



# Research on the Digital Transformation Path of Furniture Enterprise Supply Chain Based on Industrial Internet Platform

Minghui He\*, Xiaoqin Zhang<sup>a</sup>

Neusoft Institute Guangdong, Foshan 528225, China

<sup>a</sup>zhangxiaoqin@nuit.edu.cn

\*Corresponding author's e-mail: heminghui@nuit.edu.cn

**Abstract.** With the intensified market competition and the upgrading of consumer demand, furniture enterprises are facing the urgent need of transformation and upgrading. The emergence of the industrial Internet platform provides new opportunities for the digital transformation of the supply chain of furniture enterprises. This paper discusses the application of industrial Internet platform in the digital transformation of furniture enterprise supply chain. Firstly, it analyzes the current situation and problems of the digital transformation of the supply chain in the furniture industry. Then it takes Foshan Weishang Furniture Manufacturing Co., Ltd. as an example to show the application results of the industrial Internet platform in furniture enterprises. Secondly, based on the concept of industrial Internet platform and value co-creation, the industrial Internet platform model of furniture enterprises is constructed, and the platform business process and risk management and control mechanism are described in detail. Finally, it summarizes the important role of the industrial internet platform in the digital transformation of furniture enterprises, which provides a reference for furniture enterprises to achieve transformation and upgrading.

**Keywords:** industrial Internet platform, value co-creation, furniture enterprises, supply chain, digital transformation

## 1 Introduction

Internet platforms include industrial Internet platforms and consumer Internet platforms [1]. Consumer Internet platforms pay more attention to economies of scale on the demand side, and are also the objects of more research in the past. When the consumer end extends to the back end of the industrial chain, it will face great challenges brought by the complexity of participants and industrial resources, so the concept of industrial Internet, which focuses more on the reconstruction of the supply side industrial ecology, was born [2].

In the White Paper on the Economic Development of China's Industrial Internet Industry (2023) [3], the added value of the Internet industry more than one hundred billion yuan of nine, the industrial Internet manufacturing drive the largest, reached

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C. W. K. Chen et al. (eds.), *Proceedings of the 9th International Conference on Engineering Management and the 2nd Forum on Modern Logistics and Supply Chain Management (ICEM-MLSCM 2024)*,

Advances in Engineering Research 243,

[https://doi.org/10.2991/978-94-6463-531-7\\_13](https://doi.org/10.2991/978-94-6463-531-7_13)

1.89 trillion yuan in 2022. It shows that the industrial Internet not only on the technical level to promote the development of manufacturing, but also on the economic level for manufacturing growth provides a powerful power. The furniture industry is a branch of the manufacturing industry. Although the specific value-added data are not mentioned separately in the white paper, it can be predicted that with the in-depth application of the industrial Internet, the furniture industry will also benefit from product design, production processes, supply chain management, etc., so as to improve its overall economic efficiency and market competitiveness.

## 2 Research review

### 2.1 Industrial Internet platform

The concept of industrial platform was first proposed by Gawer & Cusumano (2014), and defined as a basic product, service or technology provided by one or more enterprises, and participating enterprises can develop complementary innovative products and produce positive network effects [4]. Jovanovic et al. (2022) divided the three platform prototypes of "product platform, supply chain platform and platform ecosystem" from the perspective of industrial manufacturing [5]. Menon et al. (2020) defines the industrial Internet platform as "a group of technologies that can generate value for the user enterprise when the platform involves other entities such as consumers, suppliers or subcontractors [6].

The industrial Internet platform involves multiple links such as production, supply and sales of the industrial chain, providing multilateral users with basic support services for the upstream and downstream of the industrial chain, and promoting the digitalization, networking and intelligent upgrading of industrial chain enterprises by integrating industrial resources and optimizing industrial processes [1]. Liu Yang (2024) combined with industrial 5.0 era background, the industry Internet platform is defined as: based on digital technology to reconstruct the industrial chain of all kinds of resources and organization connection, for the industry ecological diverse and interdependent all kinds of stakeholders to provide interactive support, for different organizations in ecological complementary solutions to provide technical support of comprehensive digital platform[7]. In terms of the promoting role of the industrial Internet platform on the industrial transformation, the existing research puts more emphasis on the platform in promoting the upstream and downstream coordination of the enterprise industrial chain [8], Complementary technology innovation [9], and to reduce the cooperation cost of innovation [10] and other positive effects. However, there is still a lack of discussion on how to combine the industrial Internet platform transformation. The furniture industry mainly develops in the form of industrial clusters, forming a number of furniture industry clusters, such as Guangdong, Zhejiang, Shandong and so on. The furniture industry cluster has obvious advantages. The application of industrial Internet platform by furniture enterprises can reduce enterprise costs, improve production efficiency and promote the coordinated development of the industrial chain.

