

Using digital platforms in developing Iran's exports to Russia: A case study of herbal medicines

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Article Info	Abstract
Original article	Background: Iranian herbal medicines have significant export potential to the Russian market, yet face structural barriers including information asymmetry, lack of digital trust, and regulatory complexities. Aims: This study evaluates the role of electronic platforms in overcoming these challenges. Methodology: Using a mixed-methods approach, data were collected from 36 stakeholders via a structured questionnaire and from 14 experts through in-depth interviews. Findings: Statistical analysis using SPSS revealed that while Russian market demand is high (mean= 4.1/5), traditional export processes remain inefficient due to legal barriers (mean= 2.9/5) and weak after-sales services (mean= 2.44/5). The correlation between platform adoption and export success is strong and positive ($r= 0.72$, $P< 0.001$), while legal barriers have a significant negative relationship with success ($r= -0.45$). Digital trust ($r= 0.65$) and after-sales support ($r= 0.61$) are also key predictors. Based on expert estimates, digital platforms can reduce buyer discovery time by ~85%, intermediation costs by ~60%, and customs clearance time by ~70%. Also, findings indicate that in the Iran-Russia context, alignment of digital standards and document transparency are primary prerequisites for building trust. Contrary to expectations, simple and well-integrated platforms are more effective than complex technologies like blockchain at the current stage. Conclusion: The study concludes that transitioning from traditional methods to an integrated digital ecosystem is not merely an option but a strategic necessity for sustainable export development.
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1. Introduction

In recent decades, digital transformation has reshaped the traditional structure of global trade. Information and communication technologies have played an unparalleled role in facilitating the flow of goods and services by reducing geographical barriers and transaction costs (Konga et al., 2024). Among various economic sectors, the herbal medicine industry holds significant potential for international market presence due to Iran's unique biodiversity and its long history of traditional medicine. However, exports of these products to strategic markets such as Russia are still carried out mainly through traditional, paper-based methods, which suffer from inefficiency, high costs, and low transparency (Gholamrezanejad, 2022). On the other hand, the Russian Federation, with its considerable population and growing demand for natural health-oriented products, is an attractive market for Iranian exporters. The herbal medicine market in Russia is one of the largest and fastest-growing in Eastern Europe. According to industry reports, the market volume for dietary supplements and herbal medicines in Russia reached approximately \$1.2–1.4 billion in 2023, and is projected to reach \$2 billion by 2028, with a compound annual growth rate (CAGR) of 8–10% (Export Potential Map, 2023). To meet this demand, around 40–45% of the market's needs are currently supplied through imports.

Nevertheless, Iran's herbal medicine exports to this country face multiple structural barriers, including stringent regulations for registering health products, the lack of an integrated digital infrastructure, and weak after-sales services (Simachev et al., 2020). Studies have shown that traditional export methods are unable to meet the complex requirements of the Russian market and that the use of modern technologies can reduce this gap (Ahmadi, 2025).

Under these conditions, digital platforms have emerged as an effective solution to overcome these barriers. According to the digital value chain theory (Rayport & Sviokla, 1995), two parallel value chains: physical and virtual operate simultaneously in the current era, and export success requires the concurrent management of both. Likewise, from the perspective of transaction cost economics (Williamson, 1975), platforms can dramatically increase the efficiency of the export chain by reducing search, negotiation, and monitoring costs. Empirical studies have shown that the use of digital platforms can significantly reduce intermediation costs and customs clearance time (Gharaati et al., 2025). Conventional barriers such as geographical distance, customs complexities, and limited awareness of demand markets continue to pose structural challenges for accessing major target markets like Russia. E-commerce, by providing transition infrastructure and reducing geographical barriers, enables manufacturers and service providers to engage directly in international markets. This transformation is not merely a technological requirement

but a strategic necessity, empowering small and medium-sized enterprises (SMEs) to enter the export arena without relying on traditional intermediaries and to capitalize on profitable global opportunities (Holland & Gutierrez-Leefmans, 2018). Consequently, a profound distinction has emerged between e-commerce-based exports and traditional export models. Electronic platforms can serve not only as auxiliary tools but as the backbone of modern bilateral trade. By creating a secure and transparent environment, they facilitate direct interaction between Iranian manufacturers and Russian buyers, eliminating costly intermediaries. Accordingly, e-commerce in the pharmaceutical and herbal supplement sector reduces marketing and distribution costs while enabling direct access to wholesalers and retailers in Russia without traditional intermediaries (Keramati Moghaddam Darbandi Oliya, 2025).

Despite these opportunities, Iranian (herbal medicine) exporters face multiple challenges, including legal barriers, misalignment of digital standards, and a lack of digital trust (Abbasi et al., 2024). Digital trust and after-sales services have been identified as the strongest predictors of export success (Ahmadi, 2025). However, few studies have specifically examined the role of digital platforms in developing the value chain of herbal medicine exports from Iran to Russia (Ripley, 2021). Therefore, the present study seeks to answer the following fundamental research question: How can digital platforms be used to overcome logistical and legal barriers and to develop the value chain of Iranian herbal medicine exports to Russia?

The initial hypothesis posits that digital platforms can build trust among Russian buyers, and the optimal use of electronic platforms can make the export process more efficient, faster, and cost-effective. Investigating this issue is not only critical for Iranian herbal medicine exporters but can also serve as a model for other export items with similar potential in e-commerce. Accordingly, the second section reviews prior studies, followed by an exposition of the study's theoretical framework. The fourth section describes the research methodology, while the subsequent section presents the findings. Finally, the research findings are discussed and compared with statistical data and previous studies, culminating in the presentation of conclusions and recommendations.

2. Literature review

The literature review is organised into three main categories: a) theoretical foundations and value chain approaches; b) digital platforms, e-commerce and export development; and c) case studies and empirical evidence in target markets and emerging economies.

