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Research on the Path and Strategy of Digital Supply Chain Transformation

Dongyang Zhang[1], Mingxia Fu[2], Sai Zhang [3]

[1]*Kazakh-British Technical University Business School, Almaty, Kazakhstan, 050000*
[2]*Shaanxi Xinzhongneng Industrial and Trade Co., Ltd, Xi'an City, Shaanxi Province, 710000, China*
[3]*Chengdu Open University, Chengdu, Sichuan Province, 610000, China*

Abstract: *Under the background of rapid development of digital economy, digital transformation of supply chain has become an important way for enterprises to enhance their competitiveness. By elaborating the connotation and characteristics of digital supply chain, exploring how digital technology can effectively reshape the supply chain management mode, analyzing the motivation of digital supply chain transformation in detail from the three dimensions of technology promotion, market change and management optimization, elaborating the specific paths for enterprises to realize the digital transformation of the supply chain in the four aspects of the path of information integration, technology-driven path, process reengineering path, and organizational synergy path, and addressing the difficulties and risks in the digital. In view of the difficulties and risks in the practice of digital supply chain transformation, strategic planning, technology deployment, talent development and risk control strategies are proposed, in order to provide theoretical guidance and practical reference for the successful transformation of enterprise supply chain.*

Keywords: *digital supply chain; supply chain transformation; digital technology; implementation path; transformation strategy*

1. Introduction

At present, the rapid development of digital technology is reshaping the enterprise supply chain management mode. The wide application of new-generation information technology such as industrial Internet, big data, artificial intelligence, etc., promotes the accelerated evolution of supply chain in the direction of digitization, networking and intelligence [1]. Digital supply chain through big data, cloud computing, Internet of Things and artificial intelligence and other emerging technologies, the traditional supply chain links of information and resources to achieve comprehensive integration and intelligent optimization, to provide enterprises with efficient, flexible and agile supply chain solutions [2]. However, at present, in the implementation process of digital supply chain transformation, enterprises often lack a clear implementation path and systematic strategic planning, and poor transformation results or even failure occur frequently [3]. Based on this background, starting from the real needs of enterprises, we conduct a systematic and in-depth study on the connotation characteristics, transformation motivation, path selection and implementation strategy of digital supply chain transformation, trying to clarify the key factors and practical paths of transformation, and provide feasible theoretical guidance for the digital transformation of enterprise supply chain.

2. Overview of Digital Supply Chain Transformation

2.1 Definition of Digital Supply Chain

Digital supply chain refers to the full use of new-generation digital technologies such as the Internet, Internet of Things, big data, artificial intelligence and other new-generation digital technologies by enterprises to carry out a comprehensive digital transformation and integration of all aspects of the supply chain, in order to improve the overall efficiency and flexibility of the supply chain [4]. Compared with the traditional supply chain, the digital supply chain takes data as the driving force, closely connects the activities of procurement, production, logistics, sales and customer service, and realizes end-to-end information coherence and optimal allocation of resources. By building a digital supply chain, enterprises can map supply chain activities in the real world to the digital space in real

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time, and monitor, analyze and make decisions on a unified platform. This new form of supply chain is value creation-oriented, emphasizes timely information sharing and intelligent processing, and aims to improve the supply chain's responsiveness to market changes and adaptability to uncertainty.

2.2 Characteristics of digital supply chain

Digital supply chain is centered on customer demand and realizes demand-pull operation mode through digital technology [5]. Compared with the capacity-driven linear supply chain in the past, the digital supply chain pays more attention to adjusting supply, production and distribution plans from customer feedback and market changes. The digital supply chain emphasizes end-to-end visualization and real-time. With the help of Internet of Things (IoT) sensors, radio frequency identification (RFID) and other technological means, logistics, inventory, transportation and other status data in the supply chain can be collected in real time and shared to a unified platform, so that managers can have a clear picture of the operation of the entire supply chain. The digital supply chain is characterized by data-driven decision-making and intelligence. The collection and analysis of massive business data, combined with artificial intelligence and machine learning algorithms, enables enterprises to make intelligent decisions in demand forecasting, inventory optimization, and transportation route planning. For instance, by leveraging big data to analyze historical sales and market information to predict future demand trends, and applying artificial intelligence algorithms to optimize warehouse and distribution routes, logistics costs can be reduced and distribution efficiency can be enhanced.

3. Motivation Analysis of Digital Supply Chain Transformation

3.1 Technology Promotion

In recent years, the popularization of Internet technology and the enhancement of computing power have enabled enterprises to acquire and process massive data at a lower cost; and the wide application of IoT devices has enabled unprecedented interconnectivity among various links in the supply chain. From the release of raw materials, production line operation, to the transportation of finished products, channel sales, each link can be realized through sensors and networks to collect data and remote monitoring. Faced with the opportunities brought by these technologies, enterprises naturally put digital transformation on the agenda, with a view to improving supply chain performance through technology empowerment. To this end, some enterprises have begun to introduce robots and automated equipment to improve warehousing and distribution efficiency, and are utilizing blockchain technology to enhance supply chain traceability management and credit management.

3.2 Market changes

Today's consumers' demands are more diverse and rapidly changing, with an increasing number of personalized customization and small-lot, multi-frequency orders, making it difficult for the traditional rigid supply chain to meet these new demands in a timely manner. At the same time, the rise of e-commerce and digital marketing has greatly changed the way of commodity circulation, and the new retail mode of online and offline integration requires the supply chain to have higher flexibility to adapt to all-weather, multi-channel services. Facing the pressure of globalized competition, enterprises not only have to compete in products and prices, but also need to compete in supply chain response speed and service level. Market uncertainty is also increasing, such as natural disasters, public health events (such as epidemics) and other “black swan” events on the supply chain impact, enterprises urgently need a more resilient supply chain to ensure stable supply.

3.3 Management Optimization

Traditional supply chain management often suffers from information asymmetry, long processes, and lagging decision-making, for example, information silos caused by departments working separately, and lack of coordination among supply, production, and sales, which leads to inventory backlogs or discontinued supply. Management wanted to streamline and optimize supply chain processes through digital transformation to achieve leaner and more efficient operations. By introducing advanced information systems and data analytics tools, the data chain of each link within the enterprise can be bridged to achieve collaborative management of procurement, production planning, inventory and transportation, thereby reducing operating costs, minimizing waste and improving turnover. At the

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same time, the digital supply chain helps to improve the science and timeliness of decision-making. Based on real-time data reports and visualized analysis results, managers can identify bottlenecks and anomalies in the supply chain faster and make timely adjustment decisions. Compared with the traditional management style that relies on empirical judgment, the transparency and quantitative analysis brought by digital means can help reduce the blind spot of decision-making and improve the management level. With the expansion of enterprise scale and the increase of supply chain network complexity, it is difficult to effectively monitor and control the risk of the whole chain by traditional manual operation.

4. The path of digital supply chain transformation

4.1 Information integration path

Information integration path is a basic path of digital supply chain transformation, the core of which is to break the information silos and realize the information coherence and sharing of the whole supply chain process. Under this path, enterprises first focus on building and improving the information system to integrate the information flow of each node of the supply chain onto a unified platform. Specifically, this includes the establishment of an integrated enterprise resource planning (ERP) system, supply chain management (SCM) system, customer relationship management (CRM) system, etc., and ensure smooth data interaction between these systems. Through the integration of information systems, procurement, production, inventory, logistics, sales and other aspects of the data can be converged in real time, the formation of the supply chain of the “single data source”. The information integration path also involves the information docking between enterprises and supply chain partners. Through the use of Electronic Data Interchange (EDI), Vendor Managed Inventory (VMI) platforms or other digital interfaces, enterprises can realize system docking with suppliers and distributors to automatically share key information such as orders, inventory, and transportation. For example, suppliers are able to understand the enterprise's inventory consumption and production plan in a timely manner, and prepare materials or adjust production in advance; enterprises can also track real-time logistics and transportation information, and accurately grasp the status of raw materials and products in transit. The deepening of information integration can greatly improve the coordination of the supply chain: production plans can be adjusted based on real-time sales data, warehousing and distribution can be optimized based on inventory information around the world, and transportation arrangements can be optimized with reference to the latest order demand and traffic conditions.

4.2 Technology-driven path

Technology-driven path means that enterprises take the application of new technology as the entry point to lead the change and upgrade of each link in the supply chain. In this path choice, enterprises focus on how to utilize cutting-edge technological means to enhance the efficiency, visibility and intelligence of the supply chain. For example, the application of Internet of Things (IoT) technology can interconnect items, equipment and vehicles, etc., and collect real-time information on the environment, location, status, etc. through sensors, and then transmit these data back to the back-end system with the help of the network, so as to realize the automatic monitoring and management of inventory and transportation. In warehousing, AI can optimize inventory layout and picking paths to improve operational efficiency; in transportation and distribution, algorithms can dynamically plan the optimal route to reduce delivery time and transportation costs. The exploration and application of blockchain technology in the supply chain is also a technology-driven path. Through the non-tampering and traceability characteristics of blockchain, enterprises can build a supply chain trust mechanism to realize data recording and verification of the origin of goods, logistics process, delivery and acceptance.

4.3 Process Reengineering Path

The process reengineering path emphasizes the re-examination and design of supply chain business processes, adapting to the digital environment and giving full play to the advantages of technology by reforming traditional processes. Enterprises will comb through existing supply chain processes to identify pain points and inefficiencies. For example, traditional processes may have excessive manual approvals leading to long procurement cycles, and lack of flexibility in production planning leading to inventory backlogs. In digital transformation, companies can draw on the concept of business process

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reengineering (BPR) to redesign these processes using digital technology. Enterprises can streamline multi-level approval processes into online automated approvals to improve procurement responsiveness, and adopt a rolling plan mechanism based on real-time data to dynamically adjust production and inventory strategies to reduce excess inventory and stock-outs. Process reengineering also implies the optimization of the convergence of upstream and downstream processes in the supply chain. With the support of digitalization, enterprises can promote the seamless integration of sales, production, procurement, logistics and other processes. The process reengineering path also focuses on customer-centric process reconstruction. Digitization allows companies to obtain in-depth data on customer behavior and preferences, according to which they can redefine the processes of order processing, customized services, returns and exchanges to make them more relevant to customer needs and enhance the customer experience. It can be said that the process reengineering path is a transformation method starting from management and process, which ensures that enterprises not only "change to new tools" but also "change to the new runway" in digital transformation, and carry the benefits of digital technology with new business processes.

4.4 Organizational Collaboration Path

Digital supply chain transformation is not only a change of technology and process, but also involves a change of internal management mode and culture. Under the organizational synergy path, enterprises will focus on establishing an organizational guarantee mechanism conducive to digitalization. In order to ensure the smooth implementation of the supply chain digitalization project, the enterprise may set up a special cross-departmental digital transformation team, bringing together key personnel from IT, procurement, production, logistics, sales and other departments to work together to ensure that there is adequate communication between technology and business. In this matrix team operation, departments break boundaries and work together with a common supply chain goal in mind, improving project promotion efficiency. In order to achieve true end-to-end digitization, companies need to establish strategic partnerships with upstream and downstream supply chains to jointly promote data sharing and process convergence. Specifically, enterprises can develop information interfaces with core suppliers to realize real-time interconnection of order and inventory data; they can also establish a sales data sharing mechanism with major channel vendors to keep abreast of changes in end demand. The Organizational Synergy Path also emphasizes the cultivation of the corporate culture and talent pool needed for digital transformation. Management needs to create an atmosphere that supports innovation and continuous improvement, encouraging employees to embrace new technologies and optimize old processes, and giving them the necessary training and incentives.

5. Implementation Strategies for Digital Supply Chain Transformation

5.1 Strategic Planning

When promoting digital supply chain transformation, thorough strategic planning is the starting point for success. Enterprises should first clarify the positioning of digital transformation in the overall business strategy and set clear visions and goals. Companies can set specific targets such as how much inventory turnover can be improved, how much logistics costs can be reduced, and how much customer satisfaction can be improved over a number of years through the digital supply chain. With clear goals, companies need to assess the digital maturity of their current supply chain, identify gaps and room for improvement, and develop a transformation roadmap accordingly. The strategic plan should cover the phasing and key tasks of the transformation, for example, divided into the period of infrastructure construction, pilot application, and full-scale rollout, etc., with clear corresponding work priorities and milestones for each phase. The support and participation of top management is the key to the successful implementation of the strategic plan. Management should incorporate digital supply chain transformation into the company's strategic agenda, provide the necessary resources, and establish a governance structure to oversee the progress of the transformation. During the strategic planning process, companies also need to consider multiple factors in an integrated manner, including technology selection, investment budget, organizational change and risk response. An effective strategy is to prioritize projects that can yield significant benefits in the short term as entry points to gain experience and internal confidence. For example, start with the implementation of digitalization pilots in inventory management or order fulfillment, and then gradually expand the scope after achieving success. At the same time, strategic planning should focus on synergy with business strategy to ensure that digital supply chain construction can support the company to enhance market competitiveness and

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profitability.

5.2 Technology Deployment

Enterprises need to select appropriate technology solutions based on their business needs and planning, and ensure that these technologies can be smoothly integrated into the existing operation system. In terms of technology selection, the principle of combining applicability and foresight should be followed: not only to meet the urgent needs of enterprises to improve efficiency and reduce costs at present, but also to take into account the direction of future business development and technology evolution. When choosing supply chain management software, it is necessary to consider its compatibility with the enterprise's existing ERP, WMS (Warehouse Management System), etc., as well as the degree of support for its expansion module for the future needs of new functions. Technology deployment usually needs to be gradual, to avoid “one-size-fits-all” type of implementation which may cause business interruption or employee resistance. Enterprises can adopt the approach of first pilot, and then promote the new technology in individual departments or links for testing and optimization, to verify the effect and solve the problem before promoting to the whole bureau. Enterprises should set up professional project teams, clarify their respective responsibilities, develop implementation schedules, and maintain close communication with technology vendors. At the same time, it is necessary to do a good job of user training to ensure that employees master the correct use of the new system and equipment; establish a fault emergency response mechanism to ensure that the technology deployment process can be quickly responded to and resolved when problems arise. In the digital supply chain technology deployment should also focus on data management and quality control. No matter what kind of new technology is introduced, if there is a lack of high-quality data support, its effect will be greatly reduced. Enterprises should deploy technology at the same time, sort out data standards, clean historical data, establish data governance mechanisms to ensure the consistency and accuracy of data between different systems. Only with both technology and data can the effectiveness of the digital supply chain be fully realized.

5.3 Talent development

Companies need to assess the talent structure of their existing teams to identify the adequacy of key skills required for digital transformation. For example, whether the supply chain team has the ability to analyze data, whether they are proficient in the operation of new systems, and whether the IT department understands the business scenarios. If the internal talent pool is insufficient, companies need to build the required talent team through a combination of training and introduction. On the one hand, a hierarchical training program can be carried out for existing employees, including the popularization of digital thinking, the operation of specific software tools, and the deepening of professional data analysis and artificial intelligence knowledge, so that employees can be qualified for the job requirements in the digital environment. On the other hand, the introduction of professionals with digital supply chain experience is also a necessary supplement, such as the introduction of composite talents familiar with big data and supply chain optimization, or the establishment of a full-time position such as Chief Digital Officer (CDO) to coordinate and promote the enterprise's digital strategy. In the talent development strategy, the incentive mechanism and the shaping of corporate culture are equally important. Digital transformation is often accompanied by changes in job responsibilities and work styles, and companies should establish corresponding performance appraisal and incentive systems to encourage employees to take the initiative to participate in and promote digital innovation. Employees with outstanding performance in supply chain digitalization projects are given rewards and promotion opportunities, creating an atmosphere where everyone strives to be a pioneer in transformation.

5.4 Risk control

With supply chain business highly dependent on digital system operation, once the system is paralyzed or data leakage occurs, it will have a serious impact on the enterprise. For this reason, enterprises should synchronize and strengthen information security measures during technology deployment, such as establishing network firewalls, data encryption and access rights control mechanisms, conducting regular security vulnerability scans and emergency drills, and ensuring that supply chain systems have the ability to resist attacks and recover quickly. Implement backup and disaster recovery programs for critical systems and data to prevent business interruption due to single point of failure. Management risks during the transformation process also need to be emphasized.

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Rapid change may cause maladaptation and resistance within the organization. If communication is not in place and training is not adequate, employees may not be familiar with the new processes, resulting in operational errors or even negative resistance, thus affecting business operations. Risks in the interface between the digitized supply chain and external partners should also be considered. If the degree of digitization of upstream and downstream enterprises in the supply chain is uneven, incompatible data interfaces and disjointed collaboration processes may occur, affecting the overall effect. In this regard, enterprises need to formulate partner digitization standards, select partners with relatively mature digital capabilities who are willing to jointly invest in transformation, and clarify the norms of both parties in terms of data sharing, security responsibilities, etc. in the cooperation agreement. Gradually promote the digitalization level of the entire supply chain ecosystem in order to fundamentally reduce the risk of collaboration. Finally, enterprises should establish a performance monitoring and risk warning mechanism in the transformation process, track key indicators (such as order fulfillment rate, inventory turnover days, number of supply interruptions, etc.), and analyze the reasons and adjust the strategy in a timely manner once it deviates from the target or appears abnormal.

6. Conclusion

Overall, the digital transformation of supply chain is not just a technology application process, but a comprehensive change process involving enterprise strategy, management style and cultural change. Enterprises must take into account their own business characteristics, implement transformation plans step by step, and build up internal collaboration mechanisms and external ecosystems that are adapted to the digital environment in order to truly realize the goal of supply chain transformation. With the continuous evolution of technology and changes in market demand, digital supply chain research will continue to deepen, focusing on the integration and application of emerging technologies and differentiated transformation practices among industries, so as to better guide the actual transformation actions of enterprises.

References

[1] Xiaowen Wang,Ying Li,Nanxu Chen. Digital Transformation, Supply Chain Overflow and Enterprise Integration Innovation [J/OL]. East China Economic Management, 1-13[2025-04-09].
[2] Xu Feng. Research on the impact of digital transformation on enterprise procurement and supply chain efficiency [J]. China Logistics and Purchasing, 2025, (4): 109-110.
[3] Huang Lihe. Enterprise digital transformation, supply chain and business credit [J]. Credit, 2025, 43 (2): 19-29.
[4] Liu Yu,Wang Yang. Optimization of enterprise supply chain management mode under the perspective of digital transformation [J]. China Agricultural Accounting, 2025, 35 (6): 109-111.
[5] Gao Wenjiao. Digital transformation strategy of enterprise supply chain management [J]. National Circulation Economy, 2025, (5): 112-115.