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INNOVATIVE DEVELOPMENT OF DISTRIBUTION LOGISTICS UNDER DIGITAL TRANSFORMATION

The article is devoted to the issues of innovative development of distribution logistics in the context of digital transformation. The purpose of the study is to identify and systematize methodological approaches to digital transformation planning. On the example of Alibaba Logistics and based on the reference model to digital transformation as a of approach value and efficiency increase, a three-stage innovative plan for the digital transformation of distribution logistics is described. These researches will help with future distribution logistics development in China and Belarus.

Keywords: *innovative development, logistics, digital logistics, distribution, unmanned distribution, Alibaba*

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ИННОВАЦИОННОЕ РАЗВИТИЕ РАСПРЕДЕЛИТЕЛЬНОЙ ЛОГИСТИКИ В УСЛОВИЯХ ЦИФРОВОЙ ТРАНСФОРМАЦИИ

Статья посвящена вопросам инновационного развития распределительной логистики в условиях цифровой трансформации. Цель исследования – выделить и систематизировать методические подходы к планированию цифровой трансформации. На примере логистики в компании Alibaba и на основе эталонной модели цифровой трансформации как подхода к повышению ценности и эффективности описан трехэтапный инновационный план цифровой трансформации распределительной логистики. Данные исследования помогут в дальнейшем развитии распределительной логистики в Китае и Беларуси.

Ключевые слова: *инновационное развитие, логистика, цифровая логистика, распределения, беспилотная дистрибуция, Alibaba*

The economy determines trade, and logistics are derived from trade. In an environment where the COVID-19 virus has normalized, the labor-intensive logistics industry is facing digital transformation in all aspects of transportation, warehousing, and distribution [1]. And the labor-intensive logistics industry is in desperate need of transformation as the demographic dividend fades. Within the foreseeable horizon, China's working-age population (aged 15–64) will decline by more than 50 million by 2030 and by up to 280 million in the total labor force by 2050–2060. As the population ages, so does the proportion of the workforce. The previous model of relying on a «sea of people» to drive distribution logistics development is no longer effective in the long term, and it is particularly important that the logistics industry implements digital transformation.

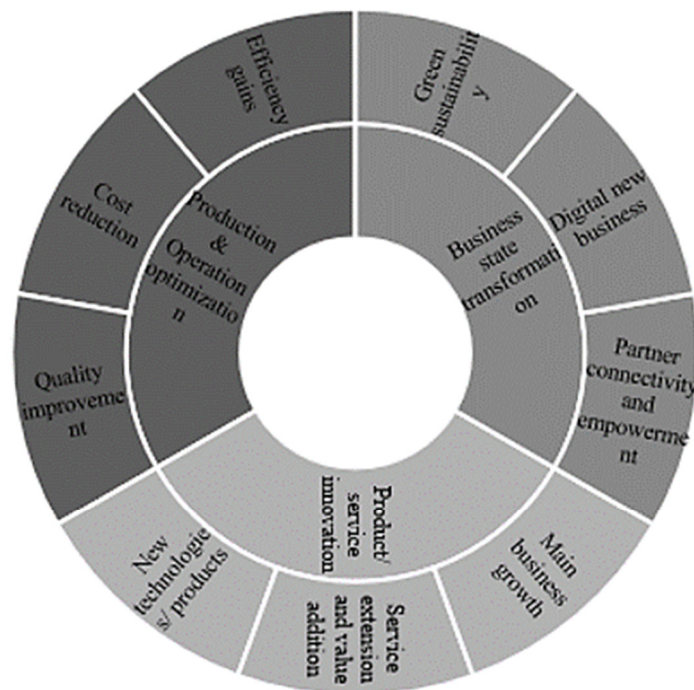
Many scholars have studied the digital transformation of distribution logistics. He Liming proposed that the widespread use of digital technology and the digitalization of distribution logistics are important drivers for the high-quality development of the logistics industry [2]. Stephan et al. analyzed the feasibility of drone distribution in terms of local policies and the human environment, and proposed a feasible solution [3]. Yin Siwen et al. analyzed the problems of Alibaba's Cainiao post in the «last mile» of distribution and proposed strategies for digital transformation [4].

Due to different human environments and national policies, successful cases in different countries are not necessarily applicable to the distribution logistics of that country, but have some reference

significance. Patchara et al. proposed a synchronized truck and drone distribution model that allows multiple drones to take off from a truck, serve one or more customers, and return to the same truck for battery exchange and package recovery [5].

However, it is necessary to analyze the problems in distribution logistics and dig into the deeper causes of these problems. Currently, through digital transformation, leading Chinese logistics companies such as Alibaba, Jingdong Logistics, and Sinotrans have achieved remarkable results in terms of service efficiency improvement, business model innovation, and organizational business model transformation. Although many logistics companies have recognized the importance of digital transformation, it is difficult to break through due to limited technical capabilities and insufficient resources.

In November 2022, the Chinese Standardization Committee released «Digital transformation – reference model for value and effectiveness» [6]. This puts forward a reference classification of the value benefits that can be achieved by digital transformation, and clarifies the value benefits that keep jumping up in the process of digital transformation from three aspects: production and operation optimization, product / service model innovation, and business model transformation (see Figure).



■ Production & Operation optimization ■ Product/ service innovation ■ Business state transformation

Digital Transformation Value Benefit Reference Model

Source: [6].

It aims to help the industry establish a value benefit-oriented methodological mechanism to integrate value benefit requirements throughout the process of digital transformation, obtain transformation effectiveness and achieve innovative development.

Transportation model innovation

The transportation mode of intelligent distribution is the latest exploration to realize distribution logistics under digital transformation. Transportation is the core link of the distribution industry chain, and there are two main directions of digital innovation and development: one is unmanned distribution with self-driving technology as the core, and the other is based on computer vision and AIoT product technology to provide real-time sensing functions for transportation vehicle management systems.

The amount of investment and financing in China’s intelligent distribution industry has been climbing year by year in the past two years, with the total investment amount reaching US\$260 million

in 2021. The «Strategic Planning Outline for Expanding Domestic Demand 2022–2035» released by the Chinese State Council clearly proposes to accelerate the development of intelligent products and support the application of technologies such as autonomous driving and unmanned distribution (see table). Therefore, 2023 will be an important year for unmanned distribution.

Digital transformation of the distribution logistics partial financing

Date	Company	Category	Rounds	Latest Valuation
4/2022	TopXGun Robotics	Unmanned vehicle distribution	B+	500 million RMB
12/2021	White Rhino	Unmanned vehicle distribution	Pre-A	250 million RMB
11/2021	Feng Yi Technology	UAV distribution	A	1 billion RMB
11/2021	Antwork Technology	Unmanned vehicle distribution	B	150 million RMB
8/2021	NEOLIX	Unmanned vehicle distribution	B	2.2 billion RMB
7/2021	White Rhino	Unmanned vehicle distribution	Pre-A	325 million RMB
4/2021	SF UAS	UAV distribution	A	1.6 billion RMB
9/2020	Zhixingzhe Technology	Unmanned vehicle autopilot system	C+	1.5 billion RMB

Source: author’s developed.

At present, Alibaba’s unmanned distribution has started to enter the trial operation stage in relatively closed scenes such as port areas and parks. However, the distance from actual operation is still great, and it is expected that at this stage, the commercialization value of digital transformation in distribution logistics is mainly reflected in functions such as vehicle status monitoring and driving behavior monitoring.

Inventory business optimization

Logistics enterprises rely on stock business, by using computer vision, machine learning, operations optimization, and other technologies in warehouse distribution business activities to build digital scenarios, within the scope of the main business to obtain, develop, and use key business data, so as to obtain value benefits such as efficiency, cost reduction, and quality improvement [7]. In Alibaba’s logistics service Cainiao distribution warehouse, for example, the original operation method is mainly human-to-cargo picking, which faces the problems of escalating labor costs and the urgent need to improve the efficiency and accuracy of picking. After Alibaba helped the Cainiao distribution warehouse undergo digital transformation, the results of simultaneous tests in the digital distribution warehouse and the traditional distribution warehouse showed that a picker in a traditional distribution warehouse walked 27,924 steps and picked 1,500 pieces of goods in seven and a half hours of work, which was close to the limit of manual picking. In contrast, a picker in a digital distribution warehouse only needs to walk 2,563 steps and pick up to 3,000 pieces. It achieves a 210 % increase in picking human efficiency, a 10 % increase in inventory space utilization, a 10 % to 40 % reduction in labor costs, and a 99.99 % increase in picking accuracy, effectively improving operational efficiency.

Business state transformation

E-commerce has driven the development of the logistics industry, and logistics has also made e-commerce. Now, with the iterative evolution of the e-commerce model, logistics has also supported the development of e-commerce. With the new needs of e-commerce continuing to change and iterate, the business model of logistics is no longer a simple part of the transport downstream; more needs to be done to achieve the whole logistics reconstruction and optimization of suppliers to consumers [8]. After

breaking through the integration of business, logistics enterprises cultivate digital business, rely on the value of open and co-creation of eco-level capabilities, create an ecosystem of distribution logistics, carry out the acquisition, development, and utilization of ecosystem-level data covering the whole enterprise and partners, cultivate and develop new models and new business models with data as the core, and enhance the level of business intelligence, clustering, and ecological co-creation and sharing among ecological partners. In this way, we can improve the efficiency of ecological resource allocation on demand and obtain the value benefits of ecological partners' connection and empowerment, new digital business, and green sustainable development. For example, Alibaba's distribution logistics adopt a collaborative and symbiotic approach to build and improve the distribution logistics ecology.

Conclusion

With the advent of the digital economy, the logistics industry must embrace digital transformation fully. Taking Alibaba, a leading logistics company in China, as an example, this paper proposes a «three-step» innovative solution for distribution logistics under digital transformation based on the value-benefit reference model: inventory business optimization, transportation model innovation, and business state transformation. It is expected that the digital transformation of distribution logistics will create a better operating mode for logistics enterprises while meeting the needs of more consumers and realizing the coordinated and integrated development of the logistics industry and digital transformation in the future.

References

1. *Мясникова, О. В.* Цифровая трансформация логистических систем дистрибуции при переходе на модели экономики замкнутого цикла / О. В. Мясникова // Экономика. Управление. Инновации. – 2018. – № 2 (4). – С. 3–10.
2. *Liming, He.* Modern logistics trends and priorities in China in 2023 / He Liming // Modern Logistics News. – 2023. – № 1. – P. 1–3.
3. *Stephan, M.* Drones for last mile logistics: baloney or part of the solution / M. Stephan, R. Christian, J. Christian // Transportation Research Procedia. – 2019. – № 41. – P. 73–87.
4. *Siwen, Yin.* Research on the development countermeasures of the «last mile» of e-commerce logistics: the case of Cainiao post station / Yin Siwen, Bao Xiaoyu, Chen Haonan // Modern Marketing (Business Edition). – 2020. – № 1. – P. 100–101.
5. *Kitjacharoenchai, P.* Two echelon vehicle routing problem with drones in last mile distribution / P. Kitjacharoenchai, B. C. Min, S. Lee // International J. of Production Economics. – 2020. – № 255. – P. 1–14.
6. Digital transformation - reference model for value and effectiveness [Electronic resource] // China national standardization administration committee. – Mode of access: <https://www.ciiabd.org.cn/articles/WgOBMk.html>. – Date of access: 13.03.2023.
7. *Su, Zhou.* Study on digital transformation of logistics enterprises / Zhou Su // China Storage and Transportation. – 2022. – № 4. – P. 176–178.
8. *Yujie, Chen.* Research on the mechanism of digital transformation of business process of logistics enterprises under the normalization of epidemic prevention / Chen Yujie, Liu Xuejun // Business Economic Research. – 2022. – № 2. – P. 118–121.