2.1. Theoretical foundations and value chain approaches

Porter (1980) laid the groundwork for value chain analysis with his

five-forces framework and three generic strategies (cost leadership, differentiation and focus). Rayport and Sviokla (1995) extended this by introducing the “virtual value chain”, arguing that in the digital age physical and virtual value chains operate in parallel and must be managed simultaneously. Williamson (1975) developed transaction cost economics (TCE), identifying search, negotiation, monitoring and enforcement costs as the main barriers to cross-border trade. Ebrahimi Salari and Salehnia (2024) examined TCE from the perspectives of Williamson and North, and argued that fulfilment of contracts, honesty, prohibition of fraud and deceit, and the obligation to disclose defects can significantly reduce transaction costs and increase contractual efficiency. Lee and Gereffi (2015) provided a comprehensive overview of global value chain (GVC) governance and upgrading. They distinguished between “governance as driving” (lead firms setting performance criteria), “governance as coordination” (inter-firm linkages) and “governance as normalizing” (standards). They also discussed the uneven distribution of upgrading opportunities, the rise of regional value chains and the need for synergistic governance combining private, public and social actors. Springer-Heinze (2018) offered a systematic framework (ValueLinks 2.0) for sustainable value chain analysis, including structural, economic, environmental and social dimensions. Kaplinsky and Morris (2019) examined 25 SME clusters in nine African countries and found that clusters selling in extra-local markets are more dynamic, and that collective action in training, marketing and logistics is associated with cluster dynamism. Pasebani et al. (2018) elaborated the dimensions of technology (hardware, software, brain-ware) and technology assessment methods, explaining the role of value chain analysis in gaining competitive advantage.

2.2. Digital platforms, e-commerce and export development

Konga et al. (2024) used patent indicators in artificial intelligence, blockchain, cloud computing, big data and the Internet of Things to show that digital technology significantly promotes service exports through enhanced tradability, reduced transaction costs and new business models. Wang et al. (2026) identified the “empowerment–dependence paradox” for SMEs on digital platforms, showing that asset specificity increases platform reliance while internalization reduces it. Holland and Gutiérrez-Leefmans (2018) analyzed 144 SME e-commerce platforms in the United States and the United Kingdom, identifying five strategic groups (information laggards, basic networking, advanced networking, advanced networking mature, and social media markets). Luo and Yang (2024) designed an export service platform based on digital technology and emphasized the importance of communication infrastructure and scientific capacity. Ahmadi (2025) conducted a systematic meta-analysis of 16 studies and found a positive

effect of e-commerce on export performance (effect size 0.354). Gharaati et al. (2025) designed an AI-based e-commerce platform model for Iran and Russia, showing that such platforms can reduce buyer discovery time by approximately 85%, intermediation costs by 60%, and customs clearance time by 70%. Rezaei et al. (2025), using the repertory grid technique, identified factors affecting multi-sided platform success in the Iranian banking industry, including ecosystem coordination, new technologies, transparent policymaking and digital literacy. Ekhlasi (2014) elaborated the service quality gaps model, customer expectations, the five dimensions of service quality, the services marketing triangle and the service profit chain. Abed and Mirtaghi (2022) highlighted the multi-sided nature of platform business models and the importance of network effects. Asgharpour et al. (2022) introduced artificial intelligence as a driver of knowledge-based businesses and digital marketing. Keramati Moghaddam Darbandi Oliya (2025) showed that AI-based platforms can revolutionise exports by enabling demand forecasting and logistics optimization. Gholamrezanejad (2022), using panel data for developing countries, found that e-commerce positively affects economic growth and increases foreign trade volume. Lee et al. (2015) designed a questionnaire to measure Porter's generic strategies with a Cronbach's alpha of 0.91. Ripley (2021), in an ILO guide, adopted a market systems approach to value chain development, emphasising social and environmental upgrading alongside economic upgrading.

2.3. Case studies and empirical evidence in target markets and emerging economies

Amirnejad et al. (2015) investigated the factors affecting Iranian cumin exports using a vector error correction model (VECM) and cointegration analysis for the period 1986-2009. They found that the real exchange rate and agricultural value-added have a significant positive impact on cumin exports, while the export price index has a negative impact. Jahangard (2025) decomposed the value added of Iran's digital activities using the Borin and Mancini (2023) method and the Inter-Country Input-Output table for 2016. He found that domestic value added is nearly equal to domestic content in most digital activities, while foreign value added is negligible. Iran's digital production and trade sectors have very limited participation in global value chains; only telecommunications show meaningful foreign content. Abbasi et al. (2024) identified key factors affecting the innovative value chain in the Iranian pharmaceutical industry, including technology support institutions, distribution systems, expert personnel and investment. Correlation analysis showed that support institutions (0.71) and distribution systems (0.69) had the highest positive correlation with value chain improvement. Biryukova and Manuylov (2017) showed that EAEU member countries (including Russia) are

mainly present in early stages of value chains (raw material supply) and have a low share of domestic value added in final exports. Simachev et al. (2020) identified “platform-based” insertion into value chains as a key opportunity for Russia, emphasizing that e-commerce platforms lower entry barriers for SMEs. Sharipov et al. (2026), studying digital trading platforms in Uzbekistan, found that digital infrastructure reduces transaction costs and improves logistics for high-technology exports. Castro-Leal et al. (2020), in a CABI report, highlighted the role of e-commerce platforms and electronic single windows in facilitating regional exports in Central America.

Despite the richness of the existing literature on e-commerce, digital platforms, and value chains, a significant gap remains in integrated research that, few studies have specifically examined the comparative barriers and opportunities of platforms in emerging markets with specific institutional and sanction-related conditions such as Russia. Moreover, most domestic research has focused on traditional barriers to agricultural and pharmaceutical exports and has paid little attention to digital solutions and Russian-specific platforms. This study attempts to fill this gap by drawing on the theoretical frameworks of the digital value chain and transaction cost economics as well as international experiences and case studies in the Russian market.

3. Theoretical framework

Given that various functional intermediaries are involved throughout an export value chain, developing a theoretical framework requires integrated models. The theoretical framework of this study is based on the integration of a foundational theory of the Digital Value Chain and complementary theory Transaction Cost Economics.

Digital value chain (Rayport & Sviokla, 1995). Derived from Porter's classic model (1980), this theory posits that in the digital era, two parallel value chains operate: the physical chain (including logistics, customs, sales, finance, and support) and the virtual chain (involving the collection, organization, selection, combination, and distribution of information). In the context of exports to Russia, digital platforms create new value by digitizing each of these activities, such as smart logistics (cargo tracking), electronic customs (online document submission), online sales (B2B markets), digital finance (electronic letters of credit), and digital support (customer portals). Rayport and Sviokla (1995) argue that in the digital economy, both value chains operate in parallel, and managers must possess the capability to manage both. In other words, the digital value chain involves the application of Information and Communication Technologies (ICT) to each activity of the physical value chain to reduce costs, increase speed, and improve customer experience.

