of renewable energy and energy conservation. The present study examines this issue and tries to find suitable open innovations from various open innovation activities in China's smart grid. Chiu and Yang [11] in the study of competitive advantage and mutual effects At the same time, between the adoption of information technology and service innovation with the moderating effects of environmental factors, they showed that service innovation has a positive effect on competitive advantage. But the adoption of information technology has a negative effect on competitive advantage. A high level of environmental factors most likely increases the positive effect of service innovation on competitive advantage, but also most likely reduces the negative effect of information technology adoption on competitive advantage.

Bagherinejad and Javed [24] in presenting the model of open innovation in Iran's banking industry in Parsian Bank, a conceptual model of open innovation in the banking industry including three major structures such as internal factors (technological resources, the ability to absorb ideas), external factors (knowledge resources external, technological

changes) and relational factors (trust) were presented. Herandi [39] in the study of the impact of competitive advantages in order to attract customers in the banking system showed that the ability to learn the market, the power of organizational innovation the most and the factor of sustainable competitive advantage and marketing ability have the least impact on the competitive advantage of the banking system in Aims to attract and retain customers. In examining an innovative look at electronic banking and explaining the role of relational marketing strategies in relation to customers, the research results show a significant positive effect of structural link on communication satisfaction and communication satisfaction on communication commitment. Also, there is a strong and significant effect of communication commitment on the duration of communication, depth and breadth of communication, which shows the effective role of creating communication commitment on the performance of communication with the customer. In short, it can be said that in this study, the social and structural link has a significant effect on the length and depth of the link, Nazari et al. It depends not only on the development of tools and channels for providing electronic services, but the development of tools is a part of this process and other factors also play a fundamental role in this process. Therefore, the simultaneous development of soft dimensions and hard dimensions of the model can improve the synergy of the model components.

### 3 Research methodology

Considering that the scope of this research is to provide a model of the impact of open innovation on the competitive advantage of electronic services in the banking system, experts from university professors and managers and employees with at least ten years of work experience in Shiraz Agricultural Bank and the executive branch have been conducted. From the point of view of the goal, it is exploratory for the following reasons: 1- no research has been done in the country on the topic of developing auditors' warning (disclosure) model, with the method of this research (foundation data theorizing); 2- The results of this research lead to the presentation of a model; 3- The findings of this research develop the existing knowledge in the field of friendship-oriented leadership. This research, from the perspective of the implementation process (type of data), is qualitative; Because in this research method, the first part (data) is collected from various sources such as interview, library study and participation, and in this research, data is also collected through interview. Also, in the qualitative research method, the second part includes analytical and interpretive methods that are used to reach findings or theories. These methods include methods of conceptualizing data, which is called "coding". In this research, open, central and selective coding methods have been used. The third part of the qualitative research method consists of written reports or drawing graphs and figures or oral presentation, which in this research, the graphical method was used. Also, this research is inductive from the point of view of implementation logic (or type of reasoning); because in this research, the interviewees provide their explanations regarding the results of the phenomena according to their experiences. The meaning of the inductiveness of the foundation data theory is that in this method, the hypothesis is not tested, but the compiled theory is developed and produced as a result of the simultaneous collection and analysis of data [35].

As mentioned, this research is a qualitative type of research and data analysis was used to conduct it. This method allows the researcher to develop a new theory instead of using predefined theories in cases where it is not possible to develop a hypothesis or there is no theoretical coherence in relation to the subject under investigation. The new theory, not based on the researcher's personal opinion, is actually formulated based on the data collected from the real environment and in real conditions. For this purpose, relying on the contextual theory method and the (emerging) approach (Glaser [19], in the first step, through interviews with university professors, specialists and experts, discussions related to the impact model of open innovation on the competitive advantage of electronic services were tried to be specified and categorized in the banking system. For this purpose, the theoretical sampling method (snowball) was used, and the act of sampling and conducting interviews continued until the concepts and categories were saturated.

Therefore, due to the importance of the topic, it was necessary to interview experts who, while having multiple specialties, are fully familiar with the theoretical foundations of student friendship-oriented leadership and are themselves experts in the field of friendship-oriented leadership. Therefore, in the current research, people who previously or currently, while having experience in their work, were also specialized in other fields and were employed (such as experts who were or are working in the field of organizational leadership), were included in the statistical population. Which include: university faculty members, members working in the branches of Shiraz Agricultural Bank, members working in the university. Some sample people were decisionmakers in their field, and the interview started with them; then, with the progress of the research and the collection and analysis of data, an interview was conducted with other experts of the branches of Agricultural Bank of Shiraz to better understand the concepts and categories. Thus, in 1400, an interview was conducted with 10 interviewees.

