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STRATEGIC FACTORS OF BUSINESS COMPETITIVENESS IN INTERNATIONAL BUSINESS: DIGITAL TRANSFORMATION, SUPPLY CHAIN OPTIMIZATION AND CHANGES IN CUSTOMS REGULATION

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ABSTRACT

In the current context of global economic integration, business competitiveness in international markets has become increasingly dependent on the ability of organizations to adapt to technological, logistical, and regulatory transformations. This study analyzes the strategic factors influencing business competitiveness in international business, focusing on three key dimensions: digital transformation, supply chain optimization, and adaptation to changes in customs regulations. The research adopts a quantitative, explanatory-correlational design based on data collected from 210 companies engaged in international trade activities across sectors such as manufacturing, logistics, international commerce, and cross-border e-commerce. Data were obtained through a structured questionnaire using a Likert scale and analyzed using descriptive statistics, Pearson correlation, multiple linear regression, and analysis of variance (ANOVA). The results reveal significant positive relationships between the studied variables and business competitiveness. Supply chain optimization emerged as the most influential factor ($\beta = 0.39$), followed by digital transformation ($\beta = 0.34$) and adaptation to customs regulations ($\beta = 0.22$). The regression model explained 68% of the variance in business competitiveness ($R^2 = 0.68$), indicating strong explanatory power. These findings suggest that firms that integrate advanced logistics management practices, adopt digital technologies, and effectively manage regulatory requirements are better positioned to achieve competitive advantages in international markets. The study contributes to the literature by proposing an integrated analytical model that combines technological, logistical, and regulatory dimensions of competitiveness. The findings also provide practical implications for managers and policymakers seeking to strengthen the international competitiveness of firms through digitalization, supply chain resilience, and trade facilitation policies.

KEYWORDS: Digital Transformation; Global Supply Chains; International Business Competitiveness; Customs Regulation; Trade Facilitation; Logistics Management; International Trade Strategy.

1. INTRODUCTION

1.1. *General context of the problem*

In the contemporary context of the global economy, business competitiveness in international business has become a determining factor for the sustainability and expansion of organizations. The intensification of globalization, the accelerated advance of digital technologies, and the constant evolution of regulatory frameworks have profoundly transformed the dynamics of international trade. Companies participating in global markets currently face highly competitive environments characterized by rapid technological innovation, complex supply chains, and increasingly sophisticated customs regulations.

In this scenario, the ability of organizations to strategically adapt to such changes is a key element in maintaining sustainable competitive advantages. According to various theoretical approaches to business competitiveness, competitive advantages depend not only on internal factors such as organizational resources and capabilities, but also on the ability of companies to respond effectively to changes in the international environment, including technological, logistical and regulatory transformations.

Within this framework, three dimensions have become particularly relevant in recent years: digital transformation, supply chain optimisation and changes in customs regulation. These factors not only influence the operational efficiency of companies, but also condition their ability to successfully integrate into international markets.

1.2. *Digital transformation and international competitiveness*

Digital transformation has established itself as one of the main drivers of business competitiveness. This process involves the strategic integration of digital technologies – such as artificial intelligence, big data, blockchain, the Internet of Things (IoT) and digital platforms – into business models, operational processes and corporate strategies.

In the field of international business, digitalization can significantly improve the efficiency of trade operations, reduce transaction costs, increase transparency in supply chains, and facilitate access to new global markets. In addition, digital technologies make it possible to optimize processes such as logistics management, cross-border e-commerce, product traceability, and the automation of customs procedures.

Recent studies indicate that companies that adopt digital transformation strategies have higher levels of

productivity, innovation and capacity to adapt to the turbulence of international trade. However, technology adoption also poses significant challenges related to investing in digital infrastructure, training human talent, and integrating complex technology systems.

1.3. *Supply chain optimization in global trade*

Another strategic component of business competitiveness in international business is efficient supply chain management. Global supply chains have become increasingly extensive, interdependent and vulnerable to disruptions arising from economic, geopolitical, health or logistical factors.

Recent events such as the COVID-19 pandemic, geopolitical conflicts, and changing global demand patterns have highlighted the fragility of many traditional supply chains. As a result, companies have begun to adopt strategies aimed at increasing the resilience, flexibility and efficiency of their logistics networks.

Supply chain optimization involves implementing advanced logistics planning practices, process digitization, data-driven inventory management, strategic supplier integration, and utilizing emerging technologies to improve visibility and traceability of trade flows. These practices make it possible to reduce delivery times, minimize logistics costs and improve the ability to respond to changes in the international market.

In addition, the integration of digital technologies into supply chain management – such as enterprise resource planning (ERP) systems, logistics management platforms, and predictive analytics tools – has become a critical factor in strengthening business competitiveness in global markets.