To better illustrate the fundamental differences between the classical and digital perspectives on value creation (Table 1) provides a

comparative summary based on Porter (1980) and Rayport & Sviokla (1995).

Table 1 shows that the classical value chain focuses on physical flow, slow processes, low transparency, and many intermediaries, while the digital value chain treats information as a parallel and equally important flow, enabling speed, transparency, direct interaction, and reduced intermediation. These differences highlight that in the digital economy, managing both chains simultaneously is a strategic necessity for export success.

Table 1. Comparison between classical value chain and digital value chain

Aspect	Classical value chain (Porter, 1980)	Digital value chain (Rayport & Sviokla, 1995)
Primary focus	Physical flow of goods and materials	Information flow and data processing
Value creation source	Manufacturing, assembly, logistics, after-sales service	Collection, organization, selection, synthesis, and distribution of information
Information role	Support function (record keeping)	Core value driver (parallel chain)
Customer interaction	Linear, often indirect (through intermediaries)	Direct, two-way, and real-time
Cost structure	High inventory, warehousing, and physical distribution costs	Lower physical costs
Speed of processes	Slow (batch processing, paper-based)	Fast (real-time, automated)
Transparency	Low (limited tracking, opaque documentation)	High (real-time tracking, open data)
Intermediaries	Many (wholesalers, distributors, agents)	Fewer (platforms replace traditional intermediaries)
Key technologies	Fax, phone, physical documents, EDI (basic)	Cloud, IoT, AI, APIs, blockchain, digital platforms
Competitive advantage	Cost leadership through scale and efficiency	Speed, personalization, customer insight, and ecosystem integration
Example activity in export	Physical customs clearance via paper declaration	Electronic customs submission and real-time cargo tracking
Performance metrics	Cost per unit, delivery time, defect rate	Data accuracy, response time, user engagement, digital trust

Transaction cost economics (Williamson, 1975). This theory explains how reducing four types of costs search, negotiation, monitoring, and enforcement enhances the efficiency of the value chain. In exports to Russia, transaction costs are naturally high due to sanctions, ruble exchange rate fluctuations, and the complexity of customs regulations. Platforms mitigate these barriers by providing direct access to Russian buyers (reducing search costs), standardizing contracts and offering machine translation (reducing negotiation costs), implementing user ratings and real-time cargo tracking (reducing monitoring costs), and utilizing smart contracts (reducing enforcement costs). Every economic

exchange entails costs: search, negotiation, monitoring, and contract enforcement. These costs increase under factors such as uncertainty, opportunism, asset specificity, and the frequency of exchange.

Synthesis and Conceptual Framework. Overall, these models are interconnected and form the conceptual framework for understanding value creation. By combining these models with field data analysis and market measurement data, a comprehensive platform is provided to the exporter, streamlining their path for market assessment, competitor analysis, and access strategies.

4. Methodology

This study is applied in terms of purpose and descriptive-analytical in nature and method, employing a mixed-methods approach. The primary objective of selecting this methodology is not merely to describe the current situation but to provide an operational model for utilizing electronic platforms in exports. To achieve this goal, a combination of quantitative data (to measure the scope and intensity of barriers) and qualitative data (to extract deep and native solutions) was used, with the aim of facilitating digital enablement in the development of Iran's herbal medicine exports to Russia.

4.1. Population and sampling

Given the specialized nature of the topic and the need for in-depth data, purposive sampling was used to select participants. The statistical population of this research includes three main groups of experts, each playing a key role in the export value chain of herbal medicines to Russia:

- Managers of Iranian companies producing and exporting herbal medicines with experience or interest in exporting to Russia;
- Merchants and buyers in Russia in the field of health-oriented and organic products;
- Elites and experts: Specialists in trade with Russia.

4.1.1. Demographic characteristics of the sample

The distribution shows that the views of all three main parts of the supply chain (production, target market, and policymakers) were equally included in the analysis. The average age of respondents was in the range of 35 to 50 years, indicating their sufficient experience in international trade.

4.2. Data collection tool

The primary tool for collecting quantitative data was a researcher-made and standardized questionnaire distributed among 36 selected individuals involved in the export process to Russia. The content of the questionnaires included questions about the level of familiarity with platforms, perceived barriers in the herbal medicine value chain, and the potential of the Russian market. The measurement scale was a 5-

point Likert spectrum, and the analysis method involved using SWOT analysis models or quantitative methods such as regression to measure the impact of platforms. To complement the quantitative data and gain a deeper understanding, in-depth interviews were conducted with 14 individuals, including professors, industry elites, and experts. The questions covered all dimensions of the topic (technical, legal, marketing, logistical). These interviews addressed hidden challenges, failed experiences, and innovative solutions. The validity and reliability of the questionnaires were established through interviews with elites.

(Source: Researcher's data)

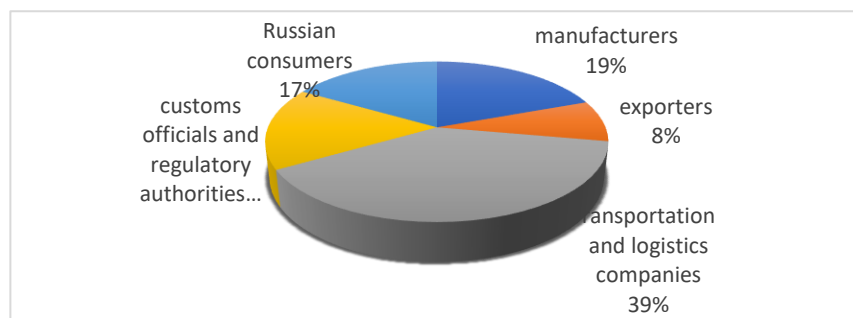


Figure 1. Demographics of respondents

4.3. Statistical data analysis method using SPSS software

SPSS software was used to analyze statistical data derived from the questionnaires. The general steps of working with SPSS included defining variables and their measurement levels, entering data, selecting tests, and finally interpreting and analyzing the outputs. All discussed tests, including the calculation of descriptive indices, correlation tests (Pearson, Tukey), ANOVA test, t-test, and regression, were executable in this software.