## 2.2 Value co-creation theory

The connotation of value co-creation was first elaborated by Ramirez (1999) from the perspective of economics, believing that value can be created by enterprises introducing consumers into the production field, that is, consumers can play the role of producers in the production process, and is a source of productivity [11]. CHEUNG et al. (2010) proposed from the perspective of supply chain system, the role of value co-creation, such as the role of the relationship learning between upstream and downstream enterprises on the value of the two [12]. The research of Hongguo Guan (2021) shows that strengthening network intensification, connection strength and connection transparency can effectively promote resource sharing and knowledge innovation among platform members and ultimately realize value co-creation [13]. The development of digital economy makes the interaction between customers and enterprises get rid of the limitation of time and space. Therefore, many enterprises are committed to building an Internet platform, through which they interact with customers and other stakeholders and create value. Han Qiao et al. (2020) sorted out the research results of enterprise business model innovation in recent years, and pointed out that the value co-creation mechanism in the platform business model will be the focus of enterprises and academia in the future [14]. Therefore, the research on the industrial Internet platform can be carried out from the perspective of value co-creation.

## 3 Analysis of the Current Status Quo and Problems of the Digital Transformation of the Supply Chain in the Furniture Industry

This paper collects data in various ways, including field research, semi-structured interviews, and literature research methods. We visited and interviewed five furniture companies in typical furniture gathering areas of Foshan, Guangdong and Nankang, Jiangxi, to understand the current situation and problems of digital transformation in the supply chain of furniture companies. We obtained relevant information from company manuals, web reports, company official websites, academic literature, etc., and compared the current situation of furniture companies at different levels of development. The following information is summarized.

Although the furniture industry has a certain foundation for digital development, with the deepening of globalization, the furniture manufacturing industry is facing fierce competition from both domestic and international sources. In the international market, consumers have increasingly high requirements for the quality, design, and environmental protection of furniture. While in the domestic market, with the improvement of consumer purchasing power and changes in consumer attitudes, the demand for personalized and intelligent furniture products is increasing. Yanwen Zhang et al. (2024) proposed an industrial Internet platform operation model for furniture manufacturing, covering resource sharing in three aspects of raw materials, orders, and labor [15]. However, for the discrete manufacturing characteristics of non-standard furniture products in a wider range of small and medium-sized furniture

enterprises, the difficulty of digital transformation is greater, the requirements are higher, and there are more limiting factors. It is necessary to carry out sufficient digital construction planning from source design, research and development to manufacturing, as well as exhibition, after-sales, and recycling throughout the product lifecycle.

Foshan Weishang Furniture Manufacturing Co., Ltd. is one of the most prominent furniture companies in terms of digital transformation of their supply chain. Weishang Furniture is one of the earliest enterprises to explore intelligent production and operation. Since its establishment in 2006, Weishang Furniture has been promoting intelligent transformation based on its own business situation, practicing the "Industry 4.0" thinking and technology application, and integrating industrial chain resources. Empowering new industrial models for industrial chain cluster enterprises, creating a collaborative digital transformation platform for the "Customized Home Industry Cluster" industrial chain, including the creation of the "New Home Network" online design service platform, HOMKOO integrated cloud platform, virtual reality cloud computing based on graphic and image data, and mobile internet cloud technology, to achieve personalized marketing, flexible production, and socialized logistics in the "C2B+O2O" business operation mode, rapidly transforming from traditional furniture manufacturing enterprises to rapidly developing modern home service enterprises. The application of digitization has made Weishang Furniture a leading enterprise in the industry in just over a decade. Weishang Furniture has effectively improved production and management efficiency, inventory turnover efficiency, capital turnover rate, and reduced management costs. Its production efficiency has been increased to 8-10 times that of traditional models; The material utilization rate is as high as 93%, 8 points higher than the industry average; The error rate is less than 1%, with an industry average of 5% -8%; The delivery cycle has been shortened from 30 days to about 15 days, and the number of drawings used for each cabinet production has been reduced from 13 to 2. The annual capital turnover rate has been increased to more than 10 times, far higher than the annual capital turnover rate of traditional peers by 2-3 times.

