Vilnius University Press

Content lists are available at VilniusUniversity Press

Transformations In Business & Economics
2025, Vol. 24 No 1 (64), pp.82-101

E-ISSN 2538-872X
https://doi.org/10.15388/Tibe.2025.24.1.4

**Chapter: Advancing Digital Transformation through Information and Innovation Management**

# CAN DIGITAL TRANSFORMATION AFFECT THE EXPORTS OF FOREIGN TRADE FIRMS?

**Fuyong Chen**
*E-mail:* 3248609175@qq.com
*ORCID*: https://orcid.org/0000-0003-1446-9718
*Affiliation:* School of Accounting, Chongqing Technology and Business University, China
*ROR:* https://ror.org/05hqf1284

**Yingying Xin** *(corresponding author)*
*E-mail*: xyysunny123@126.com
*ORCID:*
*Affiliation:* School of Finance and Economics, Guangdong Polytechnic Normal University, China
*ROR*: https://ror.org/02pcb5m77

**Nana Ma**
*E-mail*: 1334746906@qq.com
*ORCID*:
*Affiliation:* School of Business, Chengdu University, China
*ROR*: https://ror.org/034z67559

***Annotation.*** In the context of intensified global competition, it is crucial to effectively promote firm exports and improve firm export levels. However, many factors affect firm exports, including the macro level, the micro level, the institutional level, the firm financial level, etc. Digital transformation reflects the innovation and drastic changes at the technological level of firms. At present, the impact of digital transformation within firms on exports is not clear. Will it affect the export level of firms? To fill this research gap, based on the export competition theory and human capital theory, using the data of China's foreign trade listed companies from 2010 to 2022 and the OLS multiple regression analysis model, the impact of digital transformation on the export competitiveness of firms was explored. Additionally, the differences in the nature of property rights and the moderating role of human capital in the above relationship were discussed. Results show that digital transformation can significantly promote the improvement of the export level of foreign trade firms. Compared with state-owned firms, digital transformation in non-state-owned firms has a more significant effect on improving the export level of foreign trade firms. Executive human capital is an important factor affecting the efficiency of firm decision-making. Higher human capital can strengthen the role of digital transformation in improving the export level of foreign trade firms. The conclusions enrich the studies on the economic consequences of firm digital transformation and also provide empirical evidence on how to promote the export of foreign trade firms and improve the export competitiveness of foreign trade firms.

***Keywords:*** digital transformation, human capital, export level, property rights.

***JEL classification:*** D21, G30, M41.


**Submitted** on March 2024. **Accepted** on January 2025.

## Introduction

As one of the "three horses" driving economic growth, exports, investment, and consumption constitute the driving force of economic growth. The increase in exports can bring the funds needed for development to firms, expand employment, and increase foreign exchange reserves, thereby consolidating the wealth foundation and risk resistance of economic growth. According to data from the World Trade Organization, global exports will reach 23.8 trillion US dollars in 2023. The World Trade Organization predicts that the worldwide trade volume of goods will increase by 2.6% in 2024. Against the backdrop of the slowdown in the global economic situation, export trade has become an essential way for countries to expand their markets and activate the economy. At the same time, the development of the digital economy will profoundly change the economic development format and business model. Digital transformation is essential for firms to participate in developing the digital economy and use digital technology to upgrade. In addition to the governance factors at the level, will the digital transformation under its technology integration affect firm exports? Answering this question is essential for understanding firm export behavior and the positive impact of digital transformation.

Foreign trade firms are the main export entities. Their exports have a profound impact on the economy. They help provide jobs, ease employment pressure, and promote social stability and sustainable economic development (Shi *et al.*, 2023). At the same time, foreign trade firms promote the optimization and upgrading of industrial structure by participating in international market competition (Haini *et al.*, 2023). Existing literature has mainly examined product quality (Daengs *et al.*, 2020), technological level (Li *et al.*, 2020), price tariffs (Yang *et al.*, 2024; Medina, 2024), innovation patents (Aghion *et al.*, 2024), commodity distribution channels (Fang, 2023), foreign trade competition (Ridley *et al.*, 2023), and export tax rebates (Shi, Xu, 2023) to analyze the factors affecting firm exports. These studies have shown that higher product quality, technological level, lower price tariffs, and export tax preferences are all helpful in promoting firm exports.

The existing studies mainly analyze the factors affecting firm exports from economic development, tax system, product quality, and internal governance perspectives. However, with the rapid development of the digital economy, more and more firms are integrating digital technology with firm development and actively promoting the digital transformation of firms. In the practice of digital transformation, in addition to affecting the domestic market performance of firms, will it also affect their export behavior? Foreign trade firms can achieve intelligent manufacturing, brand communication, internal industry data integration and sharing, and deep integration of external industry resources through the application of digital technology to promote better development of firms (Wang, Zhang, 2019). Digital transformation can also impact product quality (Zapata *et al.*, 2020). In the context of intensified firm export competition, this study combines export competition theory and human capital theory to analyze the following question: (1) how does digital transformation affect the export of foreign trade enterprises? (2) What role does human capital play in the above-mentioned impact relationship? Export competition theory explains understanding the export behavior of foreign trade firms and improving their export competitiveness. At the same time, human capital theory also supports the emphasis on human factors in export behavior. This study systematically examines the impact of the interaction between digital transformation and upgrading and human capital on the exports of foreign trade firms from the perspective of the comprehensive digital transformation and upgrading of firms and human capital advantages, thereby answering the above research questions, better guiding firm exports, and promoting high-quality development of firms (Ngoc *et al.*, 2024; Rakhimzhanova *et al.*, 2024).

The contribution of this study is reflected in the following aspects: First, from the perspective of firm digital transformation, for the first time, the influencing factors of foreign trade firms' exports are discussed, and the relationship between the comprehensive upgrading of internal technical management of firms and the export of foreign trade firms is examined. This research perspective provides new evidence and perspective for understanding the export behavior of foreign trade firms and improving the export competitiveness of foreign trade firms. Second, the existing literature mainly analyzes export behavior from a single perspective. Still, this study simultaneously introduces the technical level of "digital transformation and upgrading" and the human capital level "board human capital" to examine the interaction of different productivity factors to understand the multi-factor driven export behavior provides the possibility and enriches the related research on human capital theory. Third, this study further examines the impact of the nature of property rights and finds that compared to state-owned firms, digital transformation in non-state-owned firms has a more significant effect on the export of foreign trade firms. This conclusion provides further evidence for firm digital transformation's logic, impact, and role under different property rights. This not only enriches research in the field of digital transformation but also provides evidence for property rights support for the digital transformation of foreign trade firms in the practical community.

The remaining structure is arranged as follows. Section 1 is the theoretical analysis and hypothesis development. Based on the export competitiveness theory, property rights theory, and human capital theory, it preliminarily analyzes the impact of digital transformation on firm exports and examines the role of human capital in it. Section 2 introduces data and methods, which analyzes the sample construction, data sources, and key data processing. Section 3 is the result analysis, which shows the main empirical results of this study, including the relationship between digital transformation and firm exports, the moderating role of property rights nature, and human capital. Section 4 discusses the results. Section 5 is the conclusion and inspiration, which combines the research conclusions of this study to provide corresponding countermeasures and suggestions for promoting firm exports and strengthening the positive role of digital transformation.

## 1. Theoretical Analysis and Hypothesis Development

### *1.1 Digital Transformation and Exports of Foreign Trade Firms*

Firms export refers to a company selling its products or services to markets outside its country (Zhou, Wen, 2022). This is an important part of international trade and involves cross-border business activities. Firm export is part of the internationalization strategy of firms (Holmlund *et al.*, 2007). It is significant for firms to expand market share, increase revenue, diversify risks, and obtain new growth opportunities. At the same time, firm export is also important in promoting national economic development, increasing foreign exchange reserves, and promoting international cooperation (Kenderdine, Ling, 2018).

The theoretical basis of export competitiveness includes the principle of comparative advantage and the principle of competitive advantage, which mainly emphasizes the different market competitiveness of the same industry in different countries or regions under the same international competition environment in export activities. Therefore, firm exports will be affected by many factors. From the perspective of the external economic environment, economic development level (Pakhucha *et al.*, 2021), exchange rate fluctuations (Liu, 2020), and trade environment (Song *et al.*, 2021) affect firm exports. From the perspective of policy and system, government support (Shamsuddoha *et al.*, 2009) and tax subsidies (Girma *et al.*, 2009) are all helpful in promoting firm exports. From the perspective of internal firms,

technological innovation (Filipescu *et al.*, 2013), management capabilities (Levallet *et al.*, 2023), and production costs (Ueki, 2015) are also important factors affecting firm exports.

Digital transformation is the process by which a firm uses digital technology to improve or completely change its business model and processes (Verina *et al.*, 2019; Angelova *et al.,* 2023). This concept not only involves the application of technology but also includes changes in firm culture, organizational structure, service model, and other aspects. Digital transformation can improve efficiency (Corejova, Chinoracky, 2021). Automated and intelligent processes can reduce repetitive work and improve work efficiency. At the same time, digital transformation can help reduce the operating costs of firms by optimizing resource allocation and reducing waste. Using digital technology, firms can launch new products or services faster and enhance their market competitiveness.

Digital transformation can impact the export of foreign trade firms, mainly in the following aspects: First, the export competition theory believes that only by improving comparative and competitive advantages can we promote exports. Digital transformation can improve the quality of export products, improve the management efficiency of foreign trade firms, and human capital levels significantly improve the quality and competitiveness of foreign trade firms' export products (Zapata *et al.*, 2020). Second, enhancing the export resilience of foreign trade firms is also an important aspect of improving the export competitiveness of foreign trade firms (Gnangnon, 2022). Faced with the uncertainty of the external environment, digital transformation helps foreign trade firms quickly respond to market changes and improve foreign trade. The ability of firms to withstand risks will accelerate the recovery of exports. Third, to reduce transaction costs, the application of digital technology, such as e-commerce platforms, can reduce the costs for foreign trade firms to find customers, sign contracts, and complete transactions. Fourth, promote innovation and new product research and development (Zapata *et al.*, 2020). Digital transformation supports technological innovation in foreign trade firms, speeds up the research and development and launch of new products, and enhances export competitiveness.

In summary, digital transformation provides new impetus and opportunities for foreign trade firms to export, helps foreign trade firms to gain a more favorable competitive position in the global market, and can effectively improve the export level of foreign trade firms. To this end, the following hypothesis is proposed.

*Hypothesis 1: Digital transformation can improve the export level of foreign trade firms.*

### *1.2 Digital Transformation, Property Rights, and Exports of Foreign Trade Firms*

The nature of property rights is an essential factor affecting firm operations and governance. In China, there are indeed significant differences between state-owned firms (state-owned firms) and non-state-owned firms (non-state-owned firms) in terms of equity structure, competitive environment, and market advantages (Tang *et al.*, 2024). These differences will affect their export motivations and decisions. State-owned firms usually have substantial financial advantages and policy support (Wu, 2018), while non-state-owned firms may have advantages in flexibility, innovation capabilities, and speed of response to market changes. As a means of internal upgrading of firms, digital transformation may positively impact the export business of non-state-owned firms.

From the perspective of management and operational efficiency, state-owned firms often have a relatively rigorous and standardized management and decision-making process with many levels, and each link requires approval and communication at all levels, which may make the response speed to market changes relatively slow. When carrying out digital reforms, state-owned firms, based on their

nature and responsibilities, usually place stability and risk control in an important position and treat each transformation link cautiously. As a result, the pace of innovation may be slow, and they are more likely to promote digital transformation to ensure gradual stability (Yan *et al.*, 2003). Non-state-owned firms usually have a flatter management structure and more efficient internal information transmission, and the decision-making process does not need to go through too many cumbersome hierarchical reports and approvals so that they can make decisions more quickly. This feature helps them quickly capture the application trends of new technologies in the market, and they are more inclined to adopt innovative methods to improve their competitiveness and market share and actively use digital transformation to seize the initiative in the fierce market competition.

Non-state-owned firms rely more on digital means to enhance international competitiveness (Jin, Pan, 2023). In the fierce international market competition to seek more excellent development space, non-state-owned firms are well aware of the vast potential contained in digital transformation. They will actively use various digital technologies, such as big data analysis and artificial intelligence, to deeply explore the diversified needs of customers in the international market and quickly adjust their product and service strategies. State-owned firms may achieve breakthroughs through scale and policy advantages in certain areas. Regarding the impact on exports, the digital transformation of non-state-owned firms is more effective due to their flexibility and innovation capabilities. They can quickly respond to changes in international market demand, flexibly use digital tools to open up new markets accurately, optimize customer experience throughout the entire chain from customer ordering, logistics, and distribution to after-sales service, and at the same time, efficiently integrate supply chain management to improve the export level of foreign trade firms effectively has won more shares on the international stage. Therefore, among non-state-owned firms, digital transformation has a more significant effect on improving the exports of foreign trade firms. The following hypothesis is made for this purpose.

*Hypothesis 2: Among non-state-owned firms, digital transformation has a more significant impact on improving exports of foreign trade firms*.

### *1.3 Digital Transformation, Human Capital, and Exports of Foreign Trade Firms*

Human capital theory emphasizes the important role of human capital in economic growth and development. The theory believes that human capital refers to the sum of employees' intangible resources such as knowledge, skills, experience, and creativity (Sima *et al.*, 2020; Lu *et al.*, 2024). These intangible resources are like the internal driving force of firm development, covering a wide range of aspects from professional and technical knowledge to prosperous industry practical experience from unique, innovative thinking to efficient problem-solving capabilities, and have a significant impact on the production, innovation, and competitiveness of firms.

The concept of human capital is fundamental in firm export decisions (Mubarik *et al.*, 2020). Employees with rich knowledge of international markets can keenly understand the market demand characteristics, consumer preferences, policies, and regulations of different countries and regions and thus accurately identify international market opportunities (Erkkilä *et al.*, 2023). Employees with great professional skills and rich coping experience can quickly develop reasonable response plans when faced with many challenges in the export market, such as trade barriers, cultural differences, and exchange rate fluctuations. In addition, with the creativity and efficient execution of employees, firms can formulate and implement effective export strategies, making themselves stand out in international market competition and achieving continuous expansion and growth of export business (Wei *et al.*, 2020)

Firm employees' education level, professional skills, and industry experience are the core components of human capital (Mubarik *et al.*, 2020; Iolanda Voda *et al.*, 2022). Education level often determines the degree of acceptance and depth of understanding of new knowledge and new concepts by employees (Li, Eryong, 2022). Professional skills are the key support for carrying out specific business operations, and rich industry experience enables employees to make reasonable judgments quickly when faced with complex situations (Phan, 2022). In export decision-making, employees with international trade knowledge and multilingual skills play an essential role. With their professional international trade knowledge, they can deeply analyze the trade policies and tariff rules of the target market (Jun *et al.*, 2021) and combine their multilingual skills to interpret local business information and cultural background to truly better understand the culture and business habits of the target market (Basah *et al.*, 2020), thereby formulating more accurate market entry strategies for firms and improving the success rate of entry.

On the other hand, human capital reflects the decision-making ability of the firm management, which directly affects the formulation and implementation of export strategies (Greer *et al.*, 2017). A management team with good analytical and problem-solving skills (Chen, 2021) can use scientific analytical methods to sort out the complex information in the international market, accurately assess the potential risks and opportunities, and formulate a flexible and effective market response strategy that conforms to market dynamics, helping firms to move forward steadily in the international market competition (Kaliyeva *et al.*, 2022).

The previous analysis believes that digital transformation can optimize product quality, production efficiency, and other trade aspects, thereby promoting foreign trade firms' export levels. Human factors play an important role in foreign trade firms' export decision-making. Higher human capital can help foreign trade firms formulate export strategies, identify international market opportunities, and respond to international risks and challenges. Therefore, higher human capital can bring a broader market and more excellent export space to foreign trade firms, strengthening the positive impact of digital transformation on the export of foreign trade firms. To this end, the following hypothesis is proposed.

*Hypothesis 3: Human capital plays a significant mediating role in digital transformation's influence on foreign trade firms' exports*.

## 2. Methodology

### *2.1 Data Source and Sampleh Selection*

This study mainly examines digital transformation's impact on foreign trade firms' exports. First, we select China's Shanghai and Shenzhen A-share listed firms from 2010 to 2022 as the initial sample. Secondly, we screen the samples and extract foreign trade firm samples. Thirdly, we remove samples with missing data. Continuous variables are winsorized at the 1% and 99% levels. The export data comes from the China Customs Import and Export Database. By matching with the stock codes of foreign trade firms, the total export amount data of foreign trade firms is obtained, other data comes from the CSMAR (China Stock Market & Accounting Research) database, and finally, 1379 sample observations are obtained.

### *2.2 Variable Settings and Descriptions*

In this study, firm export level was the dependent variable. Following Wang *et al.* (2019), the export amount, export quantity, and export unit price were used to reflect the export situation of firms. This study mainly studies the export level of firms, so the total export amount is selected to measure the

export level. Selecting the export amount can avoid the influence of different types of export products. The specific approach is to measure the export level by the natural logarithm of the export amount of the year (*Export*). The larger the value is, the higher the export level of the firm. At the same time, in the robustness test part, we also draw on the approach of Zhao *et al*. (2016) to characterize the export competitiveness of firms, which is measured by the proportion of exports in the industry divided by the proportion of gross domestic product in the industry (*EX*). The larger the value is, the stronger the export capacity of the firm.

Digital transformation (*Digit*) was the main independent variable. It has become a common practice in academia to capture and characterize the degree of digital transformation of firms through annual report text analysis (Zhang, Guo, 2022). This study is consistent with the findings of Xu (2024), the Python tool is used to extract the frequency of digital-related words in the annual report, and the proportion of digital word frequency to the total vocabulary of the annual report (multiplied by 100 times) is used as a proxy variable for digital transformation.

Property rights (*Property*) and human capital (*EduSea*) are the mediating variables. Referring to the study of Zheng *et al*. (2023), the actual controller's nature (state-owned or private firm) is used for distinction. If the property rights (*Property*) are private firms, the value is 1, and otherwise, 0. According to Liu and Guo (2017), the educational level and overseas experience of board members are mainly used to reflect the human capital level of the firm. These two are reflections of different dimensions of human capital. Since this study does not distinguish between the two, the proportion of highly educated personnel (bachelor's degree or above) and the proportion of overseas experience (work experience or educational experience) are taken as the average (Yu *et al.*, 2023; Jin, 2024) to obtain the human capital (*EduSea*) indicator.

**Table 1. Connotation and definition of main variables**

| Variable type | Variable code | Variable definition and description |
|---|---|---|
| Dependent variable | *Export* | *Export* means firm export level, measured by the natural logarithm of export value. |
| Independent variable | *Digit* | *Digit* means the digital transformation, which is measured by the proportion of digital words in the total vocabulary of the annual report. |
| Mediating variable | *Property* | *Property* means the property right, which is an indicator variable that equals 1 if the firm is a private firm, otherwise 0. |
| | *EduSea* | *EduSea* means the human capital, which is measured by the average proportion of highly educated personnel (bachelor's degree or above) and the proportion of those with overseas experience (work experience or academic experience). |
| Control variable | *Size* | Natural logarithm of total assets. |
| | *Lev* | Firm's total short-term and long-term debt divided by total assets. |
| | *Age* | Natural logarithm of total years on the market. |
| | *Roe* | Net profit divided by net assets. |
| | *Top10* | Shareholding ratio of top ten shareholders. |
| | *Outr* | Number of independent directors divided by number of board members. |
| | *LBsize* | The natural logarithm of the number of board members. |
| | *Dual* | An indicator variable that equals 1 if the chairman and general manager are both appointed, otherwise it is 0. |
| | *Grow* | Firm's operating income growth rate. |
| | *Year* | *Year* represents the year fixed effect. |
| | *Frim* | *Frim* represents the firm fixed effect. |

*Source:* authors' own results.

On the basis of existing research, the control variables selected in this study mainly included *Size*, the natural logarithm of total assets; *Lev*, the firm's total short-term and long-term debt divided by total assets; *Age*, the natural logarithm of total years on the market; *Roe*, is the net profit divided by net assets; *Top10*, is the shareholding ratio of top ten shareholders; *Outr*, the number of independent directors divided by the number of board members; *LBsize*, is the natural logarithm of the number of board members; *Dual*, is an indicator variable that equals one if the chairman and general manager are both appointed, otherwise 0; *Grow*, is firm's operating income growth rate.

The concrete connotations and definitions of the above variables are listed in *Table 1*.

### *2.3 Model Construction*

This study mainly examines the impact of digital transformation on firm exports. First, we construct Model (1) and use individual fixed effects for regression analysis:

$$Export_{i,t} = \beta_1 + \beta_2 Digit_{i,t} + \beta_3 Size_{i,t} + \beta_4 Lev_{i,t} + \beta_5 Age_{i,t} + \beta_6 Roe_{i,t} + \beta_7 Top10_{i,t} + \beta_8 Outr_{i,t} + \beta_9 LBsize_{i,t} + \beta_{10} Dual_{i,t} + \beta_{11} Grow_{i,t} + \Sigma Year + \Sigma Firm + \varepsilon \quad (1)$$

Since individual fixed effects can avoid the impact of omitted variables, individual fixed effects at the company level are controlled in Model (1). In Model (1), the explained variable is firm export (*Export*), and the explanatory variable is digital transformation (*Digit*). If the coefficient of Digit is significantly positive, it means that digital transformation can have a positive impact on firm exports.

According to the previous analysis, digital transformation may have differential impacts on firm exports under different properties of property rights. To test this hypothesis, group regression will be conducted based on the nature of property rights (*Property*). It is expected that in the non-state-owned firm group, the impact of digital mergers and acquisitions on firm exports will be more significant.

According to the previous analysis, higher human capital can strengthen the role of digital transformation in improving firm exports. To test this inference, this study builds Model (2) for regression analysis, mainly observing the coefficient of the interaction term between digital transformation and human capital. If the coefficient of *Digit*EduSea* is significantly positive, it means that the hypothesis is verified.

$$Export_{i,t} = \beta_1 + \beta_2 Digit_{i,t} \times EduSea_{i,t} + \beta_3 Digit_{i,t} + \beta_4 EduSea_{i,t} + \beta_5 Size_{i,t} + \beta_6 Lev_{i,t} + \beta_7 Age_{i,t} + \beta_8 Roe_{i,t} + \beta_9 Top10_{i,t} + \beta_{10} Outr_{i,t} + \beta_{11} LBsize_{i,t} + \beta_{12} Dual_{i,t} + \beta_{13} Grow_{i,t} + \Sigma Year + \Sigma Firm + \varepsilon \quad (2)$$

### *2.4 Descriptive Statistical Analysis*

*Table 2* reports the descriptive statistics of the main variables. As can be seen from *Table 2*, the mean value of firm export (*Export*) is 11.172, and the maximum and minimum are 23.531 and 3.193, respectively. The larger the value is, the higher the export level of the firm. The mean value of digital transformation (*Digit*) is 0.033, and the larger the value, the higher the degree of digital transformation of the firm. The mean value of property rights (*Property*) is 0.648, indicating that non-state-owned firms account for about 64.8%. The distribution of other control variables is also within a reasonable range.

**Table 2. Descriptive statistics of main variables**

| Variable | Obs | Mean | S.d. | Min | Median | Max |
|---|---|---|---|---|---|---|
| *Export* | 1,379 | 11.172 | 10.009 | 3.193 | 17.019 | 23.531 |
| *Digit* | 1,379 | 0.033 | 0.203 | 0.000 | 0.050 | 0.900 |

**Table 2 (*continuation*). Descriptive statistics of main variables**

| Variable | Obs | Mean | S.d. | Min | Median | Max |
|---|---|---|---|---|---|---|
| *Property* | 1,379 | 0.648 | 0.478 | 0.000 | 1.000 | 1.000 |
| *EduSea* | 1,379 | 0.336 | 0.161 | 0.000 | 0.357 | 0.643 |
| *Size* | 1,379 | 22.494 | 1.835 | 19.826 | 22.091 | 27.070 |
| *Lev* | 1,379 | 0.489 | 0.239 | 0.051 | 0.470 | 0.950 |
| *Age* | 1,379 | 10.352 | 6.993 | 1.000 | 9.000 | 26.000 |
| *Roe* | 1,379 | 0.076 | 0.157 | -0.806 | 0.090 | 0.384 |
| *Top10* | 1,379 | 0.602 | 0.159 | 0.269 | 0.612 | 0.971 |
| *Outr* | 1,379 | 0.393 | 0.097 | 0.000 | 0.375 | 0.636 |
| *LBsize* | 1,379 | 2.265 | 0.335 | 1.386 | 2.197 | 3.091 |
| *Dual* | 1,379 | 0.258 | 0.438 | 0.000 | 0.000 | 1.000 |
| *Grow* | 1,379 | 0.177 | 0.462 | -0.628 | 0.105 | 3.430 |

*Source:* own calculations.

### *2.5 Correlation Analysis*

From the correlation analysis results in *Table 3*, we can see that the correlation coefficient between digital transformation (*Digit*) and foreign trade firm export (*Export*) is 0.043, with a significance level of 5%, indicating that digital transformation is positively related to foreign trade firm export. The correlation coefficient between firm human capital (*EduSea*) and firm export (*Export*) is also significantly positive, indicating that higher human capital can promote exports. The Hypothesis 1 of this study has been preliminarily verified.

**Table 3. Pearson correlation coefficient matrix**

| | *Export* | *Digit* | *Property* | *EduSea* | *Size* | *Lev* | *Age* | *Roe* | *Top10* | *Outr* | *LBsize* | *Dual* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Export* | 1 | | | | | | | | | | | |
| *Digit* | 0.043** | 1 | | | | | | | | | | |
| *Property* | 0.118*** | 0.225*** | 1 | | | | | | | | | |
| *EduSea* | 0.057** | -0.032 | -0.335*** | 1 | | | | | | | | |
| *Size* | -0.080*** | -0.039 | -0.222*** | 0.325*** | 1 | | | | | | | |
| *Lev* | -0.135*** | -0.187*** | -0.372*** | 0.336*** | 0.912*** | 1 | | | | | | |
| *Age* | -0.180*** | -0.149*** | -0.422*** | 0.292*** | 0.276*** | 0.358*** | 1 | | | | | |
| *Roe* | -0.004 | -0.057** | -0.089*** | 0.026 | 0.240*** | 0.111*** | -0.021 | 1 | | | | |
| *Top10* | 0.060** | -0.058** | 0.031 | 0.010 | 0.299*** | 0.137*** | -0.298*** | 0.196*** | 1 | | | |
| *Outr* | 0.026 | -0.072*** | 0.064** | 0.014 | -0.128*** | -0.094*** | -0.068** | 0.017 | -0.096*** | 1 | | |
| *LBsize* | -0.127*** | 0.037 | -0.156*** | 0.217*** | 0.544*** | 0.413*** | 0.165*** | 0.091*** | 0.175*** | -0.110*** | 1 | |
| *Dual* | 0.190*** | 0.093*** | 0.293*** | -0.196*** | -0.218*** | -0.281*** | -0.352*** | -0.099*** | 0.077*** | -0.033 | -0.149*** | 1 |
| *Grow* | 0.074*** | 0.139*** | 0.085*** | -0.062** | 0.03 | -0.014 | -0.086*** | 0.182*** | 0.076*** | 0.014 | 0.025 | 0.046* |

*Notes:* ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively.

*Source:* own calculations.

## 3. Results Analysis

### *3.1 Basic Regression Analysis*

Export is an important part of China's dual-circulation economy. Many factors affect the export of foreign trade firms. Digital transformation is a manifestation of the comprehensive application of digital information technology by foreign trade firms. It can optimize the management of foreign trade firms, reduce firm costs, and improve firm efficiency. We believe that the digital transformation of firms can have a positive impact on firm exports, that is, significantly improve the export level of foreign trade firms.

**Table 4. The impact of digital transformation on firm export**

| Variable | (1) | (2) |
|---|---|---|
| | ***Export*** | ***Export*** |
| *Digit* | 3.184***<br>(2.931) | 2.194**<br>(1.979) |
| *Size* | | 1.238***<br>(4.261) |
| *Lev* | | 4.779***<br>(3.554) |
| *Age* | | -2.720**<br>(-2.371) |
| *Roe* | | -0.709<br>(-0.742) |
| *Top10* | | 3.203*<br>(1.785) |
| *Outr* | | -2.375<br>(-1.382) |
| *LBsize* | | 0.177<br>(0.289) |
| *Dual* | | -0.173<br>(-0.356) |
| *Grow* | | 0.0929<br>(0.313) |
| *_cons* | 9.861***<br>(18.90) | -7.334<br>(-0.909) |
| *Year Effect* | Yes | Yes |
| *Firm Effect* | Yes | Yes |
| *N* | 1379 | 1379 |
| *A-R2* | 0.024 | 0.169 |

*Notes:* ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively; the values in brackets represent robust standard errors.

*Source:* own calculations.

As shown in *Table 4*, it is the regression result based on Model (1), in which the explained variable is firm export (*Export*) and the explanatory variable is digital transformation (*Digit*). It can be seen that the coefficients of digital transformation (*Digit*) are 3.184 and 2.194, respectively, and their significance levels are 1% and 5%, respectively, indicating that after controlling other factors, it is found that digital transformation can significantly promote the export of foreign trade firms, which is consistent with the hypothesis expectations are consistent.

### *3.2 Robustness Test*

*3.2.1 Replace Core Indicators*

The export amount may only reflect the absolute level of exports by foreign trade firms. This study also draws on the practice of Zhao *et al.* (2016) to characterize the export competitiveness of foreign trade firms by dividing the proportion of exports in the industry by the proportion of gross production in the industry. The larger the value of *EX* is, the stronger the export capability of foreign trade firms. As shown in *Table 5*, when the explained variable is replaced by export competitiveness (*EX*), the regression coefficient of digital transformation (*Digit*) is still significantly positive, which shows that the findings of this study are still valid.

**Table 5. Replace core indicators**

| Variable | (1) | (2) |
|---|---|---|
| | ***EX*** | ***EX*** |
| *Digit* | 1.294**<br>(2.312) | 1.134**<br>(1.966) |
| *Size* | | 0.309**<br>(2.045) |
| *Lev* | | 1.925***<br>(2.751) |
| *Age* | | 0.00947<br>(0.0159) |
| *Roe* | | -0.267<br>(-0.538) |
| *Top10* | | 2.238**<br>(2.397) |
| *Outr* | | -1.124<br>(-1.256) |
| *LBsize* | | 0.355<br>(1.117) |
| *Dual* | | 0.257<br>(1.018) |
| *Grow* | | 0.213<br>(1.378) |
| *_cons* | 2.756***<br>(10.25) | -6.682<br>(-1.591) |
| *Year Effect* | Yes | Yes |
| *Firm Effect* | Yes | Yes |
| *N* | 1379 | 1379 |
| *A-R2* | 0.025 | 0.152 |

*Notes:* ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively; the values in brackets represent robust standard errors.

*Source:* own calculations.

*3.2.2 Endogeneity Problem*

The lag regression model can well alleviate the impact of endogeneity problems. For example, *Table 6* uses the results of lag regression. The explained variable is the value in period *t*+1. At this time, the results show that the regression coefficients of digital transformation (*Digit*) are 2.368 and 1.322, respectively, and both are significant at the 5% level, which shows that the research conclusion of this study is robust.

**Table 6. The impact of innovation ability on urban economic development**

| Variable | (1) | (2) |
|---|---|---|
| | ***EX*** | ***EX*** |
| *Digit* | 2.368**<br>(2.148) | 1.322**<br>(2.169) |
| *Size* | | 0.819***<br>(2.709) |
| *Lev* | | 4.863***<br>(3.434) |
| *Age* | | -7.994***<br>(-3.850) |

**Table 6(continuation). The impact of innovation ability on urban economic development**

| *Variable* | (1) | (2) |
|---|---|---|
| | ***EX*** | ***EX*** |
| *Roe* | | -1.071<br>(-1.038) |
| *Top10* | | 2.296<br>(1.223) |
| *Outr* | | -0.569<br>(-0.320) |
| *LBsize* | | 0.470<br>(0.734) |
| *Dual* | | 0.0518<br>(0.104) |
| *Grow* | | 0.269<br>(0.891) |
| *_cons* | 10.14***<br>(20.48) | 30.09**<br>(2.437) |
| *Year Effect* | Yes | Yes |
| *Firm Effect* | Yes | Yes |
| *N* | 1203 | 1203 |
| *A-R2* | 0.018 | 0.162 |

*Notes:* ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively; the values in brackets represent robust standard errors.

*Source:* own calculations.

### *3.3 Cross-sectional Analysis of Property Rights*

There are differences in the market positioning, competitive advantages and export strategies of state-owned firms and non-state-owned firms. According to the previous analysis, digital transformation can promote the export of foreign trade firms. Since non-state-owned firms rely more on technological innovation and technological progress to open the market, we believe that among non-state-owned firms, digital transformation has a more significant positive impact on the export of foreign trade firms. As shown in *Table 7*, column (1) is the state-owned firm group, and column (2) is the non-state-owned firm group. It can be seen that in the state-owned firm group, the regression coefficient of digital transformation (*Digit*) is not significant. In contrast, in the non-state-owned firm group, the coefficient of digital transformation (*Digit*) is significantly positive, which is consistent with Hypothesis 2.

**Table 7. The Differences in Property Rights**

| Variable | (1) | (2) |
|---|---|---|
| | ***state-owned firm*** | ***non-state-owned firm*** |
| | ***EX*** | ***EX*** |
| *Digit* | 1.431<br>(0.542) | 2.036**<br>(2.291) |
| *Size* | 1.067**<br>(2.360) | 1.604***<br>(3.768) |
| *Lev* | 9.171***<br>(3.582) | 4.791***<br>(2.919) |
| *Age* | 0.775<br>(0.359) | -4.038***<br>(-3.027) |
| *Roe* | 0.600<br>(0.315) | -1.500<br>(-1.334) |

**Table 7 (*continuation*). The Differences in Property Rights**

| Variable | (1) | (2) |
|---|---|---|
| | ***state-owned firm*** | ***non-state-owned firm*** |
| | ***EX*** | ***EX*** |
| *Top10* | -3.799<br>(-1.033) | 1.704<br>(0.759) |
| *Outr* | -4.161<br>(-1.474) | -0.557<br>(-0.265) |
| *LBsize* | 0.134<br>(0.133) | -0.830<br>(-1.084) |
| *Dual* | 0.772<br>(0.941) | -0.672<br>(-1.133) |
| *Grow* | -0.130<br>(-0.302) | 0.599<br>(1.524) |
| *_cons* | -24.28<br>(-1.089) | -14.33<br>(-1.528) |
| *Year Effect* | Yes | Yes |
| *Firm Effect* | Yes | Yes |
| *N* | 486 | 893 |
| *A-R2* | 0.183 | 0.182 |

*Notes:* ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively; the values in brackets represent robust standard errors.

*Source:* own calculations.

### *3.4 The Moderating Effect of Firm Human Capital*

Human capital can have a positive impact on the export of foreign trade firms. According to the analysis of Hypothesis 3, we believe that higher human capital can strengthen digital transformation's role in improving foreign trade firms' exports. To this end, we will use Model II to test the moderating effect of human capital. According to the regression results in *Table 8*, the coefficient of the interaction term *Digit×EduSea* between human capital and digital transformation is significantly positive, which shows that human capital plays a positive regulatory role and supports Hypothesis 3.

**Table 8. The moderating effect of firm human capital**

| Variable | ***Export*** |
|---|---|
| *Digit* | 4.591*<br>(1.836) |
| *EduSea* | 2.024<br>(1.147) |
| *Digit×EduSea* | 7.170**<br>(2.071) |
| *Size* | 1.160***<br>(3.903) |
| *Lev* | 4.699***<br>(3.488) |
| *Age* | -2.879**<br>(-2.495) |
| *Roe* | -0.691<br>(-0.723) |
| *Top10* | 3.215*<br>(1.792) |

**Table 8 (*continuation*). The moderating effect of firm human capital**

| Variable | *Export* |
|---|---|
| *Outr* | -2.330<br>(-1.355) |
| *LBsize* | 0.177<br>(0.289) |
| *Dual* | -0.140<br>(-0.288) |
| *Grow* | 0.110<br>(0.370) |
| *_cons* | -5.503<br>(-0.671) |
| *Year Effect* | Yes |
| *Firm Effect* | Yes |
| *N* | 1379 |
| *A-R2* | 0.171 |

*Notes:* ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively; the values in brackets represent robust standard errors.

*Source:* own calculations.

## 4. Discussions

In the context of the development of the digital economy, it has become an essential practice for firms to use digital information technology to transform and upgrade. Digital transformation is reflected in the comprehensive upgrade of technology and management within the firm, affecting the firm's financial decision-making and operating conditions. As global economic competition intensifies, can digital transformation help firms better participate in international economic competition and improve the export level of foreign trade firms? These issues still need to be clarified. The analysis of the results shows that digital transformation can significantly enhance the export level of foreign trade firms, and this effect differs under different properties of property rights. In addition, human capital strengthens the role of digital transformation in improving firm exports. The specific discussion is as follows:

Digital transformation significantly impacts foreign trade firms' exports, showing that a higher degree of digital transformation can significantly improve the export level of foreign trade firms. This study starts from the theory of export competition and finds that foreign trade firms can bring competitive and comparative advantages to foreign trade firms through digital transformation, making foreign trade firms more competitive in the export process. This finding shows that the export of foreign trade firms will be affected by tariffs and trade policies. The impact will also be affected by the digital transformation of foreign trade firms. The conclusion of this study also supports (Zapata *et al.*, 2020) research on the impact of digital transformation on the product quality of foreign trade firms because, in export activities, better product quality enhances the export competitiveness of foreign trade firms and improves the export competitiveness of foreign trade firms level key. On the other hand, the test results also show that the improvement of export competitiveness of foreign trade firms also depends on the technical level. The test results are consistent with the research results of Li *et al.* (2020), indicating that higher technical level improvements can promote the export of foreign trade firms.

The impact of digital transformation on improving the exports of foreign trade firms has different effects under different properties of property rights. This study found that compared with state-owned firms, the impact of digital transformation on improving the exports of foreign trade firms is more significant in non-state-owned firms. The property rights structure affects the firm governance model and distribution of

benefit resources. A reasonable property rights structure can encourage economic entities to use resources more effectively and improve economic efficiency. This study analyzes the differential impacts of digital transformation under different property rights properties. As discussed by Tang *et al*. (2024), under different property rights structures, there are differences in firms' decision-making motivations and reform effects. So, non-state-owned firms rely more on internal transformation and upgrading. Through effective internal digital transformation and upgrading, they can have a more positive impact on the export of foreign trade firms.

Human capital plays a moderating role in the relationship between digital transformation and the export of foreign trade firms. That is, when the level of human capital is high, it will strengthen the role of digital transformation in promoting foreign trade firms' exports. Starting from the theory of human capital, this study verifies the positive role of human capital as a production factor in exporting foreign trade firms. Higher human capital can interact with digital transformation at the technical level, improving foreign trade firms' export level. This conclusion is consistent with the research conclusion (Strober, 1990), indicating that human capital has played a positive role in the development of firms. On the other hand, it also shows that many factors will affect foreign trade firms' export behavior (Song *et al.*, 2021). In addition to digital transformation at the technical level, human capital factors also play an essential role in firms' exports. They can also strengthen the role of digital transformation in promoting firms' exports.

## Conclusions and Implications

### *Main Findings*

Using the data of China's Shanghai and Shenzhen A-share listed foreign trade firms from 2010 to 2022, after sample screening and elimination and variable construction, the company's individual fixed effects OLS model was used to empirically test the impact of the digital transformation of foreign trade firms on their export levels, and examine the role played by the nature of property rights, human capital. The following conclusions can be drawn: First, based on the perspective of export competitiveness theory, digital transformation can significantly improve the export level of firms, and the conclusion still holds after robustness testing. Second, for non-state-owned firms, digital transformation has a more significant impact on improving firm exports. Third, based on the perspective of human capital theory, higher human capital can strengthen the positive effects of digital transformation on firm exports.

### *Managerial Implications*

Considering the profound impact of digital transformation on economic development, enhance the export competitiveness and export level of foreign trade firms and promote high-quality economic development. To enable foreign trade firms to seize opportunities better and meet challenges in the context of digital economic development, the following enlightenment will be proposed based on the research conclusions of the study:

Actively promote digital transformation. Foreign trade firms should fully realize the importance of digital transformation in improving export levels and increasing investment in digital technology, such as introducing advanced information systems, optimizing e-commerce platform operations, etc., to enhance their competitiveness in the international market. For example, foreign trade firms can efficiently coordinate production, inventory, and sales by establishing a digital supply chain management system, thus significantly improving export efficiency and order volume.

Emphasis on human capital accumulation. Firms should focus on employee training and talent recruitment, improve employees' digital literacy and professional skills, and give full play to the advantages of digital transformation. Especially for firms planning or undergoing digital transformation, it is necessary to strengthen employee training to adapt to new working models and business processes. It is recommended that foreign trade firms regularly organize employees to participate in digital marketing training courses, which will enhance employees' ability to use social media and online platforms to expand overseas markets, thereby strengthening the role of digital transformation in promoting exports.

Create a more level playing field for non-state-owned firms. Since non-state-owned firms have performed more significantly in digital transformation to enhance exports, the government should improve policies and regulations, reduce unreasonable restrictions on non-state-owned firms, provide equal market access opportunities and resource allocation conditions, and stimulate enthusiasm for non-state-owned firms: innovation vitality and export potential. The government can introduce special support policies for the digital transformation of non-state-owned firms, including tax incentives and loan interest discounts, to help them achieve digital transformation and improve their export levels.

***Limitations and Future Directions***

This study still has some limitations. First, the indicators of firm export level need to be further refined. Although this study can capture firms' export levels from the export amount perspective, some things could still be improved. Based on the availability of data for future research, it can be measured from the aspects of export product technology level and export product price competitiveness. In addition, the sample of this study is limited to China's market. Although China has been ranked first in the world trade scale for seven consecutive years and has certain representativeness based on China's market, more research still needs to be done on developed economies such as Europe and the United States. Future research can examine the influencing factors of firm export levels at different national levels, thereby providing more abundant evidence for understanding firm exports and observing the positive role of digital transformation.

## Literature

Aghion, P., Bergeaud, A., Lequien, M., Melitz, M. J. (2024), "The heterogeneous impact of market size on innovation: Evidence from French firm-level exports", *Review of Economics and Statistics*, Vol. 106, No 3, pp.608-626.

Angelova, M., Stoyanova, T., Stoyanov, P. (2023), "Improving HR management in innovative business organizations through digitalization and ICT", *Entrepreneurship and Sustainability Issues*, Vol. 11, No 2, pp.403-418. https://doi.org/10.9770/jesi.2023.11.2(27)

Basah, N.H., Ng, S.I., Ho, J.A., Yusof, R.N.R. (2020), "Cultural similarity effect on the relationship quality between exporters and intermediaries and export performance of SMEs", *International Journal of Business and Society*, Vol. 21, No 1, pp.399-418.

Chen, Y. (2021), "Team-specific human capital and team performance: Evidence from doctors", *American Economic Review*, Vol. 111, No 12, pp.3923-3962.

Corejova, T., Chinoracky, R. (2021), "Assessing the potential for digital transformation", *Sustainability*, Vol. 13, No 19, p.11040.

Daengs, G.A., Istanti, E., Negoro, R.B.K., Sanusi, R. (2020), "The aftermath of management actions on competitive advantage through process attributes at food and beverage industries export-import in Perak Harbor of Surabaya", *International Journal of Criminology and Sociology*, Vol. 9, pp.1418-1425.

Erkkilä, T., Chou, M.H., Kauppi, N. (2023), "*Human Capital and the Rise of the Global Talent Competition*", in: *Knowledge Alchemy*, pp.46-74. Bristol University Press.

Fang, Z. (2023), "Research on the influence mechanism of RMB exchange rate change on commodity prices", *Highlights in Business*, *Economics and Management*, Vol. 9, pp.401-405.

Filipescu, D.A., Prashantham, S., Rialp, A., Rialp, J. (2013), "Technological innovation and exports: Unpacking their reciprocal causality", *Journal of International Marketing*, Vol. 21, No 1, pp.23-38.

Girma, S., Görg, H., Wagner, J. (2009), "Subsidies and exports in Germany. First evidence from enterprise panel data", *Applied Economics Quarterly*, Vol. 55, No 3, pp.179-195.

Gnangnon, S.K., (2022), "Development aid and export resilience in developing countries: A reference to aid for trade", *Economies*, Vol. 10, No 7, pp.161.

Greer, C.R., Lusch, R.F., Hitt, M.A. (2017), "A service perspective for human capital resources: A critical base for strategy implementation", *Academy of Management Perspectives*, Vol. 31, No 2, pp.137-158.

Haini, H., Loon, P.W., Li, P.L. (2023), "Can export diversification promote export upgrading? Evidence from an oil-dependent economy", *Resources Policy*, Vol. 80, pp.103292.

Holmlund, M., Kock, S., Vanyushyn, V. (2007), "Small and medium-sized enterprises' internationalization and the influence of importing on exporting", *International Small Business Journal*, Vol. 25, No 5, pp.459-477.

Iolanda Voda, A., Florea, N., Ciulu, R., Luiza Costuleanu, C., Gradinaru, C. (2022), "Digital strategy assessment in education. What actions need to be addressed? The perception of students in social sciences and humanities", *Transformations in Business & Economics*, Vol. 21, No 2A, pp.462-478.

Jin, X. (2024), "Executives' overseas experience and corporate digital transformation", *Management and Administration*, No 8, pp.193-202. (In Chinese)

Jin, X., Pan, X., (2023), "Government attention, market competition and firm digital transformation", *Sustainability*, Vol. 15, No 11, pp.9057.

Jun, Y., Xiao-Hui, S., Yan, G. (2021), "The 'competition' for training cross border e-commerce talents in China on the background of 'Internet plus'", *Journal of Higher Education Theory and Practice*, Vol. 21, No 6, pp. 219-231.

Kaliyeva, S., Baisalova, B., Nathan, J. (2022), "Managing formation of competitive human capital in project-oriented companies", *Journal of Eastern European and Central Asian Research*, Vol. 9, No 6, pp. 992-1007.

Kenderdine, T., Ling, H. (2018), "International capacity cooperation: Financing China's export of industrial overcapacity", *Global Policy*, Vol. 9, No 1, pp.41-52.

Levallet, N., Finch, D.J., McCaffery, T., Espinoza, A., Raby, S.O. (2023), "A dynamic management capabilities view of small to medium-sized enterprise export readiness: a Canadian perspective", *International Journal of Entrepreneurship and Small Business*, Vol. 48, No 4, pp.359-388.

Li, J., Eryong, X. (2022), "New directions towards internationalization of higher education in China during post-COVID-19: A systematic literature review", *Educational Philosophy and Theory*, Vol. 54, No 6, pp.812-821.

Li, Y., Zhang, H., Liu, Y., Huang, Q. (2020), "Impact of embedded global value chain on technical complexity of industry export: An empirical study based on China's equipment manufacturing industry panel", *Sustainability*, Vol. 12, No 7, p.2694.

Liu, B., Guo, S. (2017), "An empirical research on the relationship between the human capital & heterogeneity of the board and firm performance", *Journal of Management Science*, Vol. 30, No 3, pp.23-34. (In Chinese)

Liu, W. (2020), "The impact of RMB exchange rate fluctuation on enterprises' export decisions: From the perspective of heterogeneity", *Modern Economy*, Vol. 11, No 4, pp.920-937.

Lu, J., Guo, Z., Usman, M., Qu, J., Fareed, Z. (2024), "Conquering precarious work through inclusive leadership: Important roles of structural empowerment and leader political skill", *Human Relations*, Vol. 77, No 10, pp.1413-1435.

Medina, P. (2024), "Import competition, quality upgrading, and exporting: Evidence from the Peruvian apparel industry", *Review of Economics and Statistics*, Vol. 106, No 5, pp.1-16.

Mubarik, M.S., Devadason, E.S., Govindaraju, C. (2020), "Human capital and export performance of small and medium enterprises in Pakistan", *International Journal of Social Economics*, Vol. 47, No 5, pp.643-662.

Ngoc, N.T.B., Binh, N.T., Trang, C.T.T. (2024), "Public Human Capital Spending and Economic Growth in Vietnam: The Bayes Approach", *Montenegrin Journal of Economics*, Vol. 20, No 3, pp.127-140. DOI: 10.14254/1800-5845/2024.20-3.9

Pakhucha, E., Babko, N., Bilousko, T., Bilousko, R., Vynohradenko, S., Azizov, O. (2021), "Strategic analysis of export activities of enterprises to ensure sustainable development", *European Journal of Sustainable Development*, Vol. 10, No 4, pp.251-270.

Phan, T.H. (2022), "Working conditions, export decisions, and firm constraints: Evidence from Vietnamese small and medium enterprises", *Sustainability*, Vol. 14, No 13, p.7541.

Rakhimzhanova, G., Shayakhmetova, L., Tolepov, A., Maidyrova, A., Tadjieva, S. (2024), "Economic Assessment of the Quality of Human Capital", *Montenegrin Journal of Economics*, Vol. 20, No 4, pp.225-238. DOI: 10.14254/1800-5845/2024.20-4.19

Ridley, W., Devadoss, S. (2023), "Competition and trade policy in the world cotton market: Implications for US cotton exports", *American Journal of Agricultural Economics*, Vol. 105, No 5, pp.1365-1387.

Shamsuddoha, A.K., Yunus Ali, M., Oly Ndubisi, N. (2009), "Impact of government export assistance on internationalization of SMEs from developing nations", *Journal of Enterprise Information Management*, Vol. 22, No 4, pp.408-422.

Shi, J., Visas, H., Ul-Haq, J., Abbas, S., Khanum, S. (2023), "Investigating the impact of export product diversification on environmental degradation: Evidence from Chinese Provinces", *Environment, Development and Sustainability*, Vol. 25, No 10, pp.11455-11486.

Shi, X., Xu, Z. (2023), "Export tax refund and the misreporting by Chinese exporters", *Canadian Journal* of *Economics*/*Revue Canadienne D'économique*, Vol. 56, No 4, pp.1469-1489.

Sima, V., Gheorghe, I.G., Subić, J., Nancu, D. (2020), "Influences of the industry 4.0 revolution on the human capital development and consumer behavior: A systematic review", *Sustainability*, Vol. 12, No 10, p.4035.

Song, Y., Wu, Y., Deng, G., Deng, P. (2021), "Intermediate imports, institutional environment, and export product quality upgrading: Evidence from Chinese micro-level enterprises", *Emerging Markets Finance and Trade*, Vol. 57, No 2, pp.400-426.

Strober, M. H. (1990), "Human capital theory: Implications for HR managers", *Industrial Relations: A Journal of Economy and Society*, Vol. 29, No 2, pp.214-239.

Tang, T., Dou, X., Ma, X. (2024), "The strategic effects of non-state shareholders' governance: based on the perspective of product market performance of state-owned enterprises", *China Journal of Accounting Studies*, pp.1-28.

Ueki, Y. (2015), "Trade costs and exportation: A comparison between enterprises in Southeast Asia and Latin America", *Journal of Business Research*, Vol. 68, No 4, pp.888-893.

Verina, N., Titko, J. (2019), "Digital transformation: Conceptual framework", In *Proc. of the Int. Scientific Conference "Contemporary Issues in Business*, *Management and Economics Engineering"*, pp.719-727.

Wang, J., Li, Q., Yang, C. (2019), "RMB exchange rate volatility and enterprises' Export", *Journal of International Trade*, No 7, pp.156-174. (In Chinese)

Wang, S., Zhang, Y. (2019), "Research on the mechanism path and policy recommendations of digital transformation of foreign trade enterprises", *Intertrade*, No 9, pp.40-47. (In Chinese)

Wei, H., Yuan, R., Zhao, L. (2020), "International talent inflow and R&D investment: Firm-level evidence from China", *Economic Modelling*, Vol. 89, pp.32-42.

Wu, Y. (2018), "Reforming WTO rules on state-owned enterprises: SOEs and financial advantages", *Northwestern Journal of International Law & Business*, Vol. 39, No 3, p.275.

Xu, G. (2024), "Digital transformation and stock mispricing: Dampening or amplifying effects", *Financial Economics Research*, Vol. 39, No 2, pp.58-72. (In Chinese)

Yan, L., Ling, X., Wang, Z., Xu, Y. (2023), "Can mixed-ownership reform boost the digital transformation of state-owned enterprises?", *Economic Analysis and Policy*, Vol. 79, pp.647-663.

Yang, F., Wang, Y., Whang, U. (2024), "Export effects of non-tariff measures: The role of aid for trade", *The Journal of International Trade & Economic Development*, Vol. 33, No 8, pp.1626-1651.

Yu, H., Ge, L., Su, X. (2023), "The impact of tax innovation incentive policies on the human capital structure of enterprises: Based on the 'capital-technology complementarity' effect under the R&D expense super deduction policy", *Journal of Guangdong University of Finance and Economics*, Vol. 38, No 4, pp.37-50. (In Chinese)

Zapata, M.L., Berrah, L., Tabourot, L. (2020), "Is a digital transformation framework enough for manufacturing smart products? The case of small and medium enterprises", *Procedia Manufacturing*, Vol. 42, pp.70-75.

Zhang, Y., Guo, X. (2022), "Digital transformation of enterprises and the governance of executive corruption: empirical evidence based on text analysis", *Journal of Global Information Management (JGIM)*, Vol. 30, No 11, pp.1-18.

Zhao, Q., Yang, Q., Yan, B. (2016), "Market segmentation, market size and China's manufacturing export competitiveness: Re-examination of the local market effect", *Journal of International Economic Cooperation*, Vol. 364, No 4, pp.67-73. (In Chinese)

Zheng, W., Guo, P., Wu, Z. (2023), "Property rights, policy uncertainty and firms' repaying society", *Journal of Beijing Jiaotong University (Social Sciences Edition)*, Vol. 22, No 3, pp.64-73. (In Chinese)

Zhou, F., Wen, H. (2022), "Trade policy uncertainty, development strategy, and export behavior: Evidence from listed industrial companies in China", *Journal of Asian Economics*, Vol. 82, p.101528.

## AR SKAITMENINĖ TRANSFORMACIJA GALI PAVEIKTI UŽSIENIO PREKYBOS ĮMONIŲ EKSPORTĄ?

**Fuyong Chen, Yingying Xin, Nana Ma**

***Santrauka.*** Suintensyvėjus pasaulinei konkurencijai labai svarbu veiksmingai skatinti įmonių eksportą ir gerinti įmonių eksporto lygį. Tačiau įmonių eksportui įtakos turi daug veiksnių, įtraukiant makrolygmenį, mikrolygmenį, institucinį lygmenį, įmonės finansinį lygį ir kt. Skaitmeninė transformacija atspindi inovacijas ir drastiškus pokyčius įmonių technologiniame lygmenyje. Šiuo metu įmonių skaitmeninės transformacijos poveikis eksportui nėra aiškus. Siekiant užpildyti šią mokslinių tyrimų spragą ir remiantis eksporto konkurencijos teorija ir žmogiškojo kapitalo teorija, pasitelkti Kinijos užsienio prekybos biržoje kotiruojamų bendrovių 2010–2022 m. duomenys ir OLS daugialypės regresijos analizės modelis. Buvo tiriamas skaitmeninės transformacijos poveikis įmonių eksporto konkurencingumui. Be to, buvo aptarti nuosavybės teisių pobūdžio skirtumai ir moderuojantis žmogiškojo kapitalo vaidmuo minėtuose santykiuose. Rezultatai atskleidė, kad skaitmeninė transformacija gali reikšmingai paskatinti užsienio prekybos įmonių eksporto lygio gerėjimą. Palyginti su valstybės valdomomis įmonėmis, nevalstybinių įmonių skaitmeninė transformacija labiau veikia užsienio prekybos įmonių eksporto lygio gerinimą. Vykdomasis žmogiškasis kapitalas yra svarbus veiksnys, reikšmingas tvirto sprendimų priėmimo efektyvumui. Didesnis žmogiškasis kapitalas gali sustiprinti skaitmeninės transformacijos vaidmenį gerinant užsienio prekybos įmonių eksporto lygį. Išvadose papildomi įmonių skaitmeninės transformacijos ekonominių pasekmių tyrimai, taip pat pateikiami empiriniai įrodymai, kaip skatinti užsienio prekybos įmonių eksportą ir didinti užsienio prekybos įmonių eksporto konkurencingumą.

*Reikšminiai žodžiai:* skaitmeninė transformacija; žmogiškasis kapitalas; eksporto lygis; nuosavybės teisės.