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RESEARCH ARTICLE **Open Access**

A Digital Transformation Approach to Authenticate Original Products for Foreign Markets

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Abstract
This study presents a novel business model designed to explore the impact of digitalization on product authentication, a field gaining increasing relevance in today's digital economy. Leveraging Near-Field Communication (NFC) technology, the proposed model aims to support the international expansion of original products by establishing a secure product authentication database. Given NFC's widespread adoption for authenticity verification and market development, this research offers a pioneering framework for applying such technology to authenticate Iranian products—particularly in sectors like handicrafts and apparel, which possess strong export potential yet remain underutilized by local industry stakeholders. Beyond authentication, the model enables robust market intelligence gathering, especially in foreign markets where consumer insights are often fragmented. The study employs Osterwalder's business model framework to construct a comprehensive business model canvas, detailing key components such as value propositions, customer segments, and revenue streams. Two distinct service revenue strategies are proposed: a "pay-per-tap" model and a tiered annual subscription plan (Bronze, Silver, and Gold), each tailored to varying levels of service engagement and market needs.

Keywords: *Digital Transformation, Business Model, NFC Technology, Foreign Market Development, Original Products, Product Authentication*

Introduction

Developments in digital technologies have profoundly impacted the business world and its operations. The advent of Industry 4.0, coupled with evolving customer demands, has made changes in business processes essential (Alakaş, 2024; Joel et al., 2024; Yaqub & Alsabban, 2023). Digital transformation is the process of integrating digital technology into all areas of a business, fundamentally changing how it operates and delivers value to customers (Bindeeba, Tukamushaba, & Bakashaba, 2025; Sui, Hu, & Wang, 2024).

The highly volatile and uncertain economic environment nowadays makes management decisions complicated and difficult. In this environment, economic actors should be capable of managing multiple distribution channels, complex supply chains, digital transformation, as well as strategic partnership while remaining flexible in reaction to market changes (Naimi-Sadigh, Chaharsooghi, & Mozafari,

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2021; Santarsiero, Carlucci, & Schiuma, 2024).

Business model is one of the most effective tools to help managers easily describe what their business is and how they should run, evaluate, understand and measure, change, as well as simulate it and also to help them turn their intuitive understanding of their business into an objective understanding. The term business model was one of the keywords that came to the fore with the advent of the Internet (Magretta, 2002) to provide a solution to the complexities of business in today's dynamic and highly competitive industry environment. The business model helps managers better understand and define their value proposition, the way to create this value, the way to select partners, the ways to reach the customer, the way to earn revenue, as well as many other business-related issues (Boffa & Maffei, 2024; Osterwalder, Pigneur, Oliveira, & Ferreira, 2011; Rabiei, Hosseini-Motlagh, Haeri, & Minaei Bidgoli, 2021).

As digital technologies continue to evolve, they drive significant changes in business models across industries. Among these technologies, Near-Field Communication (NFC) has gained global traction for various applications, including product authentication. Although NFC has been available in Iran for several years, its potential for verifying product authenticity remains largely untapped. This gap is particularly critical for Iran’s strategic export products—such as carpets, caviar, and saffron—which enjoy strong demand in international markets but are increasingly vulnerable to counterfeiting and fraud.

The lack of robust authentication mechanisms has not only undermined consumer trust but also harmed domestic producers and exporters, while benefiting foreign competitors and unauthorized traders. Iranian officials have identified product fraud as a pressing issue, yet comprehensive technological solutions have yet to be implemented.

This study addresses this gap by proposing a business model that leverages NFC technology to authenticate original Iranian products and support their expansion into global markets. Beyond enhancing consumer confidence, the model offers valuable market intelligence by capturing geolocation data during authentication events. This data can be used to identify demand hotspots and inform strategic decisions for manufacturers aiming to enter or grow in international markets.

The present article is structured in the following manner: In the next section, the business model will be described, then different types of business models and particularly electronic business (e-business) models will be explained. Later on, NFC technology will be analyzed and then various business models of NFC-based authentication services are presented. Finally, conclusions and practical recommendations are offered.

Background

Business Model

The basic concept of business model was initially termed as "dominant logic". Dominant logic is considered as a set of norms and principles that managers should use to properly organize enterprises and projects and to seek and seize opportunities that arise in the market. This approach, which emphasizes rationality in operations, requires the establishment of specific rules for the management of the enterprise and the project

(Prahalad & Bettis, 1986). Following the emergence of dominant logic, it attracted a great deal of attention in business research.

According to experts, the main concept of the business model is defined as follows:

- Business model is based on the logic of creating and maintaining value (Shafer, Smith, & Linder, 2005).
- Business can be defined as the fundamental logic used by the organization while creating value (Cantrell & Linder, 2000).
- Business model is considered as an exploratory logic that combines the potential of technology with the realization of economic value (Chesbrough & Rosenbloom, 2002).
- Business model provides a conceptual tool that includes a set of elements and the relationships between them, which represent the logic of the enterprise operations and the project in a particular area.
- Business model is a method that should be adopted by the enterprise in order to provide value to a specific group of customers (Johnson & Lafley, 2010).
- Business model is an advanced form of enterprise's organizational management model and shows that this model provides a systematic idea of the paths (business activities) needed for the development of the enterprise and the project (Nogalski, 2009).

Therefore, it can be assumed that the business model is generally identified by the logic of operations; that is the path to be taken or the operational method to be performed in the enterprise and the project.

On the other hand, Grabowska (Grabowska, 2015) creates the cores of the concept of business model based on the dominant logic and considers maintaining value, being inside the customer's value range, being successful in a particular set of initiatives and innovations, achieving the profit zone, taking advantage of business opportunities, and specifying a roadmap as improvement and identifies three main research streams for business model conceptualization:

The first stream is a group of concepts that refers to the concept of value chain. In this area, the concepts of the business model focus on how to create and provide value to customers and then on how to turn customer payments into profits. This approach defines the organizational and financial architecture of the enterprise operations and the project. The second group includes concepts that reflect a resource-based approach and refers to the activities and resources needed to provide products and services to end customers. The third group focuses on developing a business along creating and maintaining value (Grabowska, 2015).

However, other studies, such as Afuah's (Afuah, 2004), that take a holistic approach should also be mentioned. Based on these studies, business model is related to the activities or plans and methods and the time of performing these activities while using sufficient resources to create the highest possible value for the customer (considering low or high product costs) and ensuring the position of the enterprise and the project to gain value. This interpretation of the business model leads to an emphasis on two areas that determine the nature of the model: activities and resources as well as value gain. Value creation is one of the most important features of a business model in both dimensions of value for the customer and value for the enterprise and the project (Afuah, 2004).

Different definitions for business model has led to major challenges in defining the nature and components of the model and

determining the key elements of a good business model. It also causes confusion about the definition of this term, which is why terms such as business model, strategy, business concept, revenue model, and economic model are often used interchangeably. In addition, the business model is often referred to as architecture, design, sample, method, hypotheses, and business proposition (Morris, Schindehutte, & Allen, 2005; Naimi-Sadigh, 2024).