1.4. *Changes in customs regulation and their impact on competitiveness*

Customs regulation is another key element that influences the competitiveness of companies involved in international trade. In recent decades, customs systems have undergone significant transformations aimed at facilitating trade, strengthening the security of logistics chains and improving the efficiency of border control processes.

Governments and international organizations have promoted various initiatives to modernize customs procedures, such as the digitization of procedures, the implementation of foreign trade single windows, the use of risk management systems, and regulatory harmonization between countries. These reforms seek to reduce the times and costs associated with import and export processes, while

ensuring compliance with regulatory and safety standards.

However, the evolution of customs regulation also brings new challenges for businesses. Regulatory changes, the multiplicity of international regulations, and the increasing complexity of customs procedures can create uncertainty and increase compliance costs. In this sense, companies that manage to adapt quickly to regulatory changes, implement efficient customs management systems and maintain an adequate level of regulatory compliance can obtain significant competitive advantages in international trade.

1.5. Research Gap

Despite the abundant literature on business competitiveness, digital transformation, international logistics and customs regulation, numerous studies have analysed these factors in isolation. However, in the current context of global trade, it is essential to understand how these elements interact together to influence the competitiveness of companies involved in international business.

Recent literature suggests that the strategic integration between business digitalization, supply chain optimization, and adaptation to regulatory changes can generate synergies that enhance organizational competitiveness. However, there is still limited empirical evidence that simultaneously analyzes these three factors within a comprehensive analytical framework.

In particular, it is necessary to deepen the understanding of how digital transformation facilitates supply chain optimization, how these logistics improvements interact with international trade regulatory systems, and how these processes influence the competitive performance of companies.

1.6. Justification of the study

This study is justified by the growing need to identify the strategic factors that determine business competitiveness in the dynamic environment of international business. Understanding the interaction between digital transformation, supply chain optimization, and changes in customs regulation will generate relevant knowledge for the development of more efficient and adaptive business strategies.

From an academic perspective, the research contributes to expanding the literature on international competitiveness by integrating multiple strategic dimensions within the same analytical model. The study also offers empirical

evidence that can serve as a basis for future research on business digitalization, international logistics, and global trade governance.

From a practical perspective, the results of the study can provide useful guidance for business managers, policymakers, and international trade specialists interested in improving the efficiency and competitiveness of organizations operating in global markets.

1.7. Methodological approach of the study

Based on the nature of the research problem and the objectives proposed, this study adopts a **quantitative approach with a correlational explanatory design**, aimed at analyzing the relationship between three strategic variables – digital transformation, supply chain optimization and changes in customs regulation – and their influence on business competitiveness in international business.

The study will employ descriptive and inferential statistical techniques, including correlation analysis, multiple regression, and analysis of variance (ANOVA), in order to assess the magnitude and direction of the relationships between the variables analyzed.

1.8. General objective

Analyze the strategic factors that influence business competitiveness in international business, specifically digital transformation, supply chain optimization, and changes in customs regulation.

1.9. Specific objectives

1. To assess the impact of digital transformation on the competitiveness of companies involved in international business.
2. Analyze the relationship between supply chain optimization and business competitive performance in international markets.
3. To examine the influence of changes in customs regulation on the efficiency and competitiveness of exporting and importing firms.
4. Determine the joint effect of digital transformation, supply chain optimization and adaptation to customs regulation on business competitiveness.

1.10. Research hypothesis

H1: Digital transformation has a positive and significant effect on business competitiveness in international business.

H2: Supply chain optimization has a positive influence on business competitiveness in international business.

H3: The ability to adapt to changes in customs regulation has a positive effect on business competitiveness.

H4: The interaction between digital transformation, supply chain optimization and adaptation to customs regulation significantly explains business competitiveness in international business.

2. THEORETICAL FRAMEWORK

2.1. *Business competitiveness in international business*

Business competitiveness in the context of international business refers to an organization's ability to maintain and improve its position in global markets through value creation, operational efficiency, and strategic adaptation to changes in the economic, technological, and regulatory environment. In an environment characterized by intense global competition, companies must develop sustainable competitive advantages that allow them to differentiate themselves and respond effectively to the dynamics of international trade.

Various theoretical approaches have helped to explain the determinants of business competitiveness. Among the most influential are Porter's competitive advantage model, resource-based view (RBV) theory, and the dynamic capabilities approach.

Porter's model holds that the competitiveness of firms depends largely on their ability to develop strategies that allow them to differentiate themselves or achieve cost leadership within their industry sector. In the international arena, this advantage is strengthened through technological innovation, efficiency in logistics management and adaptation to the regulatory frameworks of global markets.

