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Original Paper

Research on the Construction and Economic Consequences of the Intelligent Digital Supply Chain for Alcohol Logistics—A Case Study of Luzhou Laojiao

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Abstract

The creation of digital and intelligent supply chains can contribute to the resilience of industrial and supply chains, which contributes significantly to the high-quality growth of the real economy. At present, in the practice of digital and intelligent supply chain in China, problems like lack of data sharing and poor technological adaptability across regions restrict the scenarios of application of digital transformation. The current logistics development at Luzhou Laojiao has gone through three phases; basic digitization, system intelligence, and ecosystem collaboration. It has successfully overcome these industry challenges by capitalizing on digital and intelligent technologies and data governance. Focusing on technology empowerment and data-driven innovation, this case takes full advantage of the benefits of combined resources in the digital and intelligent supply chain of liquor logistics, creating an end-to-end collaborative model. It also guarantees business innovation and data security, establishing a holistic governance structure that encompasses the whole process of data collection and use. This collaborative case analysis provides useful lessons in innovation in liquor logistics digital supply chains and digital transformation in traditional manufacturing industries.

Keywords

Digital and Intelligent Supply Chain, Logistics Enterprise, Data Element, Artificial Intelligence

Introduction

On March 24, 2025, the Ministry of Commerce, along with various departments such as Development and Reform, Education, Industry and Information Technology, Transport, Agriculture and Rural Affairs, and Data Management, as well as local offices of the State Taxation Administration, studied, drafted and released the "Action Plan for Accelerating the Development of Intelligent Digital Supply Chain" to take advantage of opportunities in digital and intelligent supply chain development. On May 26 of the same year, the Ministry of Commerce gave a targeted interpretation of the plan, further narrowing down on five major industries-agriculture, manufacturing, wholesale, retail and others-and suggested a targeted digitalization policy called "one chain, one policy". Through the deep integration of technologies like smart automated warehouses and unmanned delivery vehicles into industrial practices, this strategy facilitates end-to-end integration of the entire supply chain, thereby achieving accurate reduction of logistics costs and integration of industries with smart logistics. This series of top-level designs clearly demonstrates the importance of digital and intelligent technologies in transforming supply chain systems and boosting industrial competitiveness, and lays the foundation for high-quality development of China's modern supply chain industry.

With two basic logics, artificial intelligence has become the central pillar of digital and intelligent supply chains as the next-generation evolution of the supply chain sector. To begin with, in the face of growing anti-globalization sentiments and escalating geopolitical conflicts-which results in greater external uncertainties-human-machine cooperation can be effective to increase supply chain resilience and risk resistance by dynamically reallocating resources and reacting in real time to emergencies, thus lowering the risk of supply chain disruptions. Second, in the technological wave that is shifting Industry 4.0 to Industry 5.0, the profound intertwining of AI into each phase of the supply chain speeds up the digital transformation process, leading to an overall innovation in production processes, management paradigms, and service models (Song, 2024). This very dual force is what makes digital and intelligent supply chains capable of accurately fitting into complex and constantly changing industrial ecosystems, turning passive adaptation into active optimization, thereby providing a clear path towards high-quality development of the modern supply chain industry in China.

1. Literature Review

1.1 The Connotation of the Intelligent Digital Supply Chain

The smart digital supply chain is a novel integrated system that enhances the conventional supply chain. Its core is to base on the profound integration of digital and intelligent technologies to rebuild the operation mode, governance mechanism, and value logic of the whole supply chain process, attain digitalization, intelligence, and visualization of the entire chain, and increase operational efficiency and