In short, business model is a method any enterprise, corporation, or organization adopts to make profit and sustain itself. The business model describes how an organization creates added value for a product/service. In the business model, according to the available resources and the customer's needs, the customer's desired value is proposed and the organization enjoys benefits and income. In other words, the business model describes how the organization earns revenue by positioning itself in the customer's value chain (Corkindale, 2010).

Business model translates the organization's plans and ideas into economic values and shows how an organization earns revenue by determining its position in the value chain and also includes information about entrepreneurship, strategies, economic issues, investments, activities, and marketing. According to Itami and Nishino (Itami & Nishino, 2010), a business model consists of two sections: the business system and the profitability model. Although the second section often leads to more profit, the first one forms the main body of the business model. This section not only acts as a working system, production basis, and service provision, but also is a section the enterprise can rely on to check the operational work as well as suppliers and customers' behaviors and gain new learning. These lessons learned are accumulated and can lead to a significant competitive advantage, and if the activities are not coherent enough, this competitive advantage could be lost. Although the profitability model increases revenue in the short term, the business system generates information in the long run, thus a successful business model should consider both (Itami & Nishino, 2010).

Business models are organizational tools that show the organization's logic for creating and gaining value as well as the organization's approach to innovation. However, enterprises face obstacles and difficulties in designing their right business models. Discovering and exploiting new business models requires high level of experience, learning, as well as different leadership styles that can facilitate the use of these new models by increasing general capabilities and flexibility (Svejenova, Planellas, & Vives, 2010).

Digital transformation Models

Since the stated authentication database can turn into a digital transformation, this section deals with e-business models and its definition. E-business models are web-based methods, concepts, frameworks, or architectures that, while considering enterprises' strategies, help them with determining their market position, value proposition to stakeholders, and maintaining their business (Lam & Harrison-Walker, 2003).

E-business model is a general term referring to business processes run in virtual spaces (or electronic ones such as the World Wide Web) (Heshmatisafa & Seppänen,

2023; Shafiee Nikabadi, 2008). E-business models are descriptions of roles and relationships between customers, consumers, partners, and suppliers and seek to identify key product, information, and money flows as well as to identify main benefits for shareholders and business partners. These models use the Internet to interact and create value for the customer and other stakeholders (Currie, 2004; Merín-Rodrigáñez, Dasí, & Alegre, 2024).

According to Timmers (Timmers, 1999), an e-business model contains components (such as customer domain, service/product, and resources), links (effects of one activity on other activities), and dynamics (the organization's response to change to gain a competitive advantage) (Hayes & Finnegan, 2005; Lin, Li, Mahmood, Guo, & Qian, 2024).

E-business models are described in terms of supplier and buyer value chains, IT architectures and systems, technical platforms, and security and traffic scales (Shirou, Yusuke, Satoshi, & Atsushi, 2007).

Lam and Harrison-Walker (Lam & Harrison-Walker, 2003) have estimated that there exist about 50 business models; thus, each of these models are described from a different perspective. Given the breadth and diversity of existing e-business models, there are different factors and criteria for classifying e-business models (Lam & Harrison-Walker, 2003).

Ticoll et al. (Ticoll, Tapscott, & Lowy, 2000) presented four different types of e-business models, and Timmers considered 11 e-business models for the business-to-business (B2B) domain (Timmers, 1999). Rappa (Rappa, 2010) proposed 8 categories for e-business models and defined 36 models (Hayes & Finnegan, 2005).

Near Field Communication Technology

In recent years, the spread of the use of radio frequency identification (RFID) technology in different fields has provoked IT enterprises to think about utilizing this technology in mobile devices. This thought led to the emergence of a new type of technology called NFC. This technology was initially invented in 1983 and approved as an ISO/International Electrotechnical Commission (IEC) standard in 2003. This smart technology includes mobile devices with NFC, NFC reader, and NFC tag (Coskun, Ok, & Ozdenizci, 2011). The hardware components of this technology are comprised of an NFC-enabled mobile phone including a radio frequency setup, a baseband processor, an NFC controller with an antenna, as well as a secure smart chip known as the secure element (Vazquez-Briseno et al., 2012).

This technology is a simple and user-friendly communication technology that has many usages and is being increasingly used in different fields. Some usages of this technology are pointed out below:

- Utilizing this technology in medicine such as in heart rate monitoring (Gopichand, Chaitanya, & Kumar, 2013), storing medical records, better diagnosis, inventory tracking, medication care, blood transfusion, monitoring health professionals' status (Ahson & Ilyas, 2011);
- One of the main applications of NFC is mobile payment and using it as a wallet. Practical examples include paying at in-store electronic terminals, purchasing tickets for public transportation such as airplane, train, and subway, as well as using an NFC-enabled device as an entrance ticket;
- Using the NFC tag on ID cards;

Using a mobile phone equipped with NFC technology as an electronic key for hotels, the house, the workplace, cars as well as using it for logging in to a personal computer;

- Using a mobile phone equipped with NFC technology as a guide in different places;
- Using NFC technology to control an organization's inventory of property and to monitor the entrance and exit of employees; And

Using NFC technology to make universities and educational affairs smarter; for instance, holding exam sessions (Naghavi, Rajabi Ragheb, & Abbasi, 2014) and providing access to bibliographic resources in the university environment (Borrego-Jaraba, García, Ruiz, & Gómez-Nieto, 2013).

Although NFC technology has been widely adopted around the world for applications such as secure transactions and product authentication, its strategic use in Iran—particularly for verifying the authenticity of high-value export goods—remains significantly underdeveloped. Despite the availability of this technology, there has been no systematic effort to implement NFC-based solutions for authenticating Iranian products such as carpets, handy craft, and saffron, which are highly valued in international markets. Moreover, existing research lacks a comprehensive business model that integrates NFC authentication with the commercial and strategic needs of Iranian producers. Another overlooked aspect is the potential of NFC systems to collect geolocation data during authentication events, which could serve as a powerful tool for market intelligence and identifying demand patterns abroad. Furthermore, current approaches do not offer integrated solutions that combine authentication with branding, customer engagement, and export strategy—particularly for small and medium-sized enterprises seeking to compete globally. This paper aims to address these gaps by proposing a business model that positions NFC technology as both a safeguard against counterfeiting and a strategic enabler for market development.

Methodology

To address the research questions of this study, a qualitative multi-method approach was adopted, combining both literature review and authentication techniques. This methodological design was chosen to ensure a comprehensive understanding of existing business models and to tailor an appropriate framework for NFC-based authentication services in Iran.

The document analysis component involved an extensive review of Iranian and international literature, including academic publications, industry reports, and existing business model frameworks. This phase provided foundational insights into various classifications of business models, and helped position the authentication database within the broader context of e-business strategies.