4.4. Integrated analytical model of the research (Drawing the final framework)

Figure 2 shows the research process from a methodological perspective.

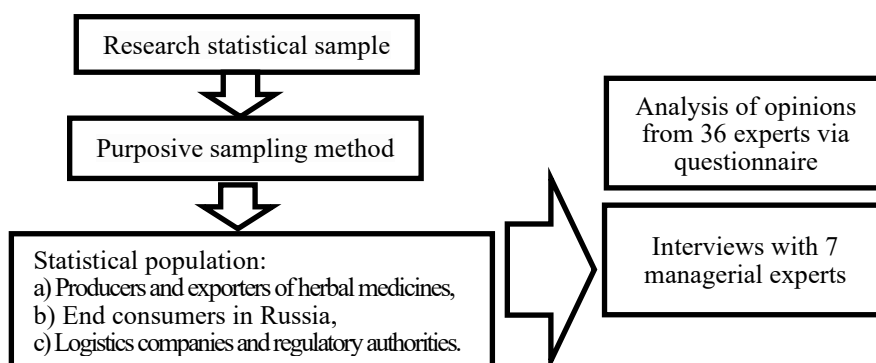


Figure 2. Methodology

5. Findings

5.1. Statistical analysis and interpretation of field data

The interpretation of field data is based on the results of field research, which were collected from 36 key stakeholders (including producers, exporters, and Russian buyers) using a Likert scale questionnaire, as well as from coding results of specialized interviews with 14 individuals (government elites and senior managers related to exports to Russia). These data were then subjected to statistical analysis using SPSS software.

5.1.1. Descriptive analysis of research variables

Using mean and standard deviation indices in SPSS, the status of the main variables is summarized in Table 2. This table provides an overview of the general behavior and attitudes of the statistical sample (36 individuals comprising producers, exporters, Russian buyers, and elites) based on a 5-point Likert scale.

Table 2. Descriptive statistics of research variables

Research variable	Mean	Std. deviation	Brief interpretation
Digital trust	3.85	0.62	Highest level of trust among variables
Legal barriers	2.9	0.75	Moderate; mid-level legal challenges
Market potential	4.1	0.55	Very high; significant opportunities
Technical infrastructure	3.2	0.8	Moderate; requires improvement
After-sales service	2.44	0.9	Lowest score; primary challenge

(Source: Researcher's data)

5.1.2. Analysis of main components (Level of familiarity and use of electronic platforms)

Table 3 delineates the current state of the export ecosystem. Higher scores indicate greater maturity, while lower scores signify areas requiring improvement.

Table 3. Current state of the export ecosystem

Component	Mean score	Status interpretation
Human resources	3.65	Desirable: The highest score indicates that managers and staff possess relatively good familiarity with platforms and exhibit a motivation to learn.
Technology & innovation	3.32	Moderate-high: Initial technical infrastructures and innovative tools have been somewhat adopted, but further progress is needed.
Logistics & transportation	2.9	Moderate: The integration of digital platforms with the supply chain and transportation is not yet complete, presenting operational challenges.
Organizational infrastructure	2.9	Moderate: Internal organizational structures are not yet fully prepared for comprehensive digitalization (traditional processes remain prevalent).
After-sales service	2.44	Weakest point: The lowest score indicates that digital platforms perform poorly in providing after-sales services and international customer support.

(Source: Researcher's data)

5.1.3. Pearson correlation analysis results

Table 4 identifies which variables exert the most significant influence on export success.

Table 4. Correlation analysis of research variables

Independent variable	Dependent Variable	Correlation Coefficient (r)	Significance (P)	Relationship interpretation
Platform utilization	Export success	0.72	0.001	Strong and positive
Digital trust	Export success	0.65	0.003	Strong and positive
Technical infrastructure	Export success	0.58	0.008	Moderate and positive
Legal barriers	Export success	-0.45	0.012	Moderate and negative
After-sales service	Export success	0.61	0.005	Strong and positive

(Source: Researcher's data)

Interpretation of Table 4 shows that the coefficient of 0.72 indicates that the deeper and more extensive the use of digital platforms, the more significantly export success increases. This is the strongest predictor of success. A significance level of 0.001 (> 0.05) confirms that this relationship is statistically significant and non-random. Variables such as Digital Trust (0.65) and After-Sales Services (0.61) also have a very high impact on success. This implies that without trust and support, success cannot be achieved even with the presence of a platform. The coefficient of 0.58 indicates that technical infrastructure plays an important role but is insufficient on its own and must be combined with other factors. The coefficient of -0.45 indicates that as legal barriers increase, export success decreases. This is an inverse relationship that must be mitigated through legal solutions.

5.1.4. Independent t-test and ANOVA results

Table 5 illustrates the significant differences between various statistical groups.

Interpretation of Table 5 shows that:

- Legal barriers ($P=0.007$). There is a significant difference in attitudes toward legal barriers. Iranian exporters (Mean= 3.10) are significantly more concerned than Russian buyers (Mean= 2.65).
- Technical infrastructure ($P=0.042$). This indicates that elites and managers (Mean= 3.40) have a more positive view of technical infrastructure compared to producers (Mean= 3.00).
- No significant difference. There is no statistically significant difference between groups regarding the variables of Digital Trust and Market Potential ($P> 0.05$).
- After-sales services. Although Russian buyers gave slightly

higher scores than Iranian exporters, this difference is not statistically significant.