On the other hand, resource-based theory (RBV) states that competitive advantages originate in the internal resources and capabilities of the company, especially those that are valuable, rare, difficult to imitate and organizationally exploitable. In this sense, the adoption of digital technologies, the ability to manage complex supply chains, and specialized knowledge on customs regulations are strategic resources that can generate sustainable competitive advantages.

The dynamic capabilities approach complements this perspective by emphasizing the importance of organizational capacity to adapt to changing environments. In the context of international trade, companies must develop capabilities to integrate emerging technologies, reconfigure their logistics networks, and respond quickly to regulatory changes.

2.2. *Digital transformation in international business*

Digital transformation is defined as the process by which organizations integrate digital technologies into their processes, organizational structures, and business models with the aim of improving their efficiency, innovation, and competitiveness. In recent years, digitalization has become a key factor for the development of competitive advantages in global markets.

Emerging technologies such as big data, artificial intelligence, the Internet of Things (IoT), blockchain, and digital platforms have profoundly transformed the way businesses operate in international trade. These technologies make it possible to improve data-based decision-making, optimize logistics management, facilitate product traceability and automate administrative and regulatory processes.

One of the main benefits of digital transformation in international trade is the reduction of transaction costs. Digital platforms make it possible to connect companies, suppliers and customers at a global level, reducing information barriers and facilitating access to new markets. Likewise, the digitization of business processes improves transparency and efficiency in international transactions.

Another relevant dimension of digital transformation is the digitalization of logistics and customs processes. The use of electronic documentation systems, cross-border e-commerce platforms and data analysis tools makes it possible to speed up export and import processes, reducing clearance times and administrative costs.

In addition, the adoption of technologies such as blockchain has been proposed as a solution to improve traceability and security in global supply chains. These technologies allow transactions to be recorded in a transparent and secure manner, making it easier to verify the authenticity of products and comply with international regulations.

However, the implementation of digital transformation strategies also faces significant challenges. These include the high initial investments in technological infrastructure, the need to develop digital skills in human capital, and the risks associated with cybersecurity.

2.3. *Global Supply Chain Management and Optimization*

Global supply chains are one of the central elements of modern international trade. These logistics networks connect multiple actors – suppliers, manufacturers, distributors and customers

– located in different regions of the world, enabling the production and distribution of goods and services on a global scale.

Efficient supply chain management is a critical factor for business competitiveness, as it directly influences variables such as production cost, delivery times, quality of service, and customer satisfaction.

In recent years, the complexity of global supply chains has increased considerably due to the fragmentation of production processes, the globalization of markets and the growing interdependence between countries. This phenomenon has led companies to adopt advanced logistics management strategies aimed at improving the efficiency and resilience of their supply networks.

Among the main supply chain optimization strategies are the integration of information systems, collaborative management with suppliers, data-driven planning, and the adoption of digital technologies to improve the visibility of logistics flows.

Digitalization has played a key role in modernizing supply chains. Enterprise resource planning (ERP) systems, transportation management systems (TMS), and predictive analytics platforms allow companies to monitor the movement of goods in real time, anticipate potential disruptions, and optimize the allocation of logistics resources.

Likewise, the concept of **resilient supply chain** has gained relevance in recent literature. Resilience refers to the ability of the supply chain to resist, adapt, and recover from disruptive events such as health crises, geopolitical conflicts, natural disasters, or disruptions in international transportation.

The COVID-19 pandemic highlighted the vulnerability of many global supply chains, leading many companies to reconsider their logistics strategies. As a result, investments in monitoring technologies, supplier diversification and nearshoring strategies have increased.

2.4. Customs regulation and trade facilitation

Customs regulation is an essential component of the international trading system, as it establishes the procedures, rules and controls that regulate the movement of goods between countries. Customs authorities play a critical role in collecting taxes, protecting national security, and monitoring compliance with trade rules.

In recent decades, various reforms have been implemented aimed at modernizing customs systems and facilitating international trade. One of the most relevant instruments in this area is the **Trade Facilitation Agreement of the World Trade**

Organization (WTO), which promotes the simplification and harmonization of customs procedures.

Among the main trade facilitation measures are the implementation of **foreign trade single windows**, the digitization of customs documents, risk management in border controls, and cooperation between customs authorities of different countries.

The digitalisation of customs systems has made it possible to significantly improve the efficiency of goods clearance processes. The use of electronic platforms for the presentation of documents, the automation of inspection processes and the use of risk analysis systems contribute to reducing the times and costs associated with international trade.

However, changes in customs regulation also create challenges for businesses. Regulatory complexity, the diversity of regulations between countries and the constant updating of regulatory frameworks require companies to develop specialized capabilities in customs management and regulatory compliance.

Companies that manage to adapt effectively to these regulatory changes can gain significant competitive advantages, as efficiency in customs processes can significantly reduce logistics costs and improve the reliability of trade operations.