The field research component employed semi-structured interviews and focus group discussions to gather contextual and experiential data. Interviews were conducted with key stakeholders and trustees involved in Iran's authenticity and traceability initiatives, including representatives from Iran Code, Shenaseh Kala, Shenasa, Track & Trace & Authentication Control (TTAC), Shabnam, and Esalat-e Salamat. These interviews aimed to uncover the operational

realities, revenue structures, and strategic challenges of existing systems.

Following the interviews, a focused group discussion was held with experts in business modeling and product authentication. This collaborative session facilitated the evaluation and selection of the most suitable business model for NFC-based authentication services. Through consensus, Osterwalder and Pigneur's Business Model Canvas was identified as the most comprehensive and adaptable framework, given its detailed breakdown of product, customer, infrastructure, and financial components, as well as its alignment with marketing principles such as the 4Ps.

This qualitative approach enabled the integration of theoretical insights with practical stakeholder perspectives, ensuring that the proposed business model is both conceptually sound and contextually relevant.

Timmers has qualitatively classified business models into 11 types (Table 1) based on two criteria of innovation and operational integration (Timmers, 1999).

Table 1.

Timmers' Classification of Business Models

No.	Business Model Type	Description
1	Electronic shop(e-shop)	These models are the same as the traditional web-based stores that can be used to market and advertise the enterprise or store and enable online ordering and payment.
2	Electronic procurement (e-procurement)	These models enable electronic bids and supplying electronic and web-based services.
3	Electronic mall(e-mall)	It consists of a collection of e-shops that usually gather together under a supporting umbrella like a famous brand.
4	Electronic mall(e-mall)	These models make it possible to electronically implement the auction bidding mechanism, as in traditional auctions.
5	Virtual community	Establishing virtual interpersonal group communication in which the revenue is generated through collecting membership or advertisement fees. These models can be connected to marketing operations as an add-on plugin to get customer feedback on the product and services received and strengthen the sense of loyalty in customers.
6	Collaboration platforms	These models provide a set of tools and information in an environment to facilitate collaboration between organizations.
7	Third-party marketplaces	These models are suitable for organizations that want to outsource their web-based marketing to a third party enterprise. Third-party marketplaces offer an interface to the suppliers' product catalogue.
8	Value-chain integrator	This model supports organizations that focus on integrating multiple steps of the value chain and create further added value by developing the potential for information flow between those steps.
9	Value chain service provider	These focus on a particular function for the value chain, such as electronic payment or logistics.
10	Information brokerage	It includes a wide range of information services that add value by processing large volumes of data on social networks or in business processes.
11	Trust and other third-party services	Provide credit and security services such as certificate authority, electronic notaries, and other third party services.

Based on the above classification, the authentication database can be considered as an "information mediator" business model since, by processing a huge amount of available data about product owners and end customers, it attempts to create added value and provide an appropriate platform for manufacturers to conduct foreign market research. Turban et al. (Turban, McLean, & Wetherbe, 2002), presented a different

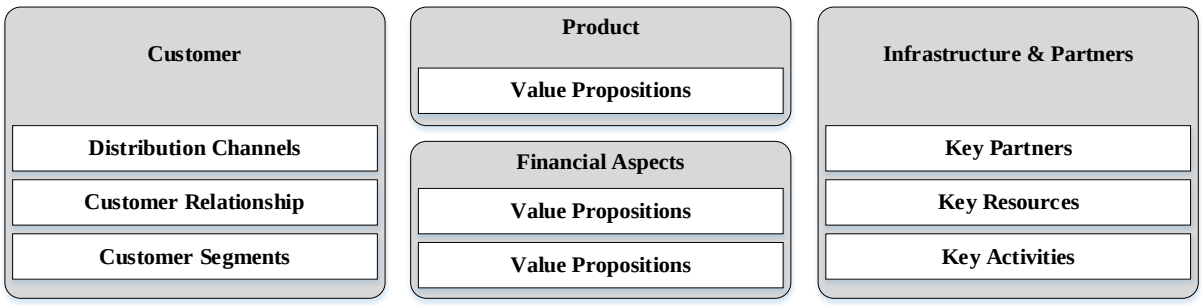
classification compared to other ones and based their classification on the business transaction parties. According to their classification, the authentication database business model that deals initially with the product owners is a B2B model. In the following steps, it can expand to B2C, B2G, and other models. According to Rappa's classification (Rappa, 2010) as well, the authentication database business model is of information mediator type meaning that it tries to provide the information required by the manufacturer, seller, and customers while considering the level of importance of data about products and customers, particularly for marketing or purchase purposes.

The components of Osterwalder and Pigneur's e-business models are divided into two levels. The first level deals with the four major elements of the business model including the product, the customer, the infrastructure and partners, as well as financial management. These concepts are further broken into other elements that ultimately form the nine components of an e-business model. From the researchers' point of view, this model has been chosen as the most appropriate business model because it contains a set of the most comprehensive and appropriate components and sub-components and also provides an overview of the interaction between the main and subsidiary components of the business model. Additionally from a marketing perspective, this model has taken 4Ps into consideration since it takes into account the product features, product quality, key resources utilized to produce the product, key activities, as well as the value created for the customer. In examining the cost structure and revenue model, the distribution, and the promotion components, it considers the product price, the distribution channels, as well as customer relationship and customer segmentation, respectively. Therefore, based upon the components this model takes into consideration, it can be regarded as a comprehensive model for product- or service-based businesses (Osterwalder et al., 2011).

All business models developed by researchers in different industries were explored. As precise and exact identification of the components of these models could define the authentication database position in industries, the components should be elaborated. Among the aforementioned business models, Osterwalder and Pigneur (Osterwalder et al., 2011) adopted a more precise approach to developing e-business models (Figure 1).

Figure 1.

Business Model Components based on Osterwalder and Pigneur's business model canvas



They have proposed components for business models which are referred to as precise definition of e-business examples and their associated components in an enterprise's business model. As regards the relevant literature, Osterwalder and Pigneur's business model could be taken as a more comprehensive model in which a business model is divided into nine components. In this respect, the analysis of the authentication database in the following section is based on this model. This model contains main business components which can be shown and compared with one another on a canvas.

Findings

Revenue Streams

The most important question while developing a business model for the authentication database is how the financial income will be generated. To answer this question, it should be said that the revenue model in Shabnam and Esalat-e Salamat has been in a way that these two businesses as state-owned ones are financially supported by the government and the product owner pays only a small amount for authenticity labels equipped with QR Code technology that are designed and produced in Iran and thus are not costly. Nevertheless, these two plans do not provide product owners with any special added value services and what matters is only product authentication; therefore, the fixed price is low.

In order to design service revenue models, a service provision strategy was developed and finally two types of service provision strategies were selected based on which the business model was designed and developed. Advantages and disadvantages of the proposed business models with sales strategy are depicted in Table 2 and Table 3.

As already stated, following the legal and tax barriers, the project team began to develop service revenue models. These models are more complicated because they are different from the selling nature of the authentication database, so it will be more difficult to implement it and make a contract

Table 4 and Table 5 describe each of the above models and determine their advantages and disadvantages.