resilience of the enterprise supply chain. It gives good backing to minimize the total logistics expenses of the society, develop a modern industrial system and optimize consumer supply. By using the new generation of information technologies like big data, artificial intelligence, Internet of Things, blockchain and cloud computing, overcome the predicament of the traditional supply chain of an information island, establish the full chain connection and real-time synchronization of logistics, capital flow, production flow and information flow, connect the data flow of the supply chain with the digital intelligence technology, and create a networked system (Xie, Zheng, & Dong, 2024) of large-scale collaboration and intelligent decision-making (Xie, 2024). The main worth of the implementation of digital intelligence technology is to address the issue of information asymmetry at every stage of the supply chain, guaranteeing authenticity and reliability of information by blockchain, and data analysis and application by artificial intelligence, thus improving the overall efficiency and resilience of the supply chain. As significant carriers of national strategy execution, traditional enterprises are changing[3] their supply chains in the private domain to industry-level platform ecosystems through their benefits of scale, standardization, and systematization (Peng et al., 2025), attaining adaptability, innovation, and evolution (Chen & Liu, 2021). Digital supply chains are not only the use of technology, but also organizational change and ecological rebuilding. A new supply chain system which is facilitated by a new generation of digital and intelligent technologies, where data is the fundamental production factor, full-process collaboration is the mode of operation, and mixed governance is the guarantee, breaking down information barriers, optimizing resource allocation, and enhancing intelligent decision-making, the core is through technology empowerment and model innovation. Within the exploration and implementation of traditional enterprises, the smart and digital supply chain ecosystem is slowly emerging as the most important route towards increasing the resilience and security level of the national industrial supply chain and developing new quality productivity.

1.2 The Building Mechanism of Digital and Intelligent Supply Chains

The establishment of a digital and smart supply chain is based on the close integration of contemporary information technology and supply chain management. It is not just an improvement of one technology or process, but it is a systematic evolutionary process consisting of a data base, intelligent decision-making empowerment, and ecological collaborative transformation. The Internet of Things, massive data storage, computing and analysis are done with the help of big data and cloud computing, demand forecasting, intelligent scheduling and risk warning are done with the help of artificial intelligence, data trustworthiness and transaction security are guaranteed by blockchain, and virtual images of the physical supply chain are created with the help of digital twins. Reach complete-process visualization and simulation optimization (Xie, 2024), and offer underlying support to the digitalization and intelligence of the entire chain. At the stage of intelligent decision-making empowerment, intelligent decision-making is implemented across the supply chain to attain dual synergy (Tao, Wang, Xu et al., 2023) of operation management and risk management (Tao, 2023). An upgrade to intelligence-driven rather than data-driven is realised through the creation of a data middle platform,

integration of multi-source heterogeneous data, and application of machine learning algorithms to create a variety of intelligent models. The most advanced form of supply chain system change is ecological thinking. With the development of digitalization, the supply chain has ceased to be an operational system of one enterprise but an ecosystem that crosses industries and entities. Ecological thinking focuses on the idea that connection matters more than ownership, openness is preferable to closure and promotes an open model of multi-subject cooperation in the form of co-construction, co-creation, and co-sharing. Transport capacity, finance, traffic, and green resources in the supply chain can be re-integrated with the help of digital platforms (Liu et al. , 2025).

1.3 The Economic Consequences of Intelligent Digital Supply Chain

In the era of deep integration of the digital economy and the real economy, the digital and intelligent supply chain, as the digital and intelligent upgrade version of the traditional supply chain, facilitates real-time information sharing, smart process optimization and efficient resource allocation at all nodes of the supply chain. Yang Siying noted that supply chain digitalization pilots can greatly improve the efficiency of enterprises' supply chains. In particular, private enterprises have much more obvious efficiency improvements than state-owned enterprises because of their agile decision-making and rapid response to market demand, while foreign enterprises, with their global supply chain management experience, have more remarkable improvements in supply chain collaboration efficiency after applying digital and intelligent technologies, particularly in cross-border supply chain connection. Digital transformation brings about cost and efficiency. Once JD Industrial assists domestic industrial enterprises to complete digital transformation, their procurement cycle is reduced to 3-5 days, and procurement and logistics-related costs are greatly lowered. McDonald's China has partnered with Cainiao Network to perfect the "last mile" delivery, cutting the urban delivery costs by 18% using digital technologies such as dynamic group buying and electric vehicle delivery. Smart supply chains can increase business performance. Businesses can indirectly enhance their performance by enhancing supply chain efficiency through digital and intelligent pilot projects, and this facilitating effect is greater for firms with lower information transparency and higher economic perception uncertainty. Digital and intelligent empowerment of industrial chains and supply chains is not individual empowerment but empowerment of the whole industrial chain and supply chain. If empowerment is only carried out on individual chain enterprises or a few enterprises, it will be hard to observe the empowerment effects. Only by dragging or stimulating the entire industrial chain and supply chain through digital intelligence empowerment can enterprises improve their competitiveness and gain the upper hand in the digital economy (Li et al., 2025).