2.5. Conceptual integration of strategic factors

From the literature review, it is possible to identify a significant interrelationship between digital transformation, supply chain optimization, and adaptation to customs regulation.

Digital transformation acts as a technological enabler that improves the efficiency of the supply chain and facilitates compliance with customs regulations. For example, digital platforms can be integrated with electronic customs systems to automate documentation and merchandise tracking processes.

In turn, an optimized supply chain allows companies to respond more efficiently to regulatory requirements and minimize delays in import and export processes. In a complementary way, effective adaptation to regulatory changes reduces operational risks and strengthens the reliability of international business operations.

Together, these factors contribute to strengthening business competitiveness by improving operational efficiency, reducing logistics costs and increasing the ability to adapt to changes in the international environment.

The conceptual model proposed in this study states that business competitiveness is influenced by

three main strategic variables:

- Digital transformation
- Supply chain optimization
- Adapting to changes in customs regulation

These variables interact with each other and generate direct and indirect effects on the competitive performance of companies participating in international business.

(The graphical representation of the conceptual model and its statistical validation by multiple regression analysis will be presented in the results section.)

2.6. Recent empirical studies

Recent empirical literature has shown the growing importance of digitalization and logistics innovation to improve the competitive performance of companies operating in global markets.

Studies have shown that companies that adopt advanced digital technologies have higher levels of operational efficiency, better adaptability to market conditions, and a higher likelihood of success in internationalization.

Likewise, recent research has found a significant relationship between technological integration in the supply chain and the improvement of logistics performance. The use of digital logistics management systems allows you to improve the visibility of goods flows, optimize inventory levels and reduce delivery times.

On the other hand, several studies have highlighted the importance of trade facilitation and customs modernization in improving business competitiveness. Countries that have implemented reforms aimed at simplifying customs procedures and digitizing trade processes have managed to significantly reduce international trade costs.

In this context, the integration of business digitalization strategies, logistics optimization and regulatory adaptation is presented as a comprehensive approach to strengthen the competitiveness of companies in international business.

3. METHODOLOGY

3.1. Research Approach and Design

This study adopts a **quantitative approach with a correlational explanatory design**, aimed at analyzing the relationship between three strategic factors - digital transformation, supply chain optimization and adaptation to customs regulations - and their impact on business competitiveness in international business.

The quantitative approach allows the relationships between variables to be objectively

measured through the use of structured instruments and inferential statistical techniques. The explanatory design is used with the purpose of identifying and analyzing the influence of independent variables on a dependent variable, allowing to establish potential causal relationships between the factors analyzed.

In this case, the independent variables correspond to:

- Digital transformation
- Supply chain optimization
- Adaptation to customs regulations

The dependent variable corresponds to:

- Business competitiveness in international business

The correlational-explanatory design is justified because the study seeks not only to identify associations between variables, but also to evaluate the joint effect of strategic factors on the competitive performance of companies operating in international trade.

3.2. Type of study

The research is of the type:

- **Applied**, because it seeks to generate useful knowledge for strategic decision-making in companies that participate in international business.
- **Cross-sectional**, since the data are collected at a single point in time.
- **Non-experimental**, since the variables are not manipulated by the researcher, but observed as they are presented in the business context.

3.3. Population and sample

The target population of the study is made up of **companies that participate in international trade activities**, including exporting organizations, importers and logistics companies linked to global supply chains.

These companies mainly belong to sectors such as:

- Manufacturing
- International Trade
- Logistics and international transport
- Cross-border e-commerce

Due to the size of the population, **stratified probability sampling was used**, with the aim of guaranteeing the representativeness of companies belonging to different productive sectors.

The final sample was composed of **210 companies with international operations**, whose managers or heads of foreign trade participated in the structured survey used as a data collection instrument.

Table 1: Business Sample Features.

Economic sector	Number of companies	Percentage
Manufacturing	68	32.4%
International trade	52	24.8%
Logistics and transport	41	19.5%
E-commerce	29	13.8%
Other export sectors	20	9.5%
Total	210	100%

The sectoral diversity of the sample allows us to analyse business competitiveness in different contexts of participation in international business.

3.4. Data collection techniques and instruments

For the collection of information, a **structured questionnaire based on a five-point Likert scale** was designed, where:

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree

The questionnaire was applied to managers, foreign trade directors, logistics managers and executives linked to international operations.

The instrument included **24 items distributed in four main dimensions**:

- Digital transformation (6 items)
- Supply chain optimization (6 items)
- Adaptation to customs regulations (6 items)
- International business competitiveness (6 items)

Before its final application, the questionnaire was subjected to **validation by expert judgment** and a **pilot test with 30 companies**, with the aim of evaluating the clarity of the items and the reliability of the instrument.