Table 2.

Advantages of authentication database with a sales revenue model

1st: Selling by receiving a post-dated cheque from the product owner	2nd: Receiving from the product owner for the first authenticity check	3rd: Receiving from the customer for the first authenticity check	4th: Receiving from the product owner for the first authenticity check - settlement at the end of the contract (combination of the first and the second models)	5th: Partnership with the product owner in receiving the cost from the end customer
1. Ease and convenience of the contract 2. Independence of receiving money from selling or not selling 3. Independence of the contract from the financial system and the sales of the product owner 4. Settlement at the end of the contract, not at the beginning 5. Attracting more end customers due to receiving a valuable free service	1. Receiving a large number of labels and settlement in installments and after selling the product 2. Reducing the product owner's risk 3. The product owner's willingness due to not paying in a lump sum at the time of making the contract 4. More precise communication with customers compared to the first method 5. Increased quality of product information 6. Attracting more end customers due to receiving a valuable free service 7. Providing assistance to the product owner to identify counterfeit products and monitor the stores performance	1. The product owner and the store's willingness to use this method 2. Independent from the financial and sales systems as well as warehouse of the product owner 3. Receiving more precise customer information (e.g., buyer name, place, and time) 4. Increased quality of information 5. The authentication database playing the role of an ownership document 6. Eliminating the product owner's risk of not selling the products (label) 7. The possibility of the buyer authentication only through this method	1. Seller's more precision in entering information compared to the first method 2. More realistic ceilings for orders 3. The seller's higher level of willingness to change the "sold" mode due to the seller's discount label 4. Increased quality of information 5. Money-back guarantee 6. More precise communication with customers 7. Attracting more end customers due to receiving a valuable free service	1. The cost of entering information is free for the product owner 2. The owner of the product tries harder to persuade customers to use the system 3. The product owner and the store welcome this method 4. Independent from the financial and sales systems as well as warehouse of the product owner 5. Receiving more precise customer information (e.g., buyer name, place, and time) 6. Increased quality of product information 7. The authentication database playing the role of an ownership document 8. The risk of not selling the product (label) is only for the authentication database. The product owner has no risk. 9. Buyer's authenticity verification via this method

Table 3.

Disadvantages of authentication database with a sales revenue model

1st: Selling by receiving a post-dated check from the product owner	2nd: Receiving from the product owner for the first authenticity check	3rd: Receiving from the customer for the first authenticity check	4th: Receiving from the product owner for the first authenticity check - settlement at the end of the contract (combination of the first and the second models)	5th: Partnership with the product owner in receiving the cost from the end customer
1. The product owner showing less willingness at the beginning of running the authentication database due to its unpopularity 2. Low utility in case of selling less than the amount considered in the contract 3. Lack of communication with the end customers of the chain 4. Not sharing sales risks with the product owner 5. Low quality of information given to the end customer 6. The product owner willing to order few labels in multiple orders and increasing the overhead expenses 7. Failure to detect fraud occurred due to not changing the label status to "sold"	1. Complexity of implementation and entanglement with financial and sales systems in the store 2. The product owner's worry about sharing financial and sales information 3. Less willingness from the stores which are not exclusive representatives of the product owner 4. Lack of willingness in stores to change the "sold mode" due to its consequent charges 5. Ordering too many labels (it is necessary to specify a ceiling in the initial contract) 6. Increased complexity in the software system due to the need to manage sold products' price tag in each store 7. Failure to detect fraud occurred due to not changing the label status to "sold"	1. Product authenticity check by a low percentage of customers 2. A need to increase the price of the label due to authenticity check by a small proportion of customers 3. Distortion of information comprehensiveness due to authenticity check by a small proportion of customers 4. Too many orders because the label is free (a ceiling needs to be set) 5. A need to define information and value-added services to motivate the end customer (guarantee, lottery, and after-sales services)	1. Complexity of implementation and entanglement with financial and sales systems in the store 2. The product owner's worry about sharing financial and sales information 3. Less willingness from the stores which are not exclusive representatives of the product owner 4. Increased complexity in the software system due to the need to manage sold products' price tag in each store 5. Failure to detect fraud occurred due to not changing the label status to "sold"	1. Product authenticity check by a higher percentage of customers compared to the third method 2. Increased price of the authentication database service for the end customer due to partnership with the product owner

Table 4.

Advantages of an authentication database with a service revenue model

1st: Activating label services with the first tap	2nd: providing services per tap	3rd: Providing services for the customer's first tap	4th: Sales and service provision contract	5th: Annual subscription (gold, silver, bronze)	6th: Establishment of a new enterprise by specifying the possibility to sell in the Articles of Association
1. Appropriate profit 2. Low investment risk for the enterprise 3. No need to change current system processes 4. Easy execution of sales process	1. Product owners' higher level of willingness to buy labels due to low price 2. Product owners' reduced risk of customers not welcoming the product 3. Easy execution of sales process	1. Welcoming product owners and sellers 2. Getting more precise customer information 3. Eliminating the risk of not selling labeled Products for the product owners	1. Covering the initial cost for all types of labels 2. Profitable and low-risk model for any amount of ordering 3. A higher level of alignment with the business reality and the processes of the authentication database	1. Easy to create a free one month offer and the like for the product owners 2. The model is provided as a service with no sales (similar to broadband or Internet service provider models) 3. A well-known and standard plan for providing services 4. Contract's independence from the system 5. an average level of risk for the product owners and the authentication database regarding the amount of income and customers' acceptance	Non-compliance with not selling limitations (in accordance with the Articles of Association) Higher level of efficacy and greater focus on services Introducing other ancillary services such as entering information for the product owners in the new enterprise's missions Transparency of financial contracts Lower premium and tax costs

Table 5.

Disadvantages of an authentication database with a sales revenue model

1st: Activating label services with the first tap	2nd: providing services per tap	3rd: Providing services for the customer's first tap	4th: Sales and service provision contract	5th: Annual subscription (gold, silver, bronze)	6th: Establishment of a new enterprise by specifying the possibility to sell in the Articles of Association
1. The customer's suspicion to the sales contract 2. All labels must be offered at the same price or a separate contract is required based on the type of label 3. Mandatory first tap by the product owner or the seller 4. The system must be able to separate the seller's taps (in order to activate) from those of the customer	1. A need to introduce more value-added services such as guarantee and persuade customers to tap more often 2. Inadequate profit: while assuming 40% tap on the product, the ratio of the break-even point of each tap should be 37500 Rials compared to the first model	1. A need to change the model when the system is pervasive due to unprofitability (because of the existence of the authentication database label, sellers and product owners are less likely to encourage customers to tap) 2. Increased sales prices because the product authentication is done by a low percentage of customers	1. False assumption of selling instead of providing services 2. Product owners less willingness to pay in advance if they are not provided with financial facilities 3. Less welcoming product owners due to increased risk of customers' acceptance	1. If the number of labels is specified before the contract, the model is service-based and not transactional 2. The way to pay on the website and the way to recharge requires arrangements in the authentication database 3. Low flexibility for label type and the number of orders	1. A need for investment and initial expenditure 2. Existence of legal restrictions for establishing a new enterprise

Authentication business model

After determining the authentication database service revenue strategy and specifying the business model canvas components based on the Osterwalder and Pigneur's model, the authentication database business model canvas is designed and presented. It is worth mentioning that the authentication database canvas is prepared with a focus on service provision and in three forms including the authentication database general model which contains common components, the second model of service revenue that is "service provision per tap", as well as the fifth model of service revenue that is "annual subscription strategies (Bronze, Silver, and Gold)".

