



Digital Transformation of Professional Markets in Zhejiang Province: Practice and Exploration of Internet Empowerment and Ecosystem Reshaping

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Abstract

As a cornerstone of China's economic modernization, Zhejiang Province has developed a globally influential network of professional markets since its post-reform industrialization. These markets have played a key role in driving local economic growth. This study examines the structural impact of internet-driven innovation on Zhejiang's markets through three main dimensions: transaction cost reduction, industrial agglomeration, and digital ecosystem evolution. The study also suggests policy recommendations for strengthening digital infrastructure, promoting intelligent management, and supporting cross-industry collaboration. Matching local strategies with national policies is needed for ensuring sustainable growth and improving global competitiveness. This research provides useful insights for regions undergoing digital transformation, showing Zhejiang's approach to connecting technological advancements with institutional frameworks for effective transformation.

Subject Areas

Big Data Search and Mining

Keywords

Zhejiang Professional Markets, Digital Transformation, Data-Driven

1. Introduction

Zhejiang Province is one of the most important areas in China's economy building

environment, and its professional markets are particularly prominent and dynamic after the reform and opening up. The number of professional markets in Zhejiang has grown rapidly since the reform; the existing professional markets can be classified as large-scale, multi-functional, extensive markets, such as Yiwu International Trade City, Shaoxing China Textile City, Yongkang Science and Technology Hardware City and Yuyao Plastic City. In 2023 alone, there were 2942 commodity markets across the province, with overall transaction volume of 2.304 trillion yuan (up 7.71% compared with previous years). Such market systems play an active role in promoting regional economic growth, commodity circulation and industrial structure optimization, and they directly assist Zhejiang foreign trade.

In recent years, however, amid the increasingly prosperous global economy and explosive growth of information technology, digital transformation is no longer optional for the formation of Zhejiang's professional markets. With the continuous development of internet technology, professional markets have given up their traditional mode of operation, adopting new business models like platform-based transactions, data-driven operation, and international linkups. In addition to facilitating more efficient market operation and lowering transaction costs, the application of digital means in Zhejiang's professional markets will undoubtedly make markets more competitive through the optimization of market structure and industrial upgrading. To support this digital transformation, Zhejiang Province has promoted the development of digital infrastructure and industrial intelligence. In 2022, the province had cultivated 430 digital service providers and advanced the construction of 46 industrial brains across various manufacturing sectors. The number of smart factories and digital workshops reached 263 and 338, respectively, forming a structured digital transformation framework that connects specialized enterprises with platform-based solutions.

Nevertheless, although digital transformation opens up new venues for Zhejiang's professional markets, problems such as the digital divide, monopolies on technology platforms that diminish merchant interests, and the lags in policy development hinder the advancement of the digital transformation of Zhejiang professional markets. How to cooperate in the technological, institutional, and capacity transition of Zhejiang professional markets is therefore the primary problem.

This paper will investigate how internet technology facilitates the digital transformation of Zhejiang's professional markets via selected cases of representative professional markets in Zhejiang. It then makes some policy suggestions for encouraging and facilitating such developments through reference to both the theoretical literature and empirical data from Zhejiang and beyond. This work should be of interest to those studying the contemporary process by which professional markets are becoming increasingly electronic and are a source of concern to many stakeholders, whether or not they see their participation as "authenticating"—that is, facilitating—in an increasing number of countries.

2. Theoretical Framework of Internet-Driven Market Transformation

The internet and information technology are now widely used. This has greatly sped up changes in professional markets. The internet lowers transaction costs. It also helps industries cluster together. Additionally, it changes how digital innovation systems work. All these factors show how the internet drives market changes.

2.1. Transaction Cost Theory Perspective: Efficiency Reconstruction and Trust Mechanism Enhancement

Transaction cost theory was first introduced by Coase (1937) [1]. Later, Williamson (1985) [2] expanded the theory. The theory argues that costs in market transactions include not just physical fees but also intangible costs. For example, information gaps and dishonest actions between parties are part of these costs. In traditional markets, merchants and consumers often deal with high costs. These include costs for searching, negotiating, and completing deals. These costs reduce market efficiency. However, with the introduction of internet technologies, particularly the application of big data, blockchain, and artificial intelligence, transaction costs have significantly decreased, leading to a substantial improvement in market operation efficiency.