In practice, after conducting each interview, the text of the interview is analyzed in detail to infer and extract concepts from each sentence. After that, the next interview was conducted. In this way, this process continued until the research reached the theoretical saturation stage. Theoretical saturation means that recent interviews do not result in any new data and are all repetitions of previous data [43]. Therefore, from the sixth interview onwards, there was no new data in the conducted interviews, and in the tenth interview, a reasonable assurance of theoretical saturation was achieved. It is worth mentioning that most of the interviewees had more than 10 years of professional experience in their field of work, and the people had a doctorate degree or were studying for a doctorate degree. The average time of each interview with each expert was about 70 minutes.

Grounded theory is a systematic and qualitative method to create a theory that can be explained on a broad level, the action or interaction of a subject with a specific identity. According to Strauss and Corbin, the context-based theory is a theory that is directly extracted from the data that has been regularly collected and analyzed during the research. In this method, data collection, analysis and final theory are closely related. Although each of the different research events place different importance on data interpretation, data interpretation is at the heart of qualitative research. In the context-based method, data interpretation plays a central role in the research process. The most important reasons for choosing this method are as follows: When there are almost few known samples about the field under study; When the researcher understands the perceptions and experiences of the participants in a particular sample;

When researchers are interested in challenging existing theories; When there is no underlying theory to explain the fit of specific psychological constructs with the investigated behaviors;

When the goal of the researcher is to develop a new theory.

The implementation of grounded theory is generally carried out in two basic steps as follows: The first step - data collection: the primary data of this research was collected from the source of unstructured interviews with experts and with an exploratory approach using the general questions raised above.

Second step - text coding and theorizing: The data coding process includes three levels: open coding, central coding and selective coding, which are explained below:

Open Coding: During open coding, the data is broken down into individual parts and examined to obtain similarities and differences. Then these "concepts" are classified based on their similarities, which is called "categorization" and "category" is a concept that is more abstract than other concepts and the foundation of the theory is formed from them. In short, the result of open coding is a set of conceptual categories created from the data.

- Axial coding: In axial coding, internal connections are established between the basic categories that are expanded in open coding, at the level of features and dimensions. At the end of this stage, categories are divided into causal conditions, intervening conditions, contextual conditions, strategies and consequences. The main topic in this research is creating a suitable attitude for friendship-oriented leadership. In this method, Maxqda software is used for qualitative data analysis and theorizing.

$$h_t = \alpha_0 + \sum \alpha_t \varepsilon_{t-i}^2 + \sum \beta_t^{h_{2t-i}} \tag{3.1}$$

$$i_t = (i_{t-1}, X_t, \sigma_t) + u_t \tag{3.2}$$

$$\text{LogINV} = \alpha + \beta_0 \text{INV}_{t-1} + \beta_1 \text{LogGDP}_t + \beta_2 \text{LogRL}_t + \beta_3 \sigma \text{GI}_t + \beta_4 \sigma \text{CPI}_t + \beta_5 \sigma \text{OIL}_t + \beta_6 \sigma \text{EXCH}_t + u_t \tag{3.3}$$

$$\text{FDt} = c_0 + c_1 Yt + c_2 \text{Invt} + c_3 \text{Inf}t + c_4 \text{EPU}t + c_5 \text{Trt} + et \tag{3.4}$$

$$\phi(L, P)_{y_t} = \sum_{i=1}^k (L, q_i) X_{it} + CW_t + U_t. \tag{3.5}$$

## 4 Research findings

In the foundational data theory, the analysis method is such that each part of the data is analyzed in parallel immediately after the collection of that part. Then, the researcher receives guidelines from the primary data analysis to access the subsequent data. These guidelines can be obtained from undeveloped categories, information gaps, or people who have sufficient insight into the phenomenon. After obtaining these guidelines, the researcher enters the research environment to collect other data. This process of data collection and analysis continues until the researcher reaches the saturation of classes [12]. In the foundational data theory, analysis consists of three types of coding, which are:

## 4.1 Open coding

In open coding, meaningful units of data are first labeled using a conceptual name, and then, using more abstract names, the obtained concepts are categorized, and the names of these categories are called categories. In the next step, by analyzing the data, the characteristics and dimensions of the obtained categories are cultivated. Of course, these steps are not linear and usually take place simultaneously and with a lot of interference. At this stage, the researcher tries to recognize the hidden concepts in the interviews by reviewing the collected data. This stage of coding is called open coding, because the researcher names the concepts with an open mind and does not set any limits for determining the codes. The goal of open coding is to break down the collected qualitative data set into the smallest possible conceptual components. The result of open coding is a set of conceptual categories created from the data. It was observed that 76 open codes were identified among 299 parts of the interviews.