- **General Business Model Canvas**

The authentication database business is in general terms similar to that of other authentication databases such as Shabnam and Esalat-e Salamat. In the business model designation and development, the points outlined in the meetings with the craft enterprises as well as those obtained through market research were taken into account and are as follows:

▪ As for the revenue stream, a model which is initially free (for the product owners and not end customers) and is later monetized is doomed to fail and the brand collapses.

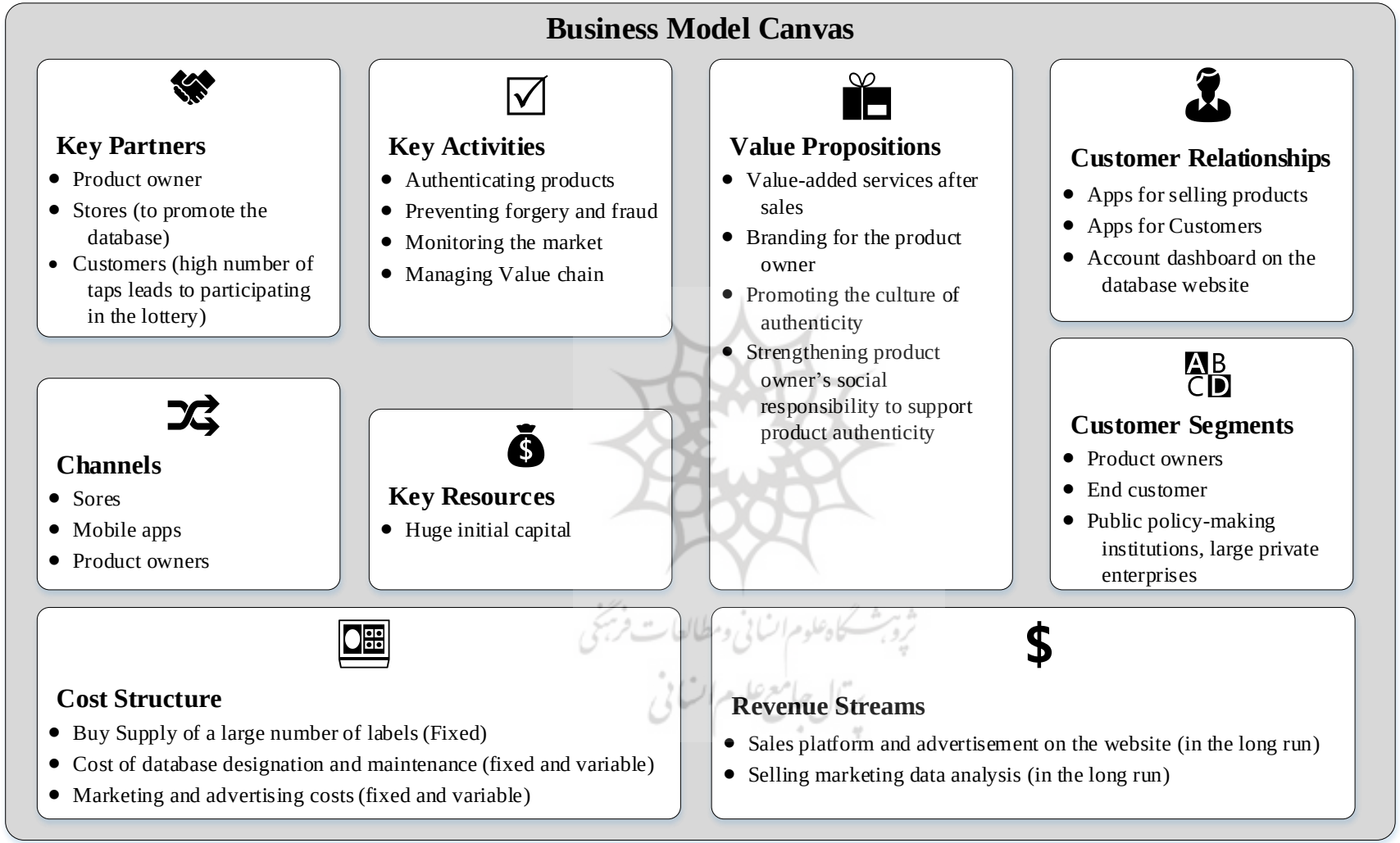
▪ Due to the traditional nature of most sales systems in Iran, metadata analysis might be profitable in the long run. Therefore, other methods should also be adopted, such as turning the authentication database into a national gateway through which everyone carries out a product authenticity check. Hence, it is possible to earn income both through advertising and online shopping. In other words, instead of buying in person, the customer can buy online from the authentication database. This way, the authentication database can become the most important gateway for buying products and checking their authenticity in Iran, because products information and prices are readily available and through which the products are provided by the owner and delivered to the customer.

▪ In the future, the authentication database may seek to make the best use of this position and its huge volume of end customers (domestic and foreign) in an attempt to do market research for different industries and to find niche markets. Therefore, short-term profitability goals are recommended to be avoided. Instead, branding and getting recognized by the product owners and the target customers are recommended to be taken seriously.

Overall, a general overview of the authentication database business model canvas is illustrated in Figure 2.

Figure 2.

General Business Model Canvas



This revenue model is more valuable compared to other models because the product owner does not pay much and is further motivated to enter into a contract. The advantages and disadvantages of this model is shown in Table 6.

Table 6.

Advantages and disadvantages of "service provision per tap" revenue strategy

"Service provision per tap" strategy	
Advantages	**Disadvantages**
1. Product owners' higher level of willingness to buy the label due to the fixed and the initial cost 2. Reduced risk of less acceptance customers for the product owner 3. Easy implementation of service provision process	1. A need to define many added value services such as guarantee and to persuade customers to tap again and again 2. Inadequate profit: Inadequate profit: while assuming 40% tap on the product, the ratio of the break-even point of each tap, compared to the first model (with a price of 15000 Rials), should be 37500 Rials 3. A tap after the contract and failure to receive money and consequent losses for the database business 4. Complexity in concluding the contract
"Annual subscription" strategy	
Advantages	**Disadvantages**
1. It is easy to provide the product owners with a promotional offer for free services in case of time extension 2. The model provides services and no sales are occurring (just like broadband or Internet service provider models) 3. A well-known and standard plan for service provision 4. Independence of the contract from authentication processes 5. Reduced risk of customers' acceptance for the authentication database 6. Higher profits for the database business	1. If the number of labels is specified before the contract, the model is service-based and not transactional 2. The way to pay on the website and the way to recharge necessitates creating a dashboard for the product owner in the authentication database 3. Low flexibility regarding the type of label and the number of orders both for a specific product owner and after the contract 4. More diverse contracts both in one industry and also among different industries

- **Annual subscription strategies (Bronze, Silver, and Gold)**

The current model differs from the previous model in terms of revenue generation and operations. In this model, the product owners, for whom the authenticity is of great importance, are addressed. Moreover, Customer Relationship Management (CRM) and marketing management have the next priority (for the product owners who want to find customers). Table 6 represents the pros and cons of these two revenue strategies.