1.4 Literature Review

In conclusion, the studies on the co-creation of social value with intelligent digital supply chain as the object are not yet mature, but some researchers have unveiled the establishment mechanism of intelligent digital supply chains based on models like platform empowerment model, alliance empowerment model and AI large model empowerment model, There is a lack of in-depth exploration

of how intelligent digital supply chains can enhance the resilience of the industrial chain and supply chain of enterprises and their impact paths and effects on the financial performance of digital supply chains of alcoholic beverages through specific case studies. Meanwhile, current studies primarily use the digital supply chains of private or foreign companies like JD. com, Lenovo and Schneider Electric as an example to study, but fewer studies consider the digital supply chain of alcohol as an example, and the research into the supply chain mechanism of central enterprises remains superficial. Using the above research gaps, this paper uses Luzhou Laojiao as the research object, examines the digital and intelligent supply chain transformation mechanism of traditional wine enterprises, suggests a practical and feasible approach to the digital and intelligent transformation of the supply chain of traditional wine enterprises in combination with the business model of Luzhou Laojiao, and applies the approach to other traditional manufacturing industries such as wine, To better reflect the present situation and enterprise value of the digital transformation of the supply chain of traditional liquor enterprises, and provide ideas and inspirations to other enterprises to achieve the development of digital and intelligent supply chains.

2. Research Design

2.1 Research Technique

The paper uses a single-case study methodology to compare the financial performance of Luzhou Laojiao with that of other leading baijiu brands, explore the economic implications of digital and intelligent transformation of Luzhou Laojiao, and explore how constructing a digitally intelligent supply chain with contemporary core competitiveness can enable high-quality development in the logistics sector. The single-case approach offers an in-depth description of the digital and intelligent transformation of the company, enables an assessment of its key role in developmental changes facilitated by digital supply chains, and explains how digital supply chains enable the transformation of state-owned enterprises. By thoroughly analysing the case study, the study unveils the future of logistics in intelligent digital supply chains, providing practical insights for digital and intelligent transformation of the liquor industry.

2.2 Case Background

Luzhou Laojiao Co. , Ltd. (hereinafter referred to as “Luzhou Laojiao) is a large state-owned liquor brewing enterprise approved by the Sichuan Provincial Government and established in 1994. Since its listing on the Shenzhen Stock Exchange in 1994, it has evolved an integrated industrial chain operation model of tradition and innovation. It is currently listed among the major backbone enterprises in Sichuan Province, and has been featured several times in the World Brand Yearbook and is always ranked among the leaders in the distilled spirits industry worldwide. Luzhou Laojiao is a central business in China liquor industry as a key carrier of both tradition and innovation; therefore, its core business includes liquor production, sales, research and development, and cultural promotion of alcoholic beverages. The company boasts of the 1573 National Treasure Cellars which have never been

out of use since 1573 and its unique brewing process dating back to 1324 handed down through 24 generations collectively referred to as the Living Dual National Treasures. In 2024, its high-quality liquor sales surpassed 100,000 tons, and brand value was among the three highest in the liquor industry in China, making it a reference enterprise of strong- aroma liquor. In that year, the company recorded operating revenue of 31.196 billion yuan and net profit attributable to shareholders of 13.473 billion yuan with the proportion of international business revenue steadily increasing, which made it one of the leading enterprises based on both quality inheritance and digital-intelligent innovation in the liquor industry.

The digital and intelligent supply chain of Luzhou Laojiao improves the efficiency of collaboration throughout the logistics process by creating a special information management system that removes the information barriers between the segments of the supply chain. This system combines the whole workflow, including the packaging material input, finished product production, warehousing and distribution to channel delivery into digitalized control processes, allowing real-time coordination and traceability of information at each node. It solves the problem of delays in the processes due to information asymmetry and enhances the efficiency of coordination and accuracy of control along the supply chain (Wang & Zheng, 2025). Digital technologies unite all the supply chain stakeholders within a single framework of collaboration, with seamless interoperability of data and coordination of processes between production and consumption, eliminating inter-process boundaries, increasing the overall turnover efficiency and resource use of the supply chain, and minimizing efficiency losses through operational bottlenecks.