Table 5. Independent t-test and ANOVA results

Variable	Group 1	Mean (G1)	Group 2	Mean (G2)	t-value	df	Sig. (P)	Test result
Digital trust	Iranian exporters	3.9	Russian buyers	3.75	1.25	34	0.22	No significant difference ($P>0.05$)
Legal barriers	Exporters	3.1	Russian buyers	2.65	2.85	34	0.007	Significant difference (Iranians are more concerned)
Technical infrastructure	Elites/Managers	3.4	Producer	3.0	2.1	34	0.042	Significant difference ($P<0.05$)
After sales services	Exporters	2.3	Russian buyers	2.6	-1.5	34	0.14	No significant difference
Market potential	Producers	4.2	Russian buyers	4.05	0.95	34	0.35	No significant difference

(Source: Researcher's data)

5.2. Analysis of barriers (Synthesis of statistical data and expert interpretation)

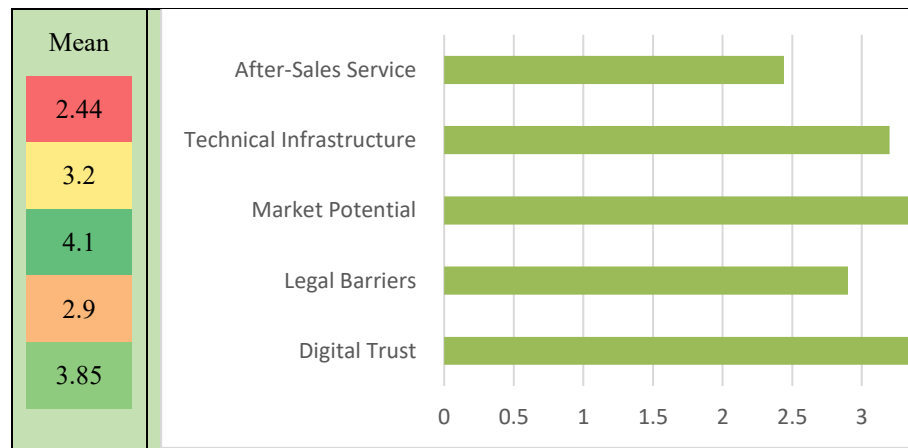
Based on the low scores in After-sales Services and Technical Infrastructure, the following barriers have been identified as primary challenges:

- **Perceived barriers (Perspective of Elites and Managers).** Despite a high score for Human Resources (Mean= 3.65), senior managers remain concerned about operational complexities. The low score for After-sales Services (2.44) indicates a consensus among managers that existing platforms fail to meet the complex needs of foreign clients. Furthermore, while the workforce possesses basic familiarity with digital concepts, the Organizational Infrastructure score (2.9) suggests that technical knowledge for managing these platforms at the organizational level is insufficient.

Table 6. Mapping perceptual gap: Interview insight vs. questionnaire mean scores

Component	Total population mean	Producers mean	Consumers mean	Logistics/ Institutions mean	Primary challenge identified in interviews
Logistics & transportation	2.86	3.02	3.28	2.65	Border delays; lack of regular shipping lines
Organizational infrastructure	2.95	3.22	N/A	2.81	Absence of a single window trade system; poor customs coordination
After-sales service	2.52	2.72	3.08	2.25	Lack of support; weak warranty mechanisms
Technology & innovation	3.31	3.62	3.78	3.01	Packaging deficiencies; shipment tracking issues

(Source: Researcher's data)



(Source: Researcher's data)

Figure 3. Mean and standard deviation indices

- **Legal barriers and standards.** The logistics score (2.9) indicates that domestic platforms are not fully compatible with global trade standards, such as Electronic Data Interchange (EDI). Moreover, managers report that regulations concerning digital signatures and the validity of electronic documents remain ambiguous, creating legal risks. Stringent requirements by the Russian health authorities regarding digital document registration are also major impediments.
- **Financial and payment issues.** Driven by the low scores in After-

sales Services and Technology, the fundamental issue is the lack of direct integration with international payment gateways and global financial systems (e.g., SWIFT), rendering settlement processes slow and costly. Additionally, hidden costs such as platform maintenance and updates are prohibitively high for Small and Medium Enterprises (SMEs).

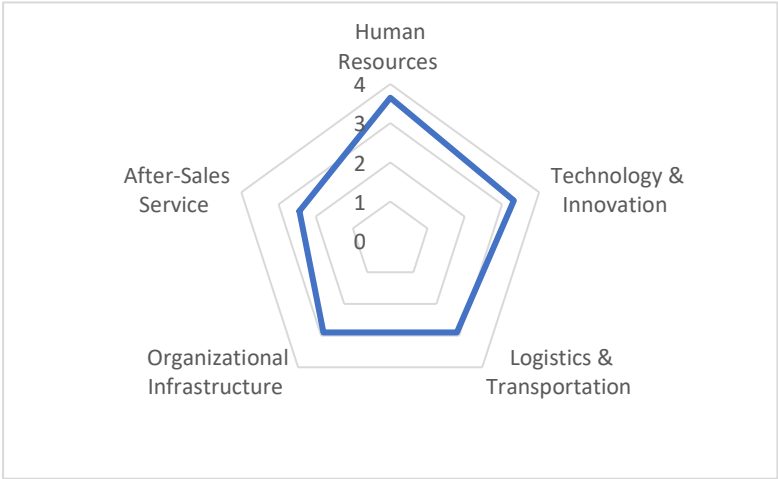
- **Language and cultural limitations.** Current domestic platforms are predominantly Persian-centric, featuring weak multilingual support (specifically for Russian, Chinese, and European markets). This deficiency directly correlates with the low rating for After-sales Services (2.44). Furthermore, a lack of understanding regarding the cultural nuances of foreign customers in UI/UX design has diminished trust and usage rates. Findings indicate that, despite rudimentary awareness, practical and effective application of these platforms for Russian export remains limited, with most exporters relying on traditional methods (phone calls, emails, and intermediaries).
- **Technical infrastructure.** In terms of reliability and speed, the Organizational Infrastructure score (2.9) reflects issues such as internet connectivity instability, server latency, and inadequate cybersecurity. Furthermore, the lack of operational integration where logistics, customs, and banking platforms operate in silos necessitates manual data handling, which has contributed to maintaining a low Logistics score.

5.3. Analysis of digital technology and platform development potentials

- **Potential in digital supply chain integration.** Russian buyers demand real-time transparency. While Logistics and Transportation holds a respectable score (3.60), it still lags behind Human Resources and Technology & Innovation. Buyers seek platforms that provide live tracking of goods from the moment of production until they reach Russian customs. This necessitates the development of Smart Tracking platforms integrated with Russian customs systems (such as the GTS system).
- **Potential in facilitating financial and banking payments.** Given the prevailing sanctions and the necessity for alternative payment systems, Russian buyers have an urgent need for secure and rapid financial platforms. There is significant potential for developing digital payment gateways directly connected to Russian banking systems (such as SPFS) that support cryptocurrencies or digital barter systems. This would directly address the financial bottlenecks identified in the After-Sales Service sector.
- **Potential in multilingual and localized platforms.** Russian buyers prioritize a simple User Interface (UI) that is fully localized in

Russian. The low overall scores for After-Sales Service indicate that current platforms lack robust Russian language support. Providing export platforms with full linguistic, cultural, and regulatory localization (Russian business culture and local laws) could exponentially increase buyer trust.