Taking the production process of customer order submission for Weishang Furniture as an example, it includes two stages: digital processing of orders and big data scheduling of production (Figure 1). The first step is to digitize the order processing. At the Process Technology Center, customer orders from all over the country are uploaded to the cloud-based order management system. Process technicians retrieve orders from the cloud and transfer them to the local virtual manufacturing system. Based on the length, width, height data, and textual description of the product on the order, the system will automatically digitize it. The digitized product orders are uploaded to the data processing center and production planning and scheduling center. Next is big data scheduling production. The production planning and scheduling center needs to select products from millions of orders that can match various conditions such as color, material utilization, delivery time, logistics direction, etc. Then integrate them into a single order that can be mass-produced to achieve large-scale production of personalized customized products.

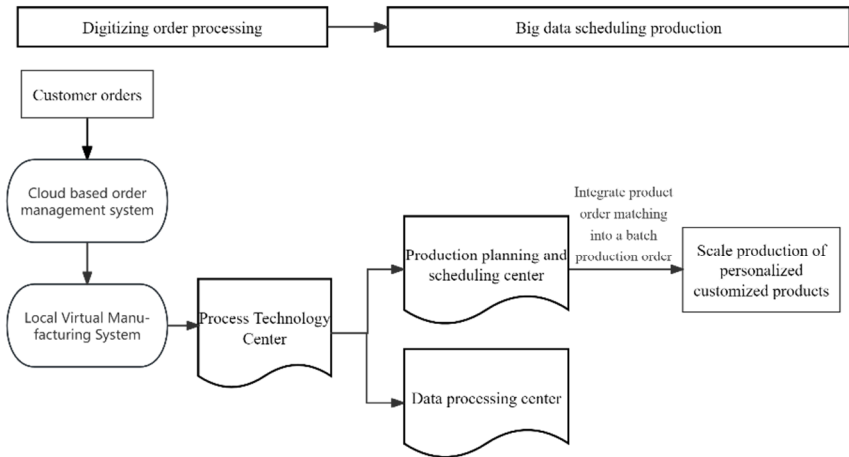


Fig. 1. Example of Weishang Furniture Order Processing Process (source: self-made)

#### 4 Digital Transformation Path of Furniture Enterprises based on the Industrial Internet Platform

Based on the concept of industrial Internet platform and value co creation, and the current digital development status of the furniture industry, this paper constructs an industrial Internet platform model for furniture enterprises (Figure 2), including the application layer, business layer, data layer, and technology layer. The industrial Internet platform realizes the whole chain digital management and improves the operation efficiency and management level of the furniture supply chain by introducing digital tools. The business layer is based on the theory of Product Lifecycle Management (PLM) and builds the "Intelligent Design - On Demand Procurement - Standard Production - Personalized Sales - Green Recycling" business process. The platform can integrate data from various links and conduct data analysis to provide decision-making support for enterprises, helping them better understand market trends and user needs. At the same time, the platform can conduct risk assessment and early warning to help enterprises prevent risks and ensure the stable operation of the supply chain. In addition, the platform also promotes collaborative cooperation among enterprises, achieves resource sharing and complementary advantages, and enhances the competitiveness of the entire furniture industry.

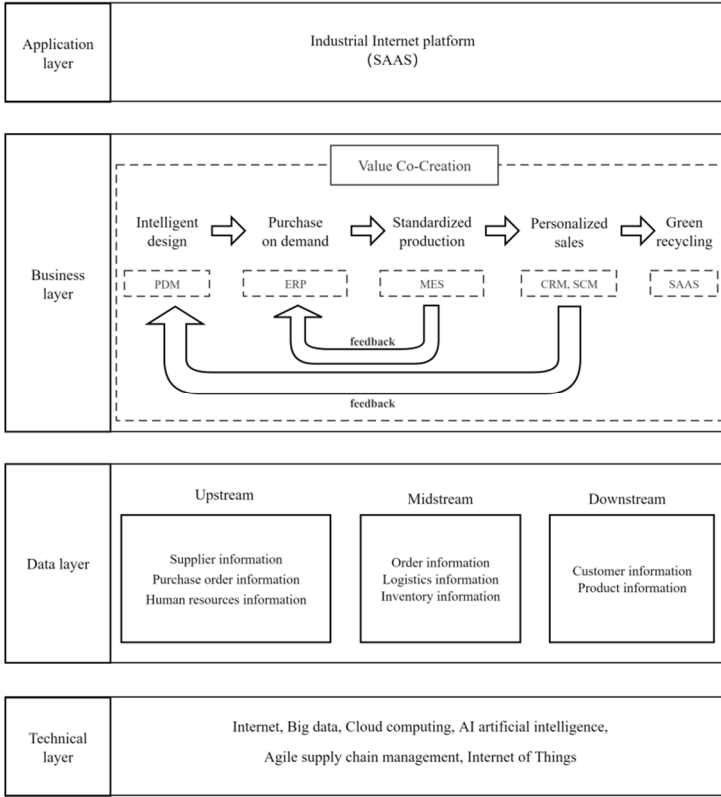


Fig. 2. Digital Transformation Path of furniture enterprises based on industrial Internet platform (source: self-made)