2.3 Case Selection

There are three main reasons why the smart logistics supply chain project of alcoholic beverages by Luzhou Laojiao was chosen as a case study: First, being an enterprise that spearheaded the digital and intelligent transformation in the baijiu industry, Luzhou Laojiao started its digital upgrade initiatives as early as 2015. It has taken a progressive development approach of informationalization-digitalization-intelligence and created the first fully automated digital production line in all phases in the industry. Its strong technical structure and early-mover advantage gives it a replicable model of digital transformation of alcoholic beverage firms. Second, being one of the benchmarks of the digital-to-intelligent transformation in the baijiu industry, Luzhou Laojiao became the first company to create a so-called Lighthouse Factory in China, combining the most advanced technologies, including AI and digital twins, to implement end-to-end integrated management. Its vision of change, namely technology empowerment and full-chain integration is quite aligned with the emphasis on digital and intelligent upgrades in the industry, which proves to be highly visionary and pragmatic advice. Third, as an exemplar of smart supply chain partnership in the alcohol sector, Luzhou Laojiao has created its own smart warehousing and logistics system based on WMS (Warehouse Management System) and monitoring systems to control efficiently, providing a dynamic benchmark to other similar businesses to develop smart supply chains and improve cost-effectiveness. Since it has

three unique features, namely, industry leadership, practical representativeness, and innovative methodology, this work chooses this project as a typical one to examine the construction and functioning of smart logistics supply chains in the alcoholic beverage industry, intending to distill a methodology that can be applied to construct such a supply chain through a thorough analysis of its digital transformation logic.

3. Case study

3.1 The Establishment Process of the Digital and Intelligent Supply Chain of Luzhou Laojiao

3.1.1 Basic Digitalization Stage (2015-2019)

The digital and intelligent supply chain of Luzhou Laojiao started with the simple digital layout. Its main aim is to dismantle data silos that have fragmented data and ineffective information exchange throughout all the links of the traditional liquor supply chain, providing a solid underlying base on which further digital and intelligent upgrading can be based. This phase aims at digitizing complete business processes links. The basic functions and major information of each supply chain division are tabulated and stored in order to replace manual documentation with data-driven management. In the meantime, simple information systems are combined and built gradually. Core supply chain links are deployed using data collection and node tracing technologies, and a simple visual framework is constructed to query and display data at critical nodes in the supply chain. This constitutes a background data system of digital and intelligent transformation and amasses core data resources towards future intelligent upgrades.

3.1.2 System Intelligence Stage (2020-2023)

As the basic data is accumulated continuously and the supply chain operations require more and more, the intelligent supply chain system of Luzhou Laojiao has reached a phase of system-level intelligent upgrade. It has already made a breakthrough between data accumulation and data value conversion, facilitating the shift of supply chain management to proactive prediction instead of passive response, and experience-based instead of data-based. The integration of smart technologies and the use of algorithm models are emphasized in this stage. Activities are undertaken on the three fundamental dimensions of intelligent decision-making-risk warning-trustworthy traceability. The efficiency of supply chain response and inventory turnover rate are enhanced through the demand forecasting and dynamic replenishment mechanism that is powered by AI algorithms. An environment monitoring system of the logistics is created and early warnings of risks are achieved with the help of intelligent algorithms, minimizing the risks of supply chain operations. A blockchain trusted traceability platform is built to achieve the entire life cycle traceability of products during production, storage, logistics to the terminal, enhance quality control and brand protection, and enable intelligent technologies to be applied in the core business cases of supply chain, unleashing data value.

3.1.3 Eco-collaborative Stage (Since 2024)

The Luzhou Laojiao digital and intelligent supply chain has reached the ecological collaboration stage.

The essence is to encourage the profound assimilation of digital and smart technologies with the supply chain processes, disrupt the linear supply chain framework, and develop into an open and collaborative ecosystem. The main thing in this stage is the construction of an open digital platform. It combines upstream and downstream resources of the supply chain, establishes a cooperative platform throughout the production, warehousing, logistics, and marketing chain, and achieves data exchange and business cooperation between upstream and downstream partners, thus enhancing the efficiency of the overall supply chain ecosystem. Meanwhile, the digital twin system is actively implemented to simulate the whole supply chain process, optimize process design and resource allocation. Constantly improve the digitalized network of cross-regional logistics to attain intelligent scheduling and effective operation of logistics links. This not only allows a digitalized closed loop of its own supply chain, but it also creates a replicable and scalable digital supply chain solution to the alcohol industry, facilitating the digital transformation of the industry.