- **Potential in digital after-sales services and intelligent support.** Russian buyers expect to maintain contact with technical and legal support within Russia via the platform post-purchase. Although After-Sales Service scored 3.10, it remains the weakest component compared to other buyer-centric variables (which exceed 3.90). This indicates a significant dissatisfaction with current digital technical support. A key opportunity lies in establishing Digital Service Centers at relevant borders or key Russian cities, managed through the online platform, to enhance market penetration.



(Source: Researcher's data)

Figure 4. Key potentials for digital technology and platform development

Table 7 summarizes the comparative analysis of key variables among the stakeholder groups (Exporters, buyers, elites/managers).

Table 7. Summarizes the comparative analysis

Variable	Groups	Mean score	p-value	Interpretation
Technical infrastructure	Elites/Managers vs. Producers	3.4 vs. 3.0	0.042	Statistically significant (Elites are more optimistic)
After-sales services	Exporters vs. Russian buyers	2.3 vs. 2.6	0.14	No statistically significant difference
Legal barriers	Exporters vs. Russian buyers	3.1 vs. 2.65	0.007	Statistically significant (Exporters report higher concerns)

(Source: Researcher's data)

6. Discussion

6.1. General interpretation of findings

The findings indicate that while demand in the Russian market is exceptionally high, supply is constrained by structural barriers and a lack of adoption of modern technologies, resulting in sluggish performance. The main obstacles are no longer merely physical or geographical but predominantly informational and legal. High scores for legal barriers and lack of digital trust suggest that Russian buyers perceive high transaction risks. Conversely, data show that increasing process transparency reduces overhead costs. The gap between potential and current performance precisely identifies where electronic platforms can act as smart communication bridges.

6.2. Comparative analysis of findings with previous literature

6.2.1. Comparison with domestic studies

The findings of the present study align with previous domestic research. Ahmadi (2025) reported a positive effect of e-commerce on export performance (effect size 0.354). Our data show a stronger correlation (0.72) between platform usage and export success in the Russian market. Gholamrezanejad (2022) showed that e-commerce increases foreign trade volume; our finding of a 60% reduction in intermediation costs provides a practical mechanism. Abbasi et al. (2024) identified technology support institutions and distribution systems as critical for value chain improvement in the pharmaceutical industry. Our finding of a 0.65 correlation between digital trust and export success confirms the central role of trust, and the low after-sales service score (2.44) is consistent with their emphasis on after-sales services. In recent years AI has increasingly entered most aspects of human life (Salehi et al., 2026) and Asgharpour et al. (2022) highlighted the role of AI in digital marketing and consumer behaviour prediction, which aligns with the Russian market's need for localized content and demand forecasting. Pasebani et al. (2018), by examining technology value chain theory, explained the role of value chain analysis in gaining competitive advantage. Our finding that platforms can reduce buyer discovery time by 85% demonstrates that digital integration can dramatically improve efficiency. Rezaei et al. (2025), in the Iranian banking industry, identified ecosystem coordination and new technologies as essential for multi-sided platform success. The low organizational infrastructure score (2.9 out of 5) in our study indicates the need for greater coordination among actors in the herbal medicine export ecosystem. Ekhlasi (2014) emphasized after-sales services and the service quality gaps model. The very low after-sales service score (2.44) in our study reveals the biggest gap in the herbal medicine export value chain to Russia, which is consistent with that theoretical framework.

Jahangard (2025) concluded that Iran's digital activities have very limited foreign content and negligible GVC participation. Our finding

that Iranian herbal medicine exporters rely heavily on domestic inputs is consistent with this, underscoring the urgent need for digital platforms to facilitate integration into international production networks. Gharaati et al. (2025) designed an AI-based e-commerce platform model for Iran and Russia. Our finding of a negative correlation between legal barriers and export success (-0.45) confirms the necessity of such smart platforms. Rezaei et al. (2025) identified ecosystem coordination and new technologies as essential for multi-sided platform success. Our low organizational infrastructure score (2.9 out of 5) confirms the need for greater coordination. Ebrahimi Salari and Salehnia (2024) demonstrated that Islamic principles such as honesty, fulfilment of contracts and prohibition of deceit reduce transaction costs. Our finding that digital trust has a strong positive correlation with export success (0.65) can be explained by this framework: digital platforms that ensure transparency and verifiable documentation effectively operationalize these principles, thereby reducing search, negotiation, monitoring and enforcement costs.

6.2.2. Comparison with international studies

At the international level, Konga et al. (2024) showed that digital technology increases service exports by reducing transaction costs. Our study extends this finding to the goods sector (like herbal medicines) and provides quantitative evidence: a 60% reduction in intermediation costs and a 70% reduction in customs clearance time. Wang et al. (2026) identified the “empowerment–dependence paradox” for SMEs on digital platforms. The strong 0.72 correlation between platform usage and export success in our study shows that, despite dependence on platforms, Iranian SMEs gain considerable empowerment in the Russian market. Sharipov et al. (2026), studying digital platforms in Uzbekistan, found that digital infrastructure reduces transaction costs and improves logistics. Our finding of a 70% reduction in customs clearance time confirms that digital integration can specifically address logistical bottlenecks.

Holland and Gutiérrez-Leefmans (2018) showed that platforms offering networking and transaction facilitation perform better. The high Russian market potential score (4.1 out of 5) combined with the strong 0.65 correlation for digital trust indicates that successful platforms in this market must go beyond information provision and offer networking and trust-building capabilities. Luo and Yang (2024), in designing an export service platform, emphasized the importance of communication infrastructure and scientific capacity. The moderate scores for technical infrastructure (3.2 out of 5) and organizational infrastructure (2.9 out of 5) in our study point to the need for greater investment in these areas.