3.5. Operationalization of variables

The operationalization of variables allows the theoretical concepts to be translated into measurable indicators within the research instrument.

Table 2: Operationalization of study variables.

Variable	Dimensions	Indicators	Scale
Digital transformation	Process digitalization	Automation of operations, use of digital platforms, data analysis	Likert (1-5)
	Technological innovation	Implementation of AI, blockchain, IoT in business operations	Likert (1-5)
Supply chain optimization	Logistics management	Supplier integration, logistics planning	Likert (1-5)
	Chain Visibility	Monitoring and traceability systems	Likert (1-5)
Customs regulation	Regulatory Compliance	Adapting to regulatory changes	Likert (1-5)
	Trade facilitation	Use of electronic customs systems	Likert (1-5)
Business competitiveness	International performance	Export growth	Likert (1-5)
	Competitive position	Operational efficiency and market access	Likert (1-5)

3.6. Validity and reliability of the instrument

The content validity of the questionnaire was evaluated using the expert **judgment method**, in which five specialists in international trade, logistics and business management participated.

The reliability of the instrument was evaluated using **Cronbach's alpha coefficient**, obtaining the following results:

Table 3: Instrument reliability.

Variable	Cronbach's Alfa
Digital transformation	0.88
Supply chain	0.86
Customs regulation	0.84
Business competitiveness	0.90
Total, of the instrument	0.89

The values obtained exceed the threshold of **0.70**, considered adequate in social science studies, which indicates a high internal consistency of the instrument.

3.7. Data collection procedure

The data collection process was developed in three stages:

1. **Identification of participating companies** through databases of chambers of commerce, business associations and export promotion agencies.
2. **Distribution of the electronic questionnaire**, using digital survey platforms.
3. **Database debugging and validation**, eliminating incomplete or inconsistent records.

The information collection period was carried out over an interval of **three months**.

3.8. Data analysis techniques

For the analysis of the information, statistical, descriptive and inferential techniques were used using specialized statistical software (SPSS and R).

The techniques employed include:

Descriptive analysis

- Media
- Standard deviation
- Frequency distribution

Inferential Analysis

- **Pearson correlation:** to evaluate the relationship between the variables of the study.
- **Multiple linear regression:** to determine the joint impact of the independent variables on business competitiveness.
- **ANOVA:** to analyze significant differences

between business sectors.

3.9. Statistical model of the research

The multiple regression model used in the study is expressed as follows:

$$Competitiveness = \beta_0 + \beta_1(Digital\ Transformation) + \beta_2(Supply\ Chain) + \beta_3(Customs\ Regulation) + \varepsilon$$

Where:

- β_0 = model constant
- $\beta_1, \beta_2, \beta_3$ = regression coefficients
- ε = error term

This model allows evaluating the individual and joint contribution of strategic factors in business competitiveness within the context of international business.

4. RESULTS

This section presents the results of the statistical analysis carried out to evaluate the relationship between digital transformation, supply chain optimization and adaptation to customs regulation, and its influence on business competitiveness in international business.

The analyses include descriptive statistics, Pearson correlations, multiple linear regression and analysis of variance (ANOVA), with the aim of empirically validating the hypotheses raised in the study.

4.1. Descriptive statistics of the variables

First, the descriptive measures of the study's primary variables were analyzed. These measures allow us to identify the average behavior of the responses of the participating companies and the dispersion of the data.

Table 4: Descriptive statistics of the variables.

Variable	Media	Standard deviation	Minimum	Maximum
Digital transformation	3.92	0.71	2.10	4.90
Supply chain	4.01	0.66	2.30	4.95
Customs regulation	3.76	0.73	2.05	4.80
Business competitiveness	4.05	0.69	2.40	4.90

The results indicate that, on average, participating companies have relatively high levels of technological adoption and logistics optimization, reflecting a growing trend towards the digitization and modernization of operations in international trade.

The supply chain has the highest average (4.01), which suggests that many companies have prioritized logistics optimization strategies to improve their competitive performance. On the other hand, adaptation to customs regulation has a slightly lower average (3.76), which could indicate greater challenges in the management of regulatory compliance.

4.2. Correlation analysis

In order to examine the relationship between the variables of the study, a **Pearson correlation analysis**

was performed.

Table 5: Pearson Correlation Matrix.

Variables	1	2	3	4
1. Digital transformation	1			
2. Supply chain	0.63**	1		
3. Customs regulation	0.55**	0.58**	1	
4. Business competitiveness	0.71**	0.74**	0.62**	1

Note: $p < 0.01$

The results show **positive and statistically significant correlations** between all the variables analyzed.