### 4.1 Platform Business Process

The industrial Internet platform of furniture enterprises takes data as the core, and realizes the integration of PDM, ERP, MES, CRM, digital management of the whole process of SCM and other systems. In the design stage, the platform collects market data, user feedback and other information, provides data support for designers, and jointly design with the PDM system to develop products more in line with the market demand. Virtual reality technology realizes three-dimensional display and simulation experience of products, supports personalized customization, and improves user experience. On the basis of the design, the platform provides raw material information sharing, order collaboration and supply chain finance services, and optimizes the procurement process combined with the ERP system to reduce costs and risks. Standardized production guidance and procurement plan to ensure the timely satisfaction of customer needs. After the purchase of raw materials, the platform will automatically generate the production plan, optimize the production process, optimize the production process, and monitor the production process in real time to ensure product quality

and efficiency. Automated production lines, robots, artificial intelligence and other technologies will further improve production efficiency and product quality. Then, enterprises can integrate online and offline sales channels, combine CRM and SCM systems to conduct order management and customer relationship management, provide personalized marketing services, and improve sales efficiency and customer satisfaction. Finally, the platform realizes green recycling through product traceability, recycling network construction and recycling measures, combined with the SAAS platform, so as to promote the environmental protection and sustainable development of the furniture supply chain.

## 4.2 Platform Risk Management and Control

As a hub connecting the upstream and downstream of the furniture industry chain, the Internet platform of the furniture industry plays a vital role in the risk management of the supply chain. Through data-driven, real-time monitoring, cooperation and risk response, the platform builds a solid risk defense line for enterprises, and helps furniture enterprises to realize the stable operation and sustainable development of the supply chain. Relying on strong data collection and analysis capabilities, the platform collects key data from all aspects of the supply chain, including production data, procurement data, sales data, inventory data, etc. Combined with big data and artificial intelligence technology, the platform deeply excavates the risk factors behind the data, such as supplier credit rating, inventory turnover rate, order delivery rate, etc., and establishes a sound risk index system. Through real-time monitoring of the supply chain status, the platform can find the potential risks in time, and timely inform the enterprises through the early warning system, so as to buy valuable time for the enterprises to take risk response measures. At the same time, the platform breaks down the barriers of the traditional supply chain and promotes all parties in the supply chain to share risk information, such as raw material price fluctuations and transportation delays, etc., so that all parties can timely understand the risk situation and take corresponding measures. At the same time, the platform promotes all parties in the supply chain to cope with risks together, such as jointly finding alternatives and sharing risks and losses, so as to form an ecosystem of risk sharing and benefit sharing. By building a multi-party cooperative risk management mechanism, the platform helps enterprises improve their ability to resist risks and jointly cope with uncertainties in the supply chain.

## 5 Conclusion

The industrial Internet platform provides a new path for the digital transformation of the furniture industry. The platform has brought new opportunities for furniture enterprises by integrating industrial chain resources, optimizing industrial processes, promoting technological innovation and model innovation, and realizing green and sustainable development. At the same time, the platform can promote collaborative cooperation between enterprises, achieve resource sharing and complementary ad-

vantages, and enhance the competitiveness of the entire industry. In addition, the industrial Internet platform plays a crucial role in the supply chain risk management. Through data driven, real-time monitoring, collaborative cooperation, risk response and other means, it builds a solid risk defense line for enterprises and helps furniture enterprises achieve stable operation and sustainable development of the supply chain.

## Confirmation

This research was funded mainly by Guangdong Federation of Social Sciences, grant number GD18YGL06, titled “Supply Chain Innovation Driven by Blockchain: Scenarios, Mechanisms, and Implementation Paths”, Guangdong Provincial Education Science Planning Project (Higher Education Special), grant number 2023GXJK591, titled “Research on the Construction of the ‘Eight Collaborative’ Industry Education Integration Education Mechanism for E-commerce Majors in Applied Undergraduate Universities” and by Foshan Federation of Social Sciences, grant number 2024-GJ080, titled “The research on the development of new quality productive forces in Foshan's home furnishing industry under the guidance of digital intelligence”.

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