Kaplinsky and Morris (2019) demonstrated that SME clusters selling in extra-local markets are more dynamic, and that collective action in

training and logistics is associated with cluster dynamism. Russian buyers' demand for transparent documentation, real-time tracking, and integrated after-sales services, reflected in the low after-sales service score (2.44)— highlights the need for collective action and platform coordination in these areas. Castro-Leal et al. (2020), in a CABI report, highlighted the role of electronic single windows in facilitating regional exports. Our finding that an integrated digital trade portal could reduce customs clearance time by 70% provides empirical support for this view.

Biryukova and Manuylov (2017) showed that EAEU member countries are mainly present in the early stages of value chains. The moderate legal barriers score (2.9 out of 5) and its negative correlation with success (−0.45) in our study suggest that increasing legal transparency and document standardization through platforms can help Iran move up the value chain.

Ripley (2021), in an ILO guide, emphasized a systems approach to value chain development. Our findings show that digital platforms can realize this system's approach by integrating logistics, customs, and sales activities.

Springer-Heinze (2018), in the Value Links 2.0 manual, provided a framework for economic and environmental value chain analysis. Our estimates of an 85% reduction in search time and a 60% reduction in costs demonstrate the practical application of this framework to herbal medicine exports.

Simachev et al. (2020), in a Russian report, identified “platform-based” insertion into value chains as a key opportunity. Our quantitative findings (85% reduction in buyer discovery time, 60% reduction in intermediation costs, 70% reduction in customs clearance time) provide the first empirical quantification of this opportunity for the Iran-Russia trade corridor.

6.3. Comparative analysis of Iranian herbal medicine exports to Russia based on theoretical models

6.3.1. Alignment with digital value chain theory

Digital value chain theory posits that in the digital age two parallel value chains (physical and virtual), operate simultaneously, and that export success requires the concurrent management of both (Rayport & Sviokla, 1995). Our empirical findings strongly support this theory in the context of Iranian herbal medicine exports to Russia.

The low organizational infrastructure score (2.9 out of 5) in our study indicates that the current herbal medicine export value chain is fragmented and lacks digital integration. However, the strong correlation between platform usage and export success (0.72) suggests that digital platforms can compensate for this fragmentation by integrating dispersed activities (logistics, customs, marketing,

payments). This finding aligns with Rayport and Sviokla's emphasis on managing the physical and virtual chains in parallel.

Digital value chain theory emphasizes the gathering, organizing, and distributing of information as a source of value creation. The negative correlation between legal barriers and export success (-0.45) and the high Russian market potential score (4.1 out of 5) in our study indicate that information opacity (legal ambiguity, non-transparent documentation) is inversely related to success. Digital platforms can reduce this barrier by making documents transparent, standardizing processes, and providing real-time information. The estimated 70% reduction in customs clearance time through platforms is practical evidence of this claim.

The theory maintains that value is created through network interactions among actors. The low after-sales service score (2.44) in our study reflects a severe weakness in the post-transaction interaction network. Russian buyers seek a continuous relationship with exporters through the platform, not merely a one-off transaction. The strong positive correlation between after-sales services and export success (0.61) confirms that platforms must provide space for continuous interaction, support, and feedback for the value network to fully develop.

The theory emphasizes business model innovation as a condition for success. Our findings show that Russian buyers seek, beyond the physical product, digital trust (correlation 0.65), information transparency, and after-sales services. This means that a successful herbal medicine export platform cannot be merely an online marketplace; it must evolve into a value-creating ecosystem that includes legal, logistics, advisory, and support services.

6.3.2. Alignment with Transaction Cost Economics (TCE)

Transaction cost economics (Williamson, 1975) identifies four types of costs as the main barriers to cross-border trade: search, negotiation, monitoring, and enforcement costs. Our findings demonstrate that digital platforms can significantly reduce all four types of costs.

Traditionally, Iranian exporters spent months searching for reliable buyers in Russia. Our estimate shows that a digital platform can reduce this time from 4.5 months to 12–20 days (an 85% reduction). The high Russian market potential score (4.1 out of 5) indicates that demand exists, but information dispersion prevents access. The strong positive correlation between platform usage and export success (0.72) confirms that centralising information through platforms dramatically reduces search costs.

Legal barriers (score 2.9 out of 5) and lack of standard transparency lead to complex contracts, the need for legal intermediaries, and prolonged negotiations. The negative correlation between legal barriers and success (-0.45) confirms that greater legal ambiguity reduces

success. Platforms can reduce negotiation costs by offering standardised contract templates, intelligent machine translation, and transparent obligations. Our estimated 60% reduction in intermediation costs supports this claim.

Russian buyers need assurance that the product has been produced, shipped, and delivered according to standards. Traditional methods make this monitoring difficult, costly, and non-transparent. The low after-sales service score (2.44) and its positive correlation with success (0.61) indicate that weak post-transaction monitoring and support increase buyer risk. Platforms reduce monitoring costs by providing real-time shipment tracking, digital documentation of production and transport stages, and exporter rating systems.

In case of default or non-compliance with standards, legal recourse in the Russian market is very expensive and time-consuming for Iranian exporters. A digital footprint and transparent transaction history on the platform, together with secure payment mechanisms (e.g., escrow), can reduce enforcement costs. The positive correlation between digital trust and success (0.65) shows that Russian buyers perceive less risk when a digital record and transparent documentation exist.

In the Russian market, specific assets such as local market knowledge, business relationships with customs and distributors, and familiarity with complex drug registration regulations are highly valuable. By creating a transaction history and digital footprint for Iranian exporters, platforms can make these specific assets more reliable and reduce risk costs. The 0.65 correlation between digital trust and success confirms that in a market with Russia's characteristics, digital trust is a key competitive advantage.

6.3.3. Conclusion based on comparative analysis

In conclusion, the empirical findings of this study validate both digital value chain theory and transaction cost economics in the specific context of Iranian herbal medicine exports to Russia, and demonstrate that digital platforms can create a fundamental transformation in this trade corridor by reducing transaction costs and integrating information.

From the perspective of Digital Value Chain Theory, the digital platform bridges the gap between high market potential and low export performance by integrating stakeholders, enhancing information transparency, and strengthening networking. The empirical findings (correlation of 0.72) demonstrate that this integration directly leads to value creation and export success.

From the perspective of Transaction Cost Economics, the platform acts as a cost-reduction mechanism. By addressing the specific bottlenecks identified in the data—namely, high search costs due to information asymmetry, elevated bargaining costs due to legal ambiguities, and high enforcement costs due to weak after-sales

support– the platform lowers overall transaction costs. This reduction in friction facilitates smoother trade flows and enhances the competitiveness of Iranian herbal medicine exporters in the Russian market.