Following an exploration of the revenue strategy and specification of its pros and cons, the business model canvas was designed and presented in Figure 3 and Figure 4

.Figure 3.

Business Model Canvas Based on "Service provision per tap" Revenue Strategy

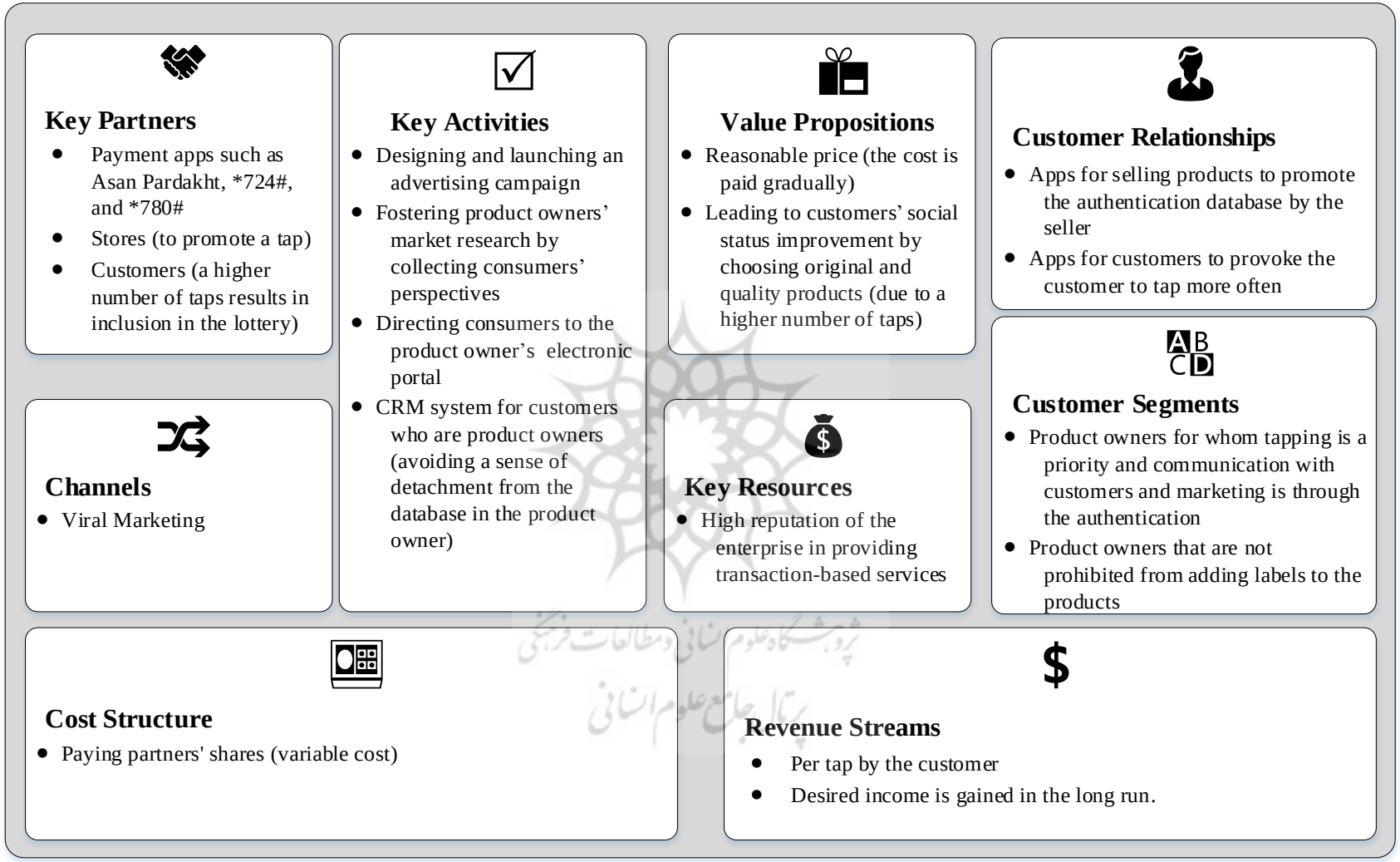
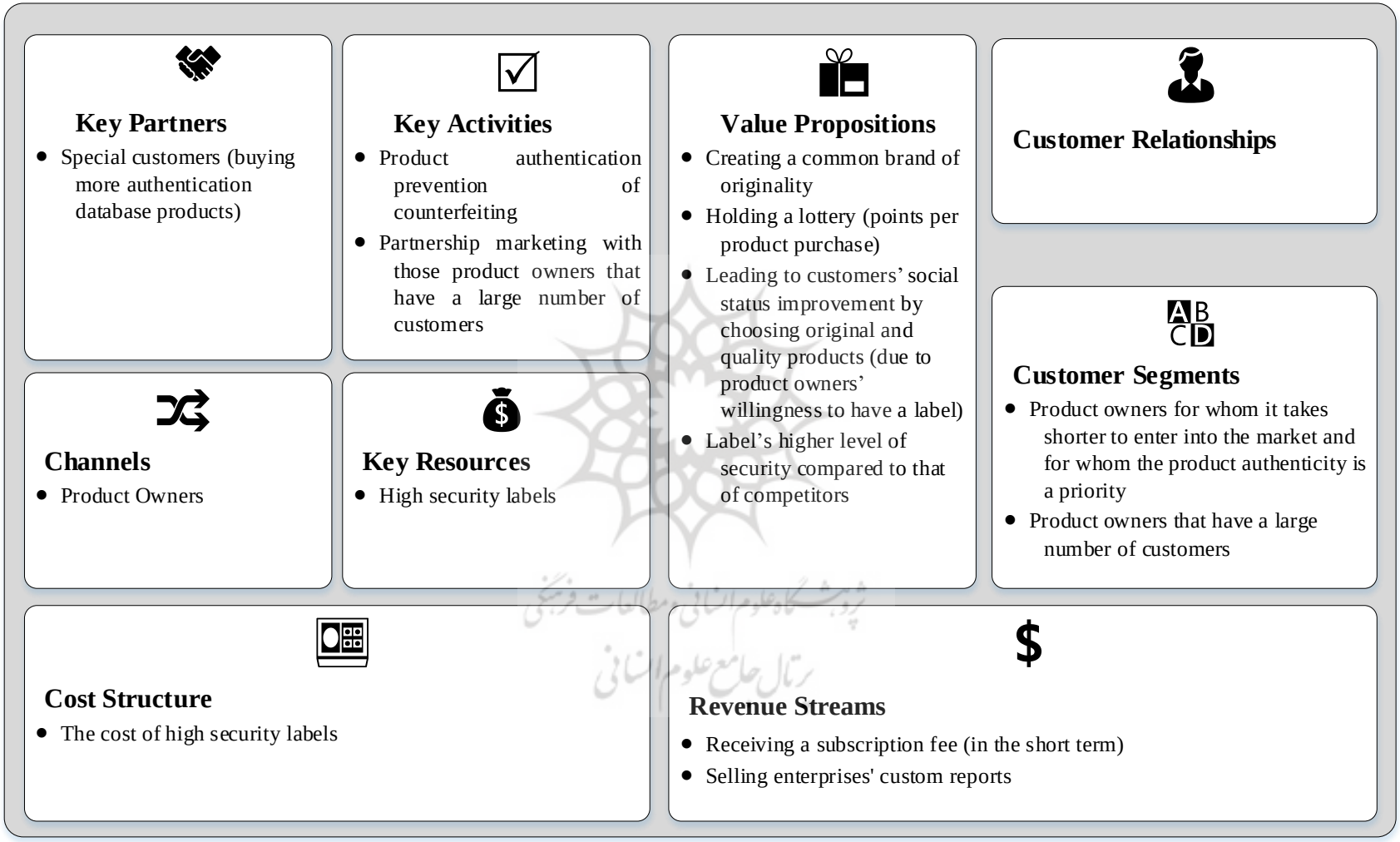