The strongest relationship is observed between:

- Supply chain and business competitiveness ($r = 0.74$)

This suggests that efficiency in logistics management has an important influence on the competitive performance of companies involved in international business.

Likewise, digital transformation has a strong

correlation with business competitiveness ($r = 0.71$), which supports the idea that technological adoption is a key factor in improving operational efficiency and access to international markets.

4.3. Multiple Regression Analysis

To evaluate the joint effect of the independent variables on business competitiveness, a **multiple linear regression analysis was performed.**

Table 6: Results of the multiple regression model.

Independent variable	Coefficient β	Standard Error	t	P-Value
Constant	0.82	0.21	3.90	0.000
Digital transformation	0.34	0.05	6.80	0.000
Supply chain	0.39	0.06	7.10	0.000
Customs regulation	0.22	0.05	4.40	0.001

$$R^2 = 0.68F = 146.7 (p < 0.001)$$

The model explains 68% of the variability of business competitiveness, which indicates a high level of explanatory capacity of the proposed model.

The results show that the three variables analysed have a positive and statistically significant effect on business competitiveness.

The variable with the greatest influence is:

Supply chain optimization ($\beta = 0.39$)

This confirms that companies that efficiently manage their international logistics networks have higher levels of competitiveness in global markets.

Digital transformation ($\beta = 0.34$) also shows a significant impact, evidencing that the adoption of digital technologies improves operational efficiency, information management and innovation capacity.

Finally, adaptation to customs regulation ($\beta = 0.22$), although with a smaller effect compared to the other variables, continues to be a relevant factor in facilitating international trade and reducing operational barriers.

4.4. Analysis of variance (ANOVA)

An analysis of variance was carried out with the aim of examining whether there are significant differences in the levels of competitiveness between the different business sectors.

Table 7: ANOVA results by economic sector.

Sector	Average competitiveness	Standard deviation
Manufacturing	4.12	0.64
International trade	4.08	0.67
Logistics	4.15	0.63
E-commerce	3.98	0.71
Others	3.94	0.69

$$F = 3.72p = 0.007$$

The results indicate that there are statistically significant differences between sectors, particularly in the logistics and manufacturing sectors, which have slightly higher levels of competitiveness.

This can be explained by the increased investment in technological infrastructure, logistics optimization and digitalization of business processes in these sectors.

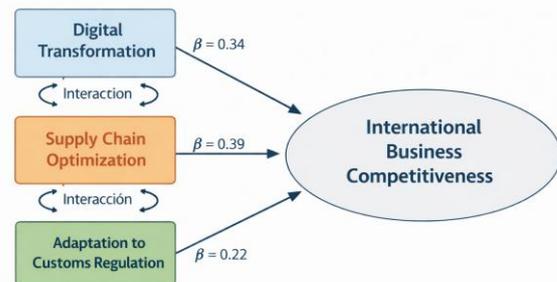


Figure 1. Validated conceptual model

Figure 1: Validated conceptual model.

Regression analysis confirms that:

- Digital Transformation → Business Competitiveness
- Supply Chain → Business Competitiveness
- Customs Regulation → Business Competitiveness

In addition, the interaction between these factors generates synergistic effects that strengthen business competitiveness in international business.

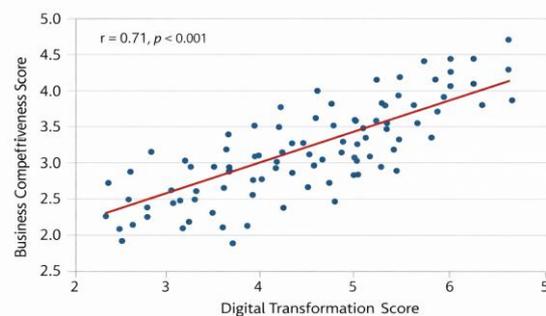


Figure 2. Relationship between digital transformation and business competitiveness

Figure 2: Relationship between digital transformation and business competitiveness.

The dispersion analysis shows a clear positive trend, indicating that as the level of business digitalization increases, competitive performance in international markets also increases.

This result supports the theories of dynamic capabilities and resource-based competitive advantage, which highlight the importance of technological innovation as a driver of business competitiveness.

4.5. Hypothesis Validation

Hypothesis	Result
H1: Digital transformation influences competitiveness	Accepted
H2: Supply chain influences competitiveness	Accepted
H3: Customs regulation influences competitiveness	Accepted
H4: The three factors together explain competitiveness	Accepted

The results confirm that business competitiveness in international business depends on the strategic integration between digitalization, efficient logistics and regulatory adaptation.

5. DISCUSSION

The objective of this research was to analyze the influence of three strategic factors – digital transformation, supply chain optimization and adaptation to changes in customs regulation – on business competitiveness within the context of international business. The results obtained provide relevant empirical evidence that allows us to understand how the interaction between these factors contributes to the strengthening of the competitive performance of companies in global markets.