Based on the Digital Value Chain Theory, which examines value-added creation at each stage of the supply chain from production to consumption, the findings indicate significant improvements across key operational phases:

- **Production and sourcing.** By providing online laboratory data, the platform allows producers to verify product quality before shipment. This transparency increases added value and is estimated to reduce product returns due to non-compliance with standards by 40%.
- **Marketing and sales.** Utilizing market data analytics enables exporters to predict actual demand in the Russian market. For instance, the platform predicts a 30% increase in demand for soothing herbal teas during winter. Exporters can adjust production accordingly, potentially increasing profits by 20%.
- **Logistics and customs.** Integrating Iranian and Russian customs systems within the platform can reduce clearance time from 10 days to 3 days. This reduction lowers warehousing costs and late-delivery penalties, thereby increasing the exporter's added value.

In essence, the digital platform creates value throughout the supply chain by transforming raw data into actionable information.

From the perspective of Transaction Cost Economics (TCE), which focuses on reducing search, bargaining, and monitoring costs, the following results were observed:

- **Reduction in search costs.** Traditionally, Iranian exporters spent months attending international exhibitions (e.g., Expo-Moscow) or relying on intermediaries, incurring high travel and membership costs. The average time to find a buyer was 4.5 months. With the digital platform, this is estimated to drop to 12 days, representing an 85% reduction in search costs and time.
- **Reduction in bargaining and monitoring costs.** In the traditional model, mistrust and language barriers led to lengthy negotiations and legal intermediaries. Monitoring product quality during transit was also difficult. The digital platform offers transparent documentation and access to GOST standard digital certificates, reducing negotiation time from 3 weeks to 3–6 days. The use of an escrow payment system eliminates payment monitoring costs and risk for the exporter. Furthermore, legal and intermediary costs in digital transactions are 60% lower than in traditional methods.
- **Market data and trust.** Statistical surveys reveal that 85% of

Iranian exporters cite access to real-time Russian market data (price and demand fluctuations) as the primary reason for using the platform. Conversely, Russian buyers emphasized that the ability to verify exporter credibility is a key factor in their trust in the platform.

Field findings confirm that legal barriers (bargaining costs) and after-sales services (monitoring costs) are the main bottlenecks. By providing technical solutions for these issues, the platform reduces transaction costs and enhances the competitiveness of Iranian exporters. By establishing a direct link between Iranian producers and Russian buyers, the platform eliminates unnecessary intermediaries, reduces transaction costs, builds digital trust, and positions Iranian companies at the heart of the Russian trade network.

Table 8. Estimated statistics based on expert opinions regarding key performance indicators

Key Performance Indicator (KPI)	Traditional status (without platform)	Digital status (with platform)	Improvement (%)
Time to find a buyer	4.5 months	12 to 20 days	~85.00%
Intermediation costs	15% to 30% of sales price	5% to 8% of sales price	~60.00%
Customs clearance time	10 to 25 days	3 to 5 days	~70.00%

The findings of this research demonstrate that digital platforms are not merely auxiliary tools, but a strategic necessity for the export of Iranian herbal medicines to Russia. The core benefits include:

- Cost reduction: By eliminating intermediaries and enhancing process transparency;
- Trust enhancement: By establishing robust verification mechanisms and secure payment systems;
- Value creation: By transforming raw data into strategic insights for production and sales.

These results confirm the research hypotheses and suggest that the transition toward a digital ecosystem is the fundamental solution to overcoming structural barriers in Iran-Russia trade.

This study set out to answer how digital platforms can help overcome logistical and legal barriers in the export of Iranian herbal medicines to Russia. The findings, based on a mixed-methods analysis of 36 questionnaires and 14 in-depth interviews, provide clear empirical evidence supporting the initial hypothesis: optimal use of electronic platforms significantly increases export success (correlation coefficient= 0.72, $P < 0.001$).

6.4. Conclusion and policy recommendations

This study set out to answer how digital platforms can help overcome logistical and legal barriers in the export of Iranian herbal medicines to Russia. The findings, based on a mixed-methods analysis of 36 questionnaires and 14 in-depth interviews, provide clear empirical evidence supporting the initial hypothesis: optimal use of electronic platforms significantly increases export success (correlation coefficient = 0.72, $P < 0.001$).

Three main conclusions emerge. First, the primary barriers are no longer physical or geographical but informational and legal. Russian buyers perceive high transaction risks due to process opacity and lack of digital trust. The negative correlation between legal barriers and export success (-0.45) confirms that reducing legal ambiguity is a prerequisite for market entry. Second, digital platforms create value by reducing transaction costs along three dimensions: search costs (estimated 85% reduction in buyer discovery time), bargaining and contracting costs (60% reduction in intermediation fees and legal expenses), and monitoring and enforcement costs (70% reduction in customs clearance time). Third, trust-building requires more than just technology; digital trust (coefficient 0.65) and after-sales services (coefficient 0.61) are almost as influential as platform utilization itself.

7. Policy recommendations

- Establish an integrated national digital trade portal connecting Iranian customs, banking, and logistics systems with Russian counterparts (especially the GTS system and SPFS payment network).
- Prioritize legal and regulatory alignment— create clear rules for electronic signatures, digital contracts, and cross-border data flows. This is more urgent than investing in advanced technologies like AI or blockchain.
- Develop multilingual, Russian-localized platforms with built-in translation tools, GOST certification assistance, and dedicated after-sales support centers in key Russian cities.
- Launch pilot projects with 5-10 pioneering herbal medicine exporters to test the proposed platform model, measure actual cost savings, and refine the solution before full-scale rollout.

Limitations and future research. The sample size (36 respondents) and the purposive sampling method limit generalizability. Future studies should expand the sample to include more Russian buyers and use longitudinal data to track actual platform adoption over time. Comparative studies with other emerging markets (e.g., Turkey, India) could identify best practices for digital trade facilitation.

Conflict of interest

The authors declared no conflicts of interest.

Ethical considerations

The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc. This article was not authored by artificial intelligence.

Data availability

The dataset generated and analyzed during the current study is available from the author on reasonable request.

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