Figure 4.

Business Model Canvas Based on "Annual subscription (Bronze, Silver, and Gold scheme)" Revenue Strategy



Managerial Insights

The following managerial insights can be excavated.

▪ Targeted Service Differentiation Enhances Value Proposition Managers should recognize that not all product owners require or desire authentication services. The business model must prioritize selective service provision, focusing on owners of original, high-value products who actively seek authenticity verification. This segmentation ensures that resources are allocated to customers who derive the most value, enhancing satisfaction and retention.

▪ Customer-Centric Design Drives Engagement In the "service provision per tap" model, the end customer becomes the focal point. Managers should ensure that product labels include comprehensive information—such as guarantees, after-sales services, and related offerings—to increase tap rates and customer interaction. This approach strengthens brand trust and encourages repeat engagement.

▪ Strategic Partnerships Boost Adoption Collaborations with digital platforms like Rubika can significantly enhance visibility and usage in tap-based models. Managers should actively pursue partnerships that align with the business model's engagement strategy. However, in subscription-based models, such partnerships are less critical, allowing for more streamlined operations.

▪ Data-Driven Insights Sustain Long-Term Relationships Regardless of the revenue model, the authentication database must deliver actionable marketing intelligence to product owners. Providing location-based customer data and usage analytics can inform marketing strategies and product positioning, increasing the likelihood of contract renewal and long-term collaboration.

▪ Voluntary Adoption Encourages Trust and Legitimacy Past government-led models like Shabnam and Esalat-e Salamat suffered from mandatory enforcement, which alienated product owners. Managers should ensure that participation in the authentication system remains voluntary, fostering trust, ownership, and organic adoption among stakeholders.

▪ Awareness Campaigns Precede Profitability For widespread adoption, comprehensive advertising and awareness efforts must precede monetization strategies. Managers should prioritize building brand recognition and educating stakeholders about the benefits of authentication services before focusing on profitability.

▪ Positioning the Database as a National Gateway With consistent delivery of value-added services and strategic outreach, the authentication database has the potential to evolve into a national platform for product verification and market intelligence. Managers should align long-term goals with this vision, investing in infrastructure, scalability, and cross-sector integration.

Concluding Remarks

This research was conducted in an attempt to design a business model for NFC technology with the aim of developing foreign markets for original products in the form of authentication database services. After an in-depth description of Osterwalder's business model and selecting the business model canvas, the service and sales revenue models of the authentication database business were explained in detail. In accordance with service revenue model, two types of business models including "service provision per tap" and "annual subscription

strategies (Bronze, Silver, and Gold)" were proposed.

- The above strategy is that the authentication database provides original products owners with special services and not all product owners have the right to use the authentication database. This model is more welcomed by a proportion of the market that wants to present the authenticity of their products. In addition, in this model, the product owner is our end customer and the product authenticity should be prioritized over marketing research. By the way, product owners should be provided with different reports so that they can make appropriate decisions about their marketing activities.
- Regarding the "service provision per tap" strategy, the customer is important and the originality of the product is important to the customer. In the fifth model, the product owner who is important gives priority to product marketing. In addition, in this model, the customer is our end customer. Therefore, the information about the guarantee, after-sales services, as well as ancillary products and services should be provided on the label so as to increase the tap rate.
- In the "service provision per tap" model, the presence of business partners such as Rubika can greatly assist in increasing the tap rate but in the "annual subscription strategies (Bronze, Silver, and Gold)" model, considering that the income is generated through subscriptions, the presence of these partners is not necessary.
- In both models, the authentication database should supply product owners with useful marketing-related information which can to a great extent lead to the continuation of the contract and can turn the authentication database into a national gateway.
- One of the biggest weaknesses of the Shabnam and Esalat-e Salamat models was that they were government-owned and that the product owners would consider using their labels as obligatory. Therefore, in both models, it is recommended that the product owners have the liberty to use or not to use these labels without an enforcement by governmental institutions.
- In both models, the main goal should be the widespread use of the authentication database and appropriate strategies should be adopted for comprehensive advertisement, and then the profitability of the database should be the next priority.

References

Afuah, Allan. (2004). Business models : a strategic management approach. New York: McGraw-Hill/Irwin.

Ahson, Syed A, & Ilyas, Mohammad. (2011). Near field communications handbook: CRC Press.

Alakaş, Egehan Özkan. (2024). Digital transformational leadership and organizational agility in digital transformation: Structural equation modelling of the moderating effects of digital culture and digital strategy. The Journal of High Technology Management Research, 35(2), 100517.

Bindeeba, Dedrix Stephenson, Tukamushaba, Eddy Kurobuza, & Bakashaba, Rennie. (2025). Toward a holistic model of sustainable investment decision-making in SMEs: a structural approach in a developing economy. Future Business Journal, 11(1), 176.

Boffa, Eleonora, & Maffei, Antonio. (2024). Investigating the impact of digital transformation on manufacturers' Business model: Insights from Swedish industry. Journal of Open Innovation: Technology, Market, and Complexity, 100312.