From the perspective of information economics, internet technologies reduce transaction costs by lowering information acquisition costs and minimizing information asymmetry. Stigler (1961) [3] identified information asymmetry as a major source of transaction costs, and internet platforms optimize the flow of information through digital display and intelligent matching, helping merchants and consumers obtain information more efficiently, thus reducing transaction friction. Bakos (1997) [4] emphasized that electronic markets effectively reduce buyer search costs, enhancing transaction efficiency. Brynjolfsson and Smith (2000) [5] found that digital transaction processes and information display significantly reduce the high costs of traditional retailers. Choudary (2015) [6] further demonstrated that platform economies optimize supply-demand relationships through big data analysis and intelligent matching, thereby enhancing market dynamic adjustment capabilities.

In summary, internet technologies not only reduce transaction costs by improving the efficiency of information flow but also strengthen the trust mechanism in transactions through technologies such as blockchain, thus driving the digital transformation of markets.

2.2. Industry Agglomeration Theory Perspective: From Geographical Clustering to Virtual Ecosystems

Industry agglomeration theory was first introduced by Marshall (1890) [7] and later developed by Porter (1998) [8]. Traditional industry agglomeration theory emphasizes that geographical clustering offers significant competitive advantages

to businesses, primarily through knowledge spillovers, labor pool effects, and shared intermediate inputs, which enhance innovation and productivity. Concentrated geographic locations enable businesses to rapidly increase their competitiveness through interaction and information exchange, fostering innovation ecosystems. However, traditional agglomeration theory largely focuses on physical space and geographical clustering, overlooking the key role of information technology and digital platforms in market agglomeration. With the advancement of digital transformation, the traditional model of industrial agglomeration is gradually shifting toward virtual ecosystems. Internet platforms, as the core medium for connecting, interacting, and transacting among market entities, allow businesses to transcend geographic boundaries and establish global industrial chains and supply networks.

Castells (2000) [9] argued that information technology allows industries to agglomerate without relying on physical locations. Instead, networks and platforms enable collaboration. Brynjolfsson and McAfee (2014) [10] added that digital tools remove geographic barriers. This helps industries and markets integrate globally. Kenney and Zysman (2016) [11] studied platform economies and found they change how industries cluster. Platforms improve how resources are distributed. They also help markets adjust more quickly. As a result, businesses can now cooperate or compete regardless of where they are located.

Overall, internet platforms support virtual agglomeration. This helps build a global industrial system. It boosts innovation in markets and increases competitiveness.

2.3. Digital Innovation Ecosystem Theory: Collaboration among Entities and Value Reconstruction

Moore (1993) [12] first proposed the theory of digital innovation ecosystems. Nambisan (2017) [13] expanded this theory. They stressed that technology, data, and institutions must work together to drive innovation among businesses. Chesbrough (2003) [14] introduced open innovation. He argued that companies can boost innovation by collaborating and sharing ideas externally. This improves innovation within digital ecosystems. Eisenmann *et al.* (2006) [15] studied platform economies. They showed that platforms connect businesses, share resources, and create value in multiple ways.

Gawer and Cusumano (2002) [16] studied platform leadership. They examined how firms like Intel and Microsoft use technology platforms to lead innovation. Baldwin and Woodard (2009) [17] studied platform design. They explained how platforms form the foundation of market innovation. Tiwana (2014) [18] looked at platform management and strategy. He showed how platforms bring different groups together and encourage joint innovation.

Overall, internet platforms and digital changes have transformed how businesses innovate. They no longer depend only on traditional company resources. Open ecosystems now enable more varied and global ways to create value.

3. Practical Cases of Internet-Driven Transformation of Specialized Markets in Zhejiang Province

The digital transformation of professional markets in Zhejiang Province depends on two factors. First, internet technologies have grown quickly. Second, the province started focusing on the digital economy early. The private sector's flexibility has also been key. This flexibility supports collaboration between industries and helps them adopt smarter technologies. The next sections explain Zhejiang's specific actions and successes in digital transformation. These examples show lessons for future efforts.

3.1. Leveraging the Early-Mover Advantage in the Digital Economy

Zhejiang Province has sped up innovation and use in the digital economy, using its early lead in this area. Good progress has been made in the growth and use of tools like artificial intelligence, big data, and cloud computing. Key projects in cities like Hangzhou and Wenzhou show Zhejiang's lead and push in the digital economy.

The "China Vision Valley" visual intelligence technology change project in Hangzhou wants to build a world-leading industry group for visual intelligence technology. Based on Hangzhou's strong technological innovation foundation, this project integrates artificial intelligence, big data, and cloud computing technologies to promote the high-quality development of the visual intelligence industry. The specific goal is to transform Hangzhou into a leading national and globally important source of innovation, a preferred destination for technological achievements, and a hub for high-end industrial clusters by 2027. The city plans to break through key technologies in the visual intelligence field through policy guidance, industrial investment funds, and focused technical research, while enhancing infrastructure and expanding into global markets.