It is evident that this process illustrates the gradual development course of the intelligent supply chain of Luzhou Laojiao, starting with the digitalization layout, followed by the upgrade of the intelligent system, and culminating in the creation of an ecological collaborative system. Each stage construction direction perfectly corresponds to the needs of the enterprise development and the transformation tendencies of the industry, which offers a model of the phased evolution of the transformation of the intelligent supply chain of the liquor industry. Figure 1 depicts the development process of Luzhou Laojiao in terms of intelligent supply chain.

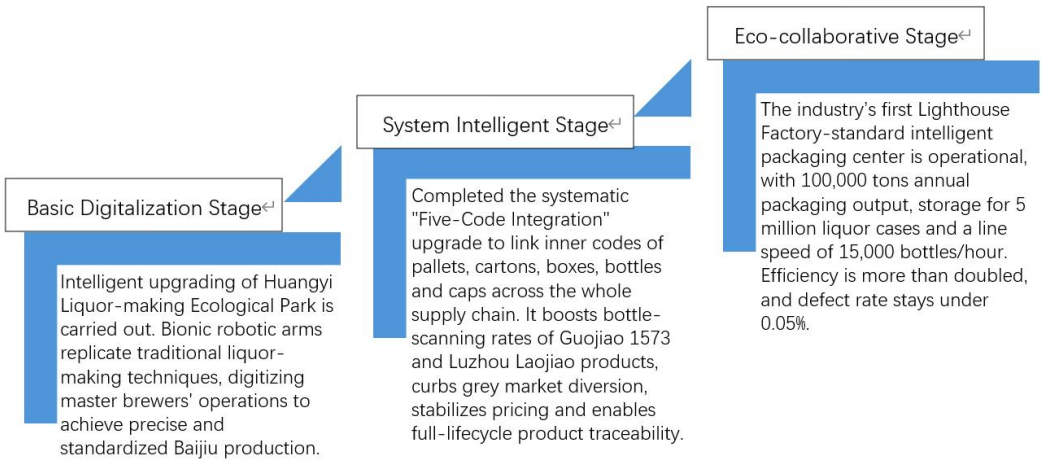

Figure 1. The Establishment Process of the Digital and Intelligent Supply Chain

3.2 Economic Consequences of the Digital and Intelligent Supply Chain

3.2.1 Digitalization Enhances Supply Chain Efficiency

Luzhou Laojiao follows the principles of inheritance, innovation and technology-driven development by combining century old craftsmanship with digital and intelligent transformation. It establishes a 1:1 digital mapping of its brewing and supply chain industrial parks covering over 3,000 mu, as well as more than 60,000 pieces of equipment, and constructs a factory-wide digital twin system. In production

and operation, this digital twin system uses real-time data to predict AI forecasts, increase lifting equipment usage by 45 percent, improve emergency response effectiveness by 40 percent, and reduce operation and maintenance expenses by 25 percent. It replaces experience-based judgment in management with data-driven decision-making, empowering corporate governance through the use of digital twin technology. Using artificial intelligence to combine large volumes of data and the know-how of master brewers, Luzhou Laojiao creates ideal production batches. The system provides real time production forecasting and guidance reducing the response time to process deviation by 80 percent and correctly predicting high quality liquor distillation yield. This solution has been implemented in supplier management, bottling lines, warehousing and logistics. The efficiency of the bottling line has increased more than two times, and the defective product rate is less than 0.05%. Production decisions that previously were made based on personal experience alone are transformed into standardized, data-driven workflows eliminating production variations due to subjective differences in operations. It provides consistent, repeatable best practice production procedures of upstream supply chain manufacturing, reducing faulty production and reducing costs associated with rework and waste of resources in the supply chain.

The inventory turnover days had an upward trend, increasing to 849 days in 2021 and reaching 1,527 days in 2025 (Figure 3). This period accurately represents the entire process of premium base liquor: 3 years of basic aging and 1-2 years of classified blending. The long turnover days are not a sign of overstocking of inventory; rather, it is a perfect fit with the premiumization strategy, which is manifested by the proactive build-up of stocks of base liquor and semi-finished products. This is very much in line with strategic inventory theory. In case inventory has three fundamental characteristics safeguarding core competitiveness, hedging against market fluctuations, and realizing value appreciation its turnover cycle must be aligned to long-term strategic goals instead of short-term operational efficiency (Sun, 2023).