## 4.2 Axial coding

In axial coding, the foundational data theorist selects a category of the open coding stage and places it in the center of the process being investigated (as the central phenomenon) and then relates other categories to it. These other categories are: "causal conditions", "strategies", "contextual and intervening conditions" and "consequences". This step includes drawing a diagram called "coding model". In this template, there are six boxes (or categories) of information:

- Causal conditions: categories related to the conditions that affect the central category.
- Context: special conditions that affect strategies.
- Core category: a mental form of a phenomenon that is the basis of the process.
- Intervening conditions: general background conditions that affect strategies.
- Strategies: specific actions or interactions that result from the central phenomenon.
- Consequences: Outputs from employing strategies.

In the axial coding stage, explaining and logically expressing the categories is vital. This is done through the storyline. The story line is a detailed and detailed explanation of the major categories with reference to notes, summaries, citing the quotes of the people under study [1].

In the results of axial coding, 76 primary codes are grouped in 11 categories. The categories include banking marketing, electronic banking, market research, and human aspects of innovation, banking performance, organizational factors, banking technology, banking users and customers, external environment. The bank has been a competitive advantage of the bank and service innovation. The category of organizational factors ranks first with 95 code repetitions, electronic banking ranks second with 56 codes, and the bank's external environment ranks third with 27 codes. Out of the total number of 10 interviewees, 10 people, equivalent to 100%, mentioned the category of organizational factors. Therefore, the category of organizational factors has been prioritized in the number of repetitions of codes and also in terms of generality and comprehensiveness among the respondents, which shows the importance of this category. The competitive advantage category of the bank was also mentioned by 3 of the interviewees, equal to 30%, which has the lowest frequency percentage.

The central category is the main phenomenon of this research, i.e. the leadership of electronic banking, which is the basis and axis of the process to which all other main categories are related, and according to the findings of the research, the factors influencing this phenomenon and strategies can be identified. Came from it and then he spoke about the consequences and results of these strategies Causal conditions include cases of categories that directly

Table 1: Core category

Category type	Category	Open source
The central category	Electronic banking	Online transactions, non-transactional activity, management of financial institutions, information, facilitation of money circulation, dual banking, financial management support, electronic branches, providing internet services, online transaction, communication

affect the central phenomenon or are the creators and developers of this phenomenon, which can often be found by



Table 2: Causal category

Category type	Category	Open source
Ali's condition	Banking marketing	Customer relationship management, brand innovation, marketing

Table 3: Background conditions

Category type	Category	Open source
Background conditions	Human aspects of innovation	Organizational leadership, people's attitude, manager's orientation, management support, individual skill
	Organizational factors	Organizational intelligence, trust, implementation of new ideas, organizational training, organizational regulations, organizational consulting, motivation, business model, organizational image, research and development, commercialization, performance monitoring and evaluation, internal organizational resources, organizational culture, organizational structure, communication Environment, knowledge management, organizational creativity, organizational change, appropriate and creative organizational force, organizational strategy

regularly looking at the data and reviewing the events, and show the obtained results. Bank marketing can be a causal condition.

Strategies are the actions that are presented in response to the central category or phenomenon, chosen in a purposeful way and by using them, the central phenomenon can be implemented. The strategies that should be considered, it is very important that the interviewees of this research pointed to banking users and customers, banking technology, service innovation, and market search more than others.

Table 4: Category of strategies

Category type	Category	Open source
Strategies	Bank users and customers	Trust, ease of use, user support
	Banking technology	Banking technology trends, privacy protection, diverse application, technology capabilities and functions, social networks, technology legitimacy and security
	Service innovation	Innovation strategy, continuous innovation, value creation, diverse services, multiple service delivery channels
	Market search	Market research team, market segmentation, understanding the market environment, identifying the target market, monitoring the customer's taste and needs

Intervening conditions, which adjust the causal conditions and affect the strategies, during the conducted interviews, the vast majority pointed to the organizational environment, external factors, which shows how these factors facilitate the implementation of the adopted strategies.

Consequences and results come from the adoption of strategies that, in a successful state, will lead to the realization

Table 5: Intervention category

Category type	Category	Open source
Intervening conditions	The external environment of the bank	Shareholders and stakeholders, society culture, intensification of global competition, Internet service providers, legal and environmental pressure, interbank cooperation

of the central category. As a result, the interviewees of this research have pointed out the bank's competitive advantage and banking performance. they do.