In Wenzhou, the construction of the "International Cloud Software Valley" project promotes the deep integration of the digital economy with traditional industries, facilitating the application of emerging technologies as cloud computing and big data. This project not only provides infrastructure support for emerging technologies but also drives the digital transformation of local enterprises through the construction of industrial parks. These projects have laid a solid foundation for Zhejiang's leadership in the digital economy and provided replicable, scalable experiences for the national transformation of the digital economy.

3.2. Highlighting the Flexibility of the Private Sector

Zhejiang Province's private economy has long been renowned for its keen market sensitivity and flexible organizational structure, traits that have been made better by the promotion of the digital economy. In the fields of foreign trade e-commerce and traditional manufacturing, private enterprises have driven a series of digitally transformative models based on micro-innovations, helped by AI technology.

In Yiwu, small and medium-sized businesses have improved market efficiency

in the foreign trade sector by using AI technology. AI algorithms analyze global market data intelligently. They allow precise matching of supply and demand. They improve product compatibility and market adaptability. They cut information search and communication costs. With AI, merchants can respond more quickly to market demand. They enhance transaction efficiency and competitiveness [19].

Private enterprises in the manufacturing sector have shown flexible digital transformation models. In the Wenzhou footwear and leather industry, the “AI + Industrial Brain” system has enabled data-driven production decisions. This system has made production processes better. AI technology improves production efficiency and strengthens collaboration between upstream and downstream enterprises through data platforms. With intelligent production and supply chain management, companies have improved their flexible manufacturing capabilities and market response speed, so they increase the overall competitiveness of the industry.

The flexibility of the private economy is clear in technological applications and in its strong adaptive capacity driven by market orientation and innovation. With a platform-based industrial ecosystem, private enterprises in Zhejiang can quickly combine technological resources and market demand, leading to efficient industry collaboration and intelligent upgrading.

3.3. Promoting Industry Collaboration and Intelligent Transformation

In the process of digital transformation, industry collaboration and intelligent upgrading have become key factors in improving industrial competitiveness. Zhejiang’s professional markets are always advancing industry collaboration and speeding up intelligent transformation through methods like smart production, green manufacturing, and cross-border e-commerce.

The Huangyan mold industry has made information sharing and good collaboration across different stages of mold production, raw material supply, and logistics distribution by developing a “5G + Industrial Internet” platform. The platform lets companies change production plans right away, use resources better, and improve the total efficiency of the industrial chain. Huangyan has also increased its cooperation with cross-border e-commerce platforms, moving forward with internationalization and making its global market competitiveness better.

In the Zhili children’s clothing industry, the creation of the ‘Children’s Clothing Industry Brain’ platform has enabled the digital management of the whole process from design to sales. This platform joins production, sales, and supply chain management, making overall capacity use better and helping collaborative innovation across the industrial chain. Zhili has also sped up the use of its brand strategy, moving from OEM (Original Equipment Manufacturing) to OBM (Own Brand Manufacturing), increasing product value and market competitiveness. By using cross-border e-commerce platforms and market procurement trade pilots, Zhili

children's clothing has entered international markets, exporting to 126 countries and regions worldwide.

Throughout the intelligent transformation process, the collaborative effect across the industrial chain has become increasingly evident. Both the Huangyan mold industry and the Zhili children's clothing industry have achieved cross-regional and cross-enterprise collaboration through the introduction of digital platforms and intelligent technologies, enhancing market responsiveness and improving the overall competitiveness of the industrial chain.

Through the analysis of various industries' digital transformation cases in Zhejiang, it is evident that local industries have actively responded to and integrated national strategies by introducing intelligent manufacturing, green production, branding strategies, and cross-border e-commerce. These transformative practices have not only accelerated the high-quality development of the local economy but also provided valuable experience for other regions in driving industrial upgrading and transformation. Under the frameworks of the "Made in China 2025" and "Digital Economy" strategies, local industries should continue to deepen digital transformation, focus on technological innovation, and foster industry chain collaboration to drive more efficient economic growth and enhanced international competitiveness. Simultaneously, local industries should strengthen alignment with national strategies, leverage regional characteristics, and improve their position in global industrial chains, contributing positively to the transformation and development of the global economy.