5.1. Interpretation of the results

The results of the statistical analysis show that the three variables studied have positive and statistically significant relationships with business competitiveness. The multiple regression model explained 68% of the variability in business competitiveness, which indicates a high explanatory capacity of the proposed conceptual model.

In particular, supply chain optimization emerged as the most influential factor in business competitiveness. This finding confirms the strategic importance of efficient logistics management in the context of international trade, where factors such as delivery times, transportation costs, and reliability of operations play a determining role in the success of companies.

Likewise, the results show that digital transformation has a significant impact on business competitiveness. The adoption of digital technologies improves operational efficiency, optimizes information management, and facilitates integration with international business partners.

On the other hand, adaptation to customs regulation also showed a significant positive effect on business competitiveness, although with a slightly smaller magnitude compared to the other variables. This result suggests that the ability of companies to

effectively manage regulatory requirements and adapt to regulatory changes can contribute to reducing operating costs and improving the fluidity of international business operations.

5.2. Comparison with previous studies

The results of this research are consistent with several recent studies on business competitiveness in international trade.

In relation to digital transformation, recent research has shown that business digitalization facilitates the integration of companies into global value chains, improves efficiency in business processes and allows the development of new business models based on digital platforms. The results of this study coincide with these findings, as they show a significant positive relationship between the level of business digitalization and competitive performance.

In terms of supply chain management, various studies have highlighted the importance of logistics integration and visibility of operations to improve business competitiveness. The digitization of logistics, the use of advanced planning systems and the implementation of collaboration strategies with suppliers make it possible to reduce operating costs and improve the ability to respond to changes in the international market.

The results obtained also coincide with recent research that highlights the relevance of the resilience of supply chains. In a global environment characterized by uncertainty and logistical disruptions, companies that manage to develop flexible and resilient supply chains have higher levels of competitiveness and sustainability in the long term.

With regard to customs regulation, various studies have shown that reforms aimed at trade facilitation—such as the digitization of customs processes and the implementation of single windows for foreign trade—contribute significantly to reducing international trade costs. In this sense, companies that manage to adapt quickly to regulatory changes and take advantage of trade facilitation mechanisms can improve their operational efficiency and strengthen their competitive position in global markets.

5.3. Theoretical interpretation of the results

The results of the research can be interpreted from different theoretical perspectives that explain business competitiveness in the context of international business.

From the perspective of Resource-Based View, the

factors analyzed in the study – digital transformation, logistical capabilities and regulatory knowledge – can be considered strategic resources that contribute to the generation of sustainable competitive advantages. Companies that develop these organizational capabilities can differentiate themselves from their competitors and improve their performance in international markets.

Moreover, the dynamic capabilities approach provides a useful conceptual framework for understanding how companies can adapt to changing environments by reconfiguring their resources and capabilities. In this sense, digital transformation and supply chain optimization represent organizational capabilities that allow companies to respond effectively to the technological, logistical, and regulatory changes of international trade.

Likewise, the results can also be interpreted in light of Porter's competitive advantage model, which highlights the importance of innovation, operational efficiency and strategic integration of business processes to achieve competitive advantages in global markets.

5.4. Implications for business management

The study's findings have important implications for the strategic management of companies involved in international business.

First, the results suggest that companies should prioritize investment in digital technologies as part of their competitiveness strategies. The digitization of business processes allows for improved operational efficiency, optimized data management, and easier integration with international business partners.

Second, companies must strengthen their supply chain management capabilities, adopting real-time monitoring technologies, advanced logistics planning systems, and supplier collaboration strategies. These practices improve visibility into logistics operations and increase the resilience of supply chains to potential disruptions.

Third, the results highlight the importance of developing specialized capacities in customs management and regulatory compliance. Companies that have specialized foreign trade teams and regulatory management systems can adapt more quickly to regulatory changes and reduce the risks associated with international operations.

5.5. Implications for public policies

The results of this research also have relevant implications for the design of public policies aimed

at strengthening business competitiveness in international trade.

In particular, governments can play a key role in promoting business competitiveness by:

- the development of digital infrastructure for international trade
- modernization of customs systems
- the implementation of trade facilitation programmes
- supporting the digital transformation of exporting companies

In addition, public policies aimed at improving logistics efficiency—such as investment in port infrastructure, transportation systems, and digital trade platforms—can contribute significantly to strengthening the competitiveness of companies in global markets.

5.6. Limitations of the study

Despite the study's contributions, it is important to recognize some limitations.

First, the research used a cross-sectional design, which implies that the data were collected at a single time point. Future studies could use longitudinal designs to analyse the evolution of business competitiveness over time.