Borrego-Jaraba, Francisco, García, Gonzalo Cerruela, Ruiz, Irene Luque, & Gómez-Nieto, Miguel Ángel. (2013). An NFC based context-aware solution for access to bibliographic sources in university environments. Journal of Ambient Intelligence and Smart Environments, 5(1), 105-118.

Cantrell, LJ, & Linder, J. (2000). Changing business models: Surveying the landscape. Accenture Institute for Strategic Change, 15(1), 142-149.

Chesbrough, Henry, & Rosenbloom, Richard S. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. Industrial and corporate change, 11(3), 529-555.

Corkindale, David. (2010). Towards a business model for commercializing innovative new technology. International Journal of Innovation and Technology Management, 7(01), 37-51.

Coskun, Vedat, Ok, Kerem, & Ozdenizci, Busra. (2011). Near field communication (NFC): From theory to practice: John Wiley & Sons.

Currie, Wendy. (2004). Value creation from e-business models: Elsevier.

Gopichand, G, Chaitanya, T Krishna, & Kumar, R Ravi. (2013). Near Field Communication and Its Applications in Various Field. International Journal of Engineering Trends and Technology, 4(4), 5.

Grabowska, Marlena. (2015). Innovativeness in business models. Procedia Computer Science, 65, 1023-1030.

Hayes, Jeremy, & Finnegan, Pat. (2005). Assessing the of potential of e-business models: towards a framework for assisting decision-makers. European Journal of Operational Research, 160(2), 365-379.

Heshmatisafa, Saeid, & Seppänen, Marko. (2023). Exploring API-driven business models: Lessons learned from Amadeus's digital transformation. Digital Business, 3(1), 100055.

Itami, Hiroyuki, & Nishino, Kazumi. (2010). Killing two birds with one stone: profit for now and learning for the future. Long Range Planning, 43(2-3), 364-369.

Joel, Olorunyomi Stephen, Oyewole, Adedoyin Tolulope, Odunaiya, Olusegun Gbenga, Soyombo, Oluwatobi Timothy, Joel, OS, Oyewole, AT, . . . Soyombo, OT. (2024). The impact of digital transformation on business development strategies: Trends, challenges, and opportunities analyzed. World Journal of Advanced Research and Reviews, 21(3), 617-624.

Johnson, Mark W, & Lafley, Alan G. (2010). Seizing the white space: Business model innovation for growth and renewal: Harvard Business Press.

Lam, Long W, & Harrison-Walker, L Jean. (2003). Toward an objective-based typology of e-business models. Business Horizons, 46(6), 17-26.

Lin, Chun-Yi, Li, Chen, Mahmood, Sadaf, Guo, Feng, & Qian, Zuoyi. (2024). Integrating culture and tourism: A resilient scale for digital transformation innovation. Journal of the Knowledge Economy, 1-34.

Magretta, Joan. (2002). Why business models matter. In: Harvard Business School Boston, MA, USA.

Merín-Rodrigáñez, Joan, Dasí, Àngels, & Alegre, Joaquín. (2024). Digital transformation and firm performance in innovative SMEs: The mediating role of business model innovation. Technovation, 134, 103027.

Morris, Michael, Schindehutte, Minet, & Allen, Jeffrey. (2005). The entrepreneur's business model: toward a unified perspective. Journal of business research, 58(6), 726-735.

Naghavi, V., Rajabi Ragheb, R., & Abbasi, H. (2014). NFC Technology Application in the University Automation System. Paper presented at the The First Regional IT Conference, Chaloos, Iran.

Naimi-Sadigh, Ali. (2024). Designing a Revenue Sharing Model for Research Platforms (Case Study: Similarity Detection Service System). Media Management Review, 3(2), 212-230.

Naimi-Sadigh, Ali, Chaharsooghi, S Kamal, & Mozafari, Marzieh. (2021). Optimal pricing and advertising decisions with suppliers' oligopoly competition: Stakelberg-Nash game structures. Journal of Industrial & Management Optimization, 17(4).

Nogalski, B. (2009). Investigations of business models in enterprises as an interesting cognitive objective in research on strategic management. Strategic management journal, 37-38.

Osterwalder, Alexander, Pigneur, Yves, Oliveira, Manuel Au-Yong, & Ferreira, João José Pinto. (2011). Business Model Generation: A handbook for visionaries, game changers and challengers. African journal of business management, 5(7), 22-30.

Prahalad, Coimbatore K, & Bettis, Richard A. (1986). The dominant logic: A new linkage between diversity and performance. Strategic management journal, 7(6), 485-501.

Rabiei, M, Hosseini-Motlagh, S-M, Haeri, A, & Minaei Bidgoli, B. (2021). Evolution of IT, management and industrial engineering

research: A topic model approach. Scientia Iranica, 28(3), 1830-1852.

Rappa, M. (2010). Business models on the web: Managing the digital enterprise.[Online]< digitalenterprise. org/models/models. html>. Accessed: September.

Santarsiero, Francesco, Carlucci, Daniela, & Schiuma, Giovanni. (2024). Driving digital transformation and business model innovation in tourism through innovation labs: An empirical study. Journal of Engineering and Technology Management, 74, 101841.

Shafer, Scott M, Smith, H Jeff, & Linder, Jane C. (2005). The power of business models. Business Horizons, 48(3), 199-207.

Shafiee Nikabadi, M. (2008). Electronic Business Model of Holding Companies. Allameh Tabatabaei University,

Shirou, Wakayama, Yusuke, Doi, Satoshi, Ozaki, & Atsushi, Inoue. (2007). Cost-effective product traceability system based on widely distributed databases. Journal of Communications, 2(2), 45-52.

Sui, Xiaoning, Hu, Huanhuan, & Wang, Rong. (2024). The impact of digital transformation on the servitization transformation of manufacturing firms. Research in International Business and Finance, 102588.

Svejenova, Silviya, Planellas, Marcel, & Vives, Luis. (2010). An individual business model in the making: A chef's quest for creative freedom. Long Range Planning, 43(2-3), 408-430.

Ticoll, David , Tapscott, Don, & Lowy, Alex. (2000). Digital Capital: Harnessing the Power of Business Webs: Harvard Business School Press.

Timmers, P. (1999). Electronic Commerce: Strategies and Models for Business-to-Business Trading. John Wiley & Sons.

Turban, Efraim, McLean, Ephraim, & Wetherbe, James. (2002). Information technology for management making connections for strategic advantage: John Wiley & Sons, Inc.

Vazquez-Briseno, Mabel, Hirata, Francisco I, Sanchez-Lopez, J, Jimenez-Garcia, Elitania, Navarro-Cota, Christian, & Nieto-Hipolito, Juan Ivan. (2012). Using RFID/NFC and QR-code in mobile phones to link the physical and the digital world. Interactive Multimedia, 12, 219-242.

Yaqub, Muhammad Zafar, & Alsabban, Abdullah. (2023). Industry-4.0-enabled digital transformation: Prospects, instruments, challenges, and implications for business strategies. Sustainability, 15(11), 8553.