Table 6: Consequences category

Category type	Category	Open source
Consequences	Competitive advantage of the bank	Increasing and maintaining market share, competition in attracting resources, development of banks
	Banking performance	Risk, increasing profit, facilitating payment, increasing productivity, increasing revenue, attracting large customers, customer satisfaction, cost reduction

### 4.3 Selective coding

In selective coding based on the model of the previous stage, propositions or explanations are provided that connect the model classes to each other or form a story that connects the model classes to each other. In the advanced mode, the researcher finishes the work by presenting the situation matrix [38]. In the field of foundational data theory, it should be noted that the review of the background is neither indicative of major concepts nor presenting hypotheses. Rather, the review of the background indicates the existence of a gap or a kind of bias in the existing knowledge and thus provides a rationale for the study [38]. For this reason, it is recommended that the researcher put aside his ideas and thoughts as much as possible [38]. Background review has the benefit of providing references to the background while presenting data to provide external support for the theoretical model [38]. Selective coding is the process of theory integration and refinement [43]. At the end, in the selective coding stage, according to the results of the previous coding steps, the main category was selected and connected to other categories in an orderly manner, the connections were validated and the categories that needed further refinement and development, they improved. It should be noted that the above steps are done in a round trip process. Therefore, the steps of selective coding are not clearly separated from each other, and it is done through an interactive process, along with open and axial coding. The experts received the paradigm model and its development process via email. The experts were asked to give their opinions about the process of developing the model and the final model, most of them approved the model, and some of them had corrections, which were applied in a round-trip process, and the final expert opinion was taken. . To integrate and present the friendship-oriented leadership model, using the foundation's data theory, after identifying the central category and relating other categories in the form of a systematic paradigm of foundation's data theorization, to refine the designed model and cultivate the main factors of action and model the final result of the research was obtained as follows (Figure 1).

## 5 Validation of foundation data theory

Although some qualitative researchers consider the discussion about the reliability and validity of data and research results to be traditionally related to quantitative research [25], but the fact is that in qualitative research, the validity and reliability of data are also And findings are an important part of the research process [29]. Things like the sensitivity of the researcher, the integrity of the methodology, the appropriateness of the sample, the simultaneous collection and analysis of data, ensure the scientific accuracy of qualitative research to a great extent. In the current research, two methods of review of participants and review of non-participating experts in the research (4 members of

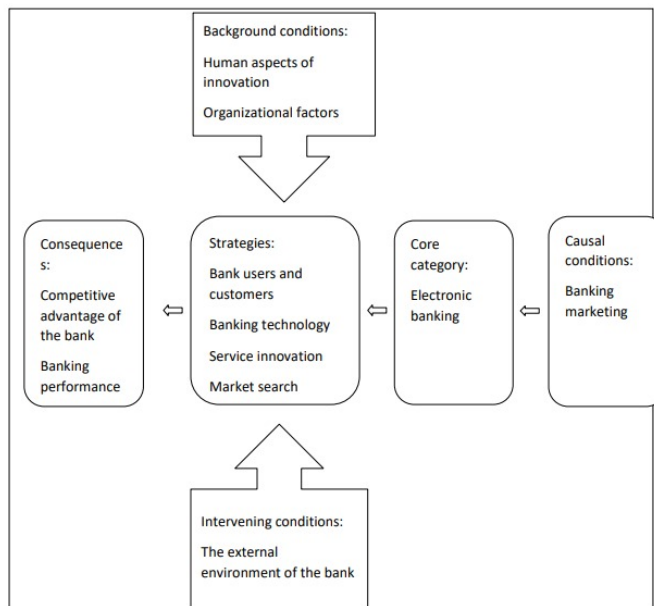


Figure 1: Paradigm model of the impact of open innovation on the competitive advantage of electronic services in the banking system.

the university faculty and one finance PhD student) were used and after receiving correction comments and consultation with supervisors and advisors, the necessary editing was done and the model The final was presented.

Kappa index has been used to measure the reliability of the designed model. In this way, another person (one of the elites of this field) has classified the codes into concepts without knowing how to integrate the codes and concepts created by the researcher. Then the concepts provided by the researcher have been compared with the concepts provided by this person. Finally, according to the number of similar concepts and different concepts, the Kappa index has been calculated. As can be seen in Table 7, the researcher has created 11 concepts and another person has created 9 concepts, out of which 8 concepts are common. As can be seen, the value of the Kappa index was calculated as

Table 7: The status of converting codes into concepts by the researcher and another person

Researcher's opinion				Yes	Another person's opinion
Total	no	yes	n0		
9	B=1	A=8	n0	Yes	Total
3	D=0	C=3	11		
12	1	11	11		

0.662, which according to Table 8 is at the level of valid agreement.

## 6 Conclusion

In this research, in order to investigate the variables of the model of the impact of open innovation on the competitive advantage of electronic services, based on interviews with research experts, related models and variables have been identified. Finally, based on the identified final criteria, the model derived from the foundation's data analysis method is presented. The results of the open coding of the qualitative data collected using the interview tool show that 76 open codes have been identified out of 299 parts of the interviews. 76 primary codes are categorized in the form of 11 categories of bank marketing, electronic banking, and market research, human aspects of innovation, bank performance, organizational factors, bank technology, bank users and customers, bank's external environment, bank's competitive advantage, service innovation.

Table 8: Kappa index status

The numerical value of the Kappa index	Agreement status
Less than zero	weak
Between 0 and 0.2	unimportant
Between 0.21 and 0.4	medium
Between 0.41 and 0.6	Appropriate
Between 0.61 and 0.8	a valid
Between 0.81 and 1	Excellent

Most industries have been affected in different ways by e-commerce and the banking industry. In the midst of these technological changes, it is obvious that banks and other financial institutions in developed markets have undergone these changes [18]. The banking and financial industry is changing in an unbelievable way. This industry has made itself powerful by using the advances of information technology. In a general view, modern electronic payment tools can be seen as a subset of electronic business, which is the powerhouse of information technology. The establishment of electronic commerce requires appropriate economic, technical, telecommunication, legal, human and cultural platforms. Electronic banking and, as a result, electronic money and its tools as one of the most important platforms in the field of electronic commerce, by facilitating the electronic payment and transfer of funds for online transactions, can be the basis for the growth and development of electronic commerce. As a result, expanding the use of electronic money will bring significant economic, political, commercial and social effects. Increasing the speed of funds transfer and access to cash at any hour of the day and night is one of the prominent features of electronic payment systems. that without the electronic transfer of funds, electronic commerce will not be fully realized and objective, therefore, in order to increase the speed of operations, banks and financial institutions can equip themselves and their branches with communication methods and interactions between themselves in terms of technology and methods of operation. And transform the customers and provide the means to attract more customers. Because communicating with current customers is easier and more beneficial than searching for new customers. Knowing the views and expectations of customers and factors affecting performance improvement will help the bank to know how to communicate with customers. to review and pay more attention to its performance and improve it, customers will respond appropriately to a bank that pays attention to the needs and expectations of the customer, and any bank that can have more information about its customers and If he forms his structure based on that, he will be the winner in the competition scene. Therefore, it is suggested that the bank should consider the use of electronic tools as the main, important in the organization in order to provide services to customers, focusing on customer satisfaction and evaluating customer satisfaction indicators and ways to improve and develop it. In line with the obtained results, it is suggested:

Developing a program in order to continuously and regularly collect information related to competitors' abilities, weaknesses and strengths, as well as competitive strategies and competitors' actions to compete with rival banks.

Considering that receiving information from the external environment is effective on the competitive position of productive banks, and since information is the main factor in gaining power, productive banks should try to collect and systematically use this information by using information technologies. To increase their competitive intelligence. Managers' attention to transparency and responsiveness and establishing proper communication with customers.

Holding training courses for employees in order to pay attention to customer behavior, understand their needs and values, and use modern market research techniques to obtain new information from customers.

Banks should develop their communication by participating in trade fairs, creating updated websites, and obtaining industry reports from various sources. Creation and development of the market research team in order to identify the current and future trends of our markets.

Today, banks with superior performance in various industries are moving towards keeping customers and gaining their loyalty, because most markets are in their maturity stage, competition is increasing and the costs of attracting new customers have also increased greatly. Keeping the customer and gaining their loyalty is considered vital for the continuation of the business. In this regard, it is necessary to provide a network of exchange of opinions with customers and continuous evaluation of people's opinions regarding their level of satisfaction with the quality of services, and try to use the critical and constructive opinions of bank customers.

The essence and nature of social networks is nothing separate from the real human world, which through technologies and software facilities makes people communicate faster and more easily, and like society and the real world, it may be accompanied by challenges, problems and good things. And it is the art and ability of specialists, managers

and decision-makers to use these useful platforms in line with the goals of the business. Therefore, it is necessary for the managers of internet transportation businesses to provide the necessary platforms and infrastructures for the development of the use of social networks.

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