Second, the study was based on perceptions of business managers, which could introduce certain subjective biases into the responses. Future research could complement this data with objective indicators of business performance, such as export levels, productivity or participation in international markets.

Finally, although the sample included firms from different sectors, future research could extend the analysis to different geographic regions or economic contexts, in order to examine possible variations in the determinants of business competitiveness.

6. CONCLUSIONS

The objective of this study was to analyze the strategic factors that influence business competitiveness in international business, specifically digital transformation, supply chain optimization and adaptation to changes in customs regulations. From the statistical analysis carried out with a sample of 210 companies with international operations, relevant findings were obtained that allow a better understanding of the determinants of business competitiveness in the context of contemporary global trade.

6.1. Main conclusions of the study

First, the results show that digital transformation

is a key strategic factor to improve business competitiveness in international business. Companies that adopt advanced digital technologies—such as e-commerce platforms, data analytics systems, and process automation tools—are able to improve their operational efficiency, optimize decision-making, and strengthen their ability to integrate into international markets.

Digitalization not only reduces operating costs, but also facilitates coordination between actors in the global value chain, improves product traceability, and increases the transparency of business operations. Consequently, digital transformation is consolidated as one of the main sources of competitive advantage in the current environment of the global economy.

Secondly, the results of the study show that the optimization of the supply chain is the factor with the greatest influence on business competitiveness within the model analyzed. Companies that implement advanced logistics management strategies, integration with suppliers and real-time monitoring systems have higher levels of operational efficiency and responsiveness to changes in the international market.

The increasing complexity of global supply chains requires companies to develop sophisticated logistics capabilities that allow them to efficiently manage the flows of goods, information, and financial resources. In this sense, the digitalization of logistics and the use of predictive analysis technologies are presented as fundamental tools to improve the resilience and flexibility of supply chains.

Thirdly, the study confirms that adapting to changes in customs regulation also significantly influences business competitiveness. Companies that have organizational capabilities to effectively manage regulatory requirements, comply with international regulations, and adapt to customs system reforms are able to reduce the costs associated with international trade and improve the efficiency of their operations.

The modernization of customs systems and the implementation of trade facilitation measures have created new opportunities to improve the efficiency of international trade. However, these changes also require companies to develop specialized competencies in customs management and regulatory compliance.

6.2. Theoretical contributions of the study

From an academic perspective, the research contributes to the development of the literature on business competitiveness in international trade by

integrating three strategic dimensions that have often been studied independently: business digitalization, supply chain management, and customs regulation.

The proposed conceptual model demonstrates that business competitiveness does not depend exclusively on internal factors of the organization, but also on its ability to adapt to the technological, logistical and regulatory changes of the global environment.

Likewise, the results of the study support the postulates of the Resource-Based View theory and the dynamic capabilities approach, by showing that companies that develop technological, logistical and regulatory capabilities can generate sustainable competitive advantages in international markets.

6.3. Practical contributions to businesses

From a managerial perspective, the study's findings offer several strategic implications for companies involved in international business.

First, organizations must consider digital transformation as a central element of their competitive strategy, investing in technologies that automate processes, improve data management, and facilitate integration with global business partners.

Second, it is critical for companies to strengthen their supply chain management capabilities, adopting advanced logistics planning systems, real-time monitoring tools, and collaboration strategies with international suppliers.

Third, companies must develop specialized organizational structures in foreign trade and customs management, capable of monitoring regulatory changes, managing regulatory compliance, and taking advantage of trade facilitation mechanisms implemented by international authorities.

6.4. Implications for the development of international trade

The results of the research also suggest that business competitiveness in international trade depends to a large extent on the institutional environment and public policies implemented by governments.

Promoting digital transformation, modernizing logistics infrastructure, and simplifying customs procedures can contribute significantly to strengthening the competitiveness of enterprises in global markets.

In particular, initiatives aimed at the digitization of customs systems, the implementation of foreign trade single windows, and regulatory harmonization between countries can reduce administrative barriers

to trade and facilitate the participation of companies in global value chains.

6.5. Recommendations for future research

Based on the results obtained, various opportunities are identified for the development of future research in the field of international business.

First, future studies could analyze the relationship between digital transformation, logistics management, and business competitiveness using longitudinal designs, allowing us to examine how these relationships evolve over time.

Secondly, it would be relevant to broaden the

analysis by incorporating other strategic variables, such as business innovation, sustainability in supply chains or integration into digital platforms for global trade.

Likewise, future research could explore these relationships in different regional contexts or industry sectors, with the aim of identifying possible differences in the determinants of business competitiveness in international trade.

Finally, the development of more advanced analysis models, such as structural equation models (SEM), could allow us to examine more precisely the causal relationships between the strategic variables analyzed.

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