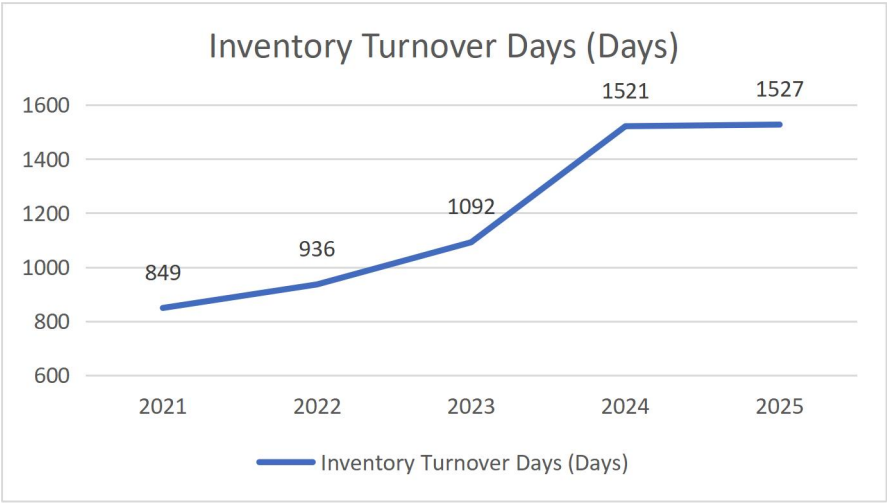

Figure 3. Inventory Turnover Days of Luzhou Laojiao from 2021 to 2025

Source: Annual Reports of Luzhou Laojiao over the Years.

Logistically, the digital and intelligent transformation of Luzhou Laojiao will be instrumental in enhancing its supply chain efficiency. Its logistics cost ratio was 0.54% in 2025 as compared to Wuliangye, a major peer brand with a ratio of 1.4% which is directly indicative of the impressive cost optimization of digital and intelligent technologies (Figure 4). In the process of the transformation, Luzhou Laojiao developed a smart supply chain management system to attain accurate full-link coordination of demand forecasting, warehouse management and transportation scheduling. Smart warehouse systems are used in warehousing where they dynamically allocate inventory according to the market demand in order to reduce unnecessary storage costs. To transport, big data algorithms produce optimal delivery paths and incorporate third-party logistics capacity, significantly reducing transit losses and resource waste (Zhao, 2018). The digital upgrade of the company is more aligned to its high-end product strategy and nationwide distribution structure as compared to other brands like Yanghe and Fenjiu. Digital technologies alleviate the pressure on logistics operations in the context of a wide national presence, and provide it with a strong position in terms of cost-control vis-a-vis Wuliangye. This cements the supply chain base of quick response to the markets and sustainable brand development.

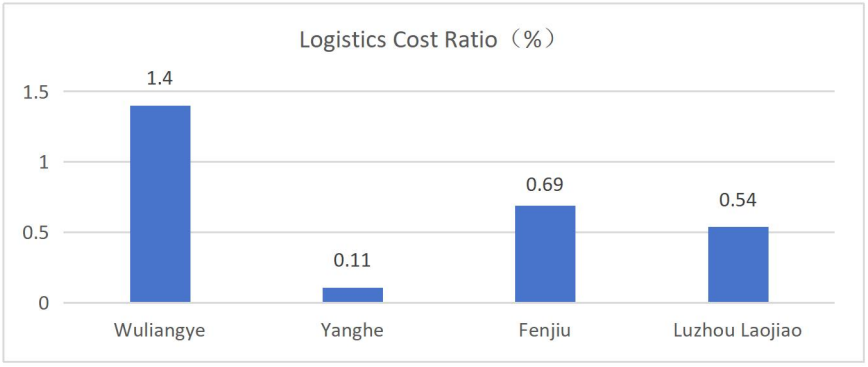

Figure 4. Comparison of Logistics Cost Rates of Luzhou Laojiao and Other Leading Liquor Brands in 2025

Source: 2025 Annual Reports of Wuliangye, Yanghe, Fenjiu, and Luzhou Laojiao

3.2.2 Logistics Cost Reduction Enabled by Digital Intelligence

The baijiu industry in China has reached a stock competition stage with increasing industrial concentration. In 2025, the leading six baijiu enterprises, i.e., Kweichow Moutai, Wuliangye, Shanxi Fenjiu, Luzhou Laojiao, Yanghe Co., Ltd. and Gujing Gongjiu, contributed to 54. 48% of total industry operating revenue and 63. 75% of total industry profits. It is on this background that cost control has become a fundamental aspect of corporate competitiveness and digital intelligent transformation is a potent channel of cost reduction and efficiency enhancement.