4. Deepening the Digital Transformation of Zhejiang's Professional Markets: Future Policy Recommendations

As digital transformation becomes more widespread globally, Zhejiang's professional markets face new challenges and opportunities. During this change process, the joint development of the government, market operators, and merchants is important. Based on the real cases and actual situations of major professional markets in Zhejiang, this paper suggests the following policy recommendations from three views: government, market operators, and merchants.

4.1. Government Guidance Level

The government has an important role in leading the digital transformation of professional markets. By creating policies, making the environment better, and building infrastructure [20], the government can make good conditions for market groups to go through digital transformation [21].

Increasing policy support and financial aid. The government should introduce more targeted policies, offering financial support and tax incentives to help market operators build digital platforms and provide technical upgrade subsidies for merchants, thereby reducing their transformation costs.

Building digital infrastructure. The government should strengthen the construction of digital infrastructure, particularly the layout of networks and data

centers, especially in remote areas. By establishing 5G networks, big data centers, and cloud computing platforms, the efficiency of data flow can be improved, supporting the implementation of intelligent decision-making and ensuring that all market entities have equal access to digital platforms.

Promoting collaboration between the government and the market. The government should actively promote the development of industry standards and assist in building digital platforms, integrating resources through public service platforms, and supporting platform-based services and digital collaboration across the entire industry chain [22]. Meanwhile, policies should encourage the development of market clusters, enabling regional collaboration to achieve resource sharing and complementary advantages [23].

4.2. Market Operations Level

Market operators are the key driving force behind digital transformation. Professional market operators should make proactive efforts to enhance management efficiency, technology application, and service innovation.

Promoting the development of intelligent management systems. Market operators should drive the transformation of market management to intelligent systems by building intelligent operation systems based on big data analysis, artificial intelligence, and the Internet of Things. Through digital platforms, real-time market dynamics can be monitored, optimizing business processes such as supply chain management, inventory control, and marketing strategies, thus improving overall operational efficiency.

Deepening the integration of online and offline channels. Market operators should promote the deep integration of online and offline channels. By creating a diversified business model that combines online platforms with offline exhibitions and sales, market circulation efficiency and brand influence can be enhanced. Additionally, strengthening collaboration with cross-border e-commerce platforms will facilitate the internationalization of markets and expand export channels.

Developing intelligent value-added services. Market operators should offer more value-added services such as smart warehousing, logistics optimization, and financial services to increase the market's service value. Introducing Internet of Things and smart hardware technologies can improve transaction security and convenience while providing merchants with more business opportunities and market expansion.

4.3. Merchant Level

Merchants are the direct beneficiaries of digital transformation, and their proactive engagement in the process is closely linked to the overall market benefits. Therefore, merchants play an indispensable role in the transformation process.

Strengthening digital awareness and technical training. Merchants should enhance their awareness of digital transformation and recognize the importance of technological innovation in improving market competitiveness. Market operators

and governments should jointly organize digital training programs to help merchants master modern tools such as electronic payments, cloud computing, and big data analytics, thereby improving the efficiency and accuracy of their business operations [24].

Encouraging brand development among merchants. Merchants should transition from relying on OEM production models to building their own brands, thus increasing product added value and market competitiveness. The government can provide policy guidance and financial support to encourage merchants to build their brands, improve market recognition, and assist merchants in expanding both domestic and international markets.

Promoting intelligent production and product innovation. Merchants should use intelligent production equipment and management systems to drive internal digital upgrades. This improves production efficiency and product quality. They can use smart warehousing and logistics systems [25]. They can use artificial intelligence for product recommendations and market forecasting. These tools reduce inventory buildup. They improve market responsiveness.

Strengthening cross-industry collaboration and open innovation. Merchants should support cross-industry cooperation during their digital transformation. They should work with technology companies, research institutions, and universities. This promotes the sharing of innovative resources and technological exchange. Merchants can share data. They can work with merchants from other industries on platforms. These actions enhance market innovation capabilities and competitiveness.

5. Conclusions

The digital transformation of professional markets in Zhejiang Province requires cooperation between the government, market operators, and merchants. First, the government must provide policy guidance and financial support, and invest in digital infrastructure. Next, market operators need to develop smart management systems, connect online and offline platforms, and improve overall efficiency. At the same time, merchants should adopt digital tools, build stronger brands, and use smart production methods. By working together, these groups can ensure Zhejiang's professional markets become more efficient, intelligent, and sustainable, setting an example for other regions in China.

Furthermore, these steps will improve market operations and enhance Zhejiang's competitiveness in global trade. This progress will also support high-quality economic growth in the region. As a result, Zhejiang will solidify its role as a leader in China's digital economy.

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Conflicts of Interest

The authors declare no conflicts of interest.

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