The intelligent digital supply chain of Luzhou Laojiao brought about significant cost savings in 2025 in terms of logistics costs, which totaled RMB 14,042.97 million, compared to other baijiu brands. Wuliangye documented logistics expenses of RMB 56, 912. 48 million, Kweichow Moutai RMB 18,

134. 25million and Fenjiu RMB 26, 776. 07 million (Figure 5). The excellent control of logistics costs by Luzhou Laojiao is due to the effective functioning of its system of digital intelligent supply chain.

On the one hand, the company implemented high-density storage solutions: the warehouses were retrofitted with shuttle racks and custom high-reach electric forklifts to optimize space usage and efficiency. On the other hand, self-developed warehouse management and monitoring systems work together to facilitate real-time tracking and data-driven administration of all stored products. Through the integration of big data, artificial intelligence and other technologies, Luzhou Laojiao's smart digital supply chain enhances logistics route planning and inventory control, reducing transportation times and warehousing costs, and maintaining cost advantages in a highly competitive market[11].

In comparison, the much greater logistics expenses of Wuliangye are due to its well-developed sales network and complicated delivery system. Although Kweichow Moutai has a better brand value and market positioning, its logistics costs remain higher than those of Luzhou Laojiao, which demonstrates that digital intelligent measures implemented by Luzhou Laojiao provide better logistics cost management. The logistics expenses of Fenjiu are also higher than that of Luzhou Laojiao, which means that it can improve its market development and efficiency in delivery. The optimizations through the digital supply chain of Luzhou Laojiao do not only reduce the logistics spending but also increase the overall operational efficiency and competitiveness in the market (Tang, Liu, & Chen, 2024). This smart and digital advantage has provided Luzhou Laojiao with a strong base in competing in the market in future as it will be able to further increase its market share without affecting the quality of its products.

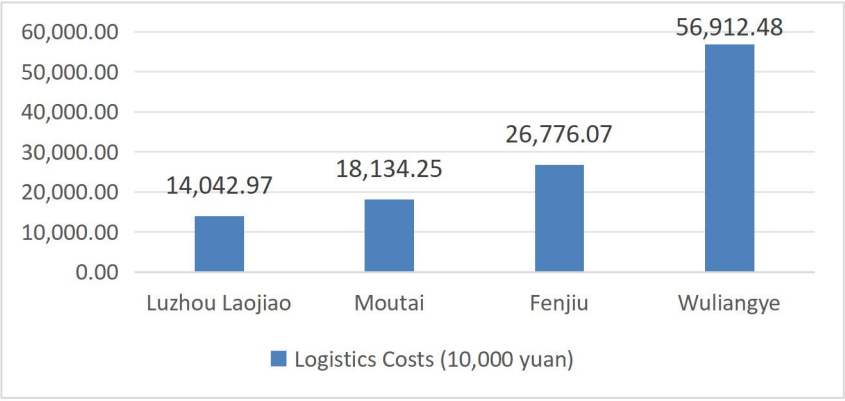

Figure 5. Comparison of Logistics Costs Between Luzhou Laojiao and Leading Baijiu Brands, 2025

Source: 2025 Annual Reports of Wuliangye, Yanghe, Fenjiu and Luzhou Laojiao.

Luzhou Laojiao had administrative expenses of 0.962 billion yuan in 2025, which decreased by 12.55 percent compared to 1.1 billion yuan in 2024. Kweichow Moutai has reported administrative costs of 8.32 billion yuan, a decrease of 10.69 percent relative to 9.316 billion yuan in 2024. The administrative costs of Wuliangye were 3.097 billion yuan, which is 12.88% less than 3.555 billion yuan in 2024. The

administrative costs of Shanxi Fenjiu reached 1.453 billion yuan, and the year-on-year growth was 0.41%. Yanghe Co. , Ltd. recorded administrative expenses of 1.79 billion yuan, which is 7.01% lower than 1.925 billion yuan in 2024 (Figure 6). Luzhou Laojiao experienced decreasing logistics costs and operating costs at the same time, and it was the only major liquor enterprise that managed to reduce both types of costs. This shows impressive achievements in its cost control management.

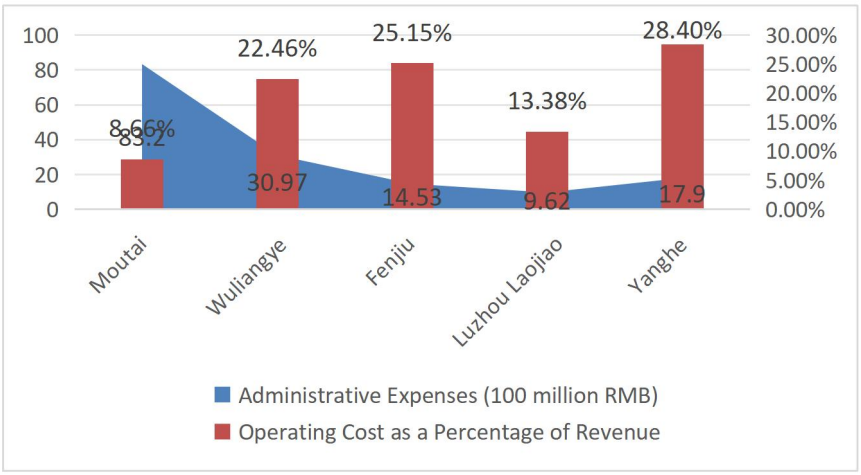

Figure 6. Administrative Expenses and Operating Cost-to-Revenue Ratios of China's Top 5 Baijiu Enterprises, 2025

Source: 2025Annual Reports of Wuliangye, Yanghe, Fenjiu and Luzhou Laojiao.

In early 2025, Luzhou Laojiao completed and started the operation of an intelligent packaging center technical renovation project with a total investment of about RMB 2.136 billion. This plant has the highest bottling speed, quality inspection, intelligence and digitalization levels, as well as the most technological innovation in the industry. It provides end-to-end integration and full process automation from packaging material processing to bottling and logistics and distribution of finished products. The production efficiency is 2-4 times that of traditional production lines, with 80%-90% less labor required, making it the first "Lighthouse Factory" in the baijiu industry.

The Lighthouse Factory automates the manual work and does away with manual processes and direct labor expenses. It improves accuracy and uniformity in operations, reducing quality defects and rework costs due to human error. Continuous production round-the-clock is a maximization of equipment utilization and throughput. The factory, which is supported by digital intelligence, uses big data analytics and AI algorithms to maximize production scheduling and logistics route planning to achieve accurate demand forecasting, minimize inventory overstock and stockout costs, and increase management efficiency and quality of decisions (Liu, 2025). Operational costs have reduced in the face of constant digital intelligent upgrades, showing profound value creation of digital technologies. Digitalization leads to declining administrative costs through simplifying management processes through data-based decision-making, as well as smart scheduling enhances manufacturing productivity.

The cost control is therefore achieved in two fronts; reduction of expenditure and improvement of efficiency.

3.2.3 Improved Corporate Performance Driven by Intelligent Digital Supply Chains

There is a positive correlation between the development of Luzhou Laojiao intelligent digital supply chain and its operating revenue and profit growth. When comparing financial data in 2019to 2025 (Figure 7), it can be seen that digital intelligent transformation has a positive effect on corporate revenues and profits.

The development of the intelligent digital supply chain of Luzhou Laojiao has a positive correlation with its operating revenue and profit growth. The comparison of financial data in 2019-2025 (Figure 7) shows that the digital intelligent transformation has a favorable effect on corporate revenues and profits. Between 2019 and 2025, the operating revenue of Luzhou Laojiao increased by 15.817 billion yuan to 25.731 billion yuan, which is equivalent to a compound annual growth rate (CAGR) of 7.20. The period 20212023 falls under the System Intelligence Stage where investments in core projects of the digital supply chain are concentrated. With the help of AI scheduling, smart warehousing and the Lighthouse Factory, the efficiency of supply chain operations was significantly enhanced, leading to an increase in revenue by more than 20 percent over three years. The cash flow was augmented and reinvested in digital infrastructure to maintain long-term growth. Nonetheless, the growth in revenues slowed down to 3.19% in 2024 and decreased by 17.52% in 2025. The deceleration was due to increased competition of stocks in the baijiu industry, channel destocking and slow demand of high-end liquor drinking. Although the revenue performance was weaker, the cost-control benefits of digital transformation maintained profitability at a high level, as the net profit grew at a CAGR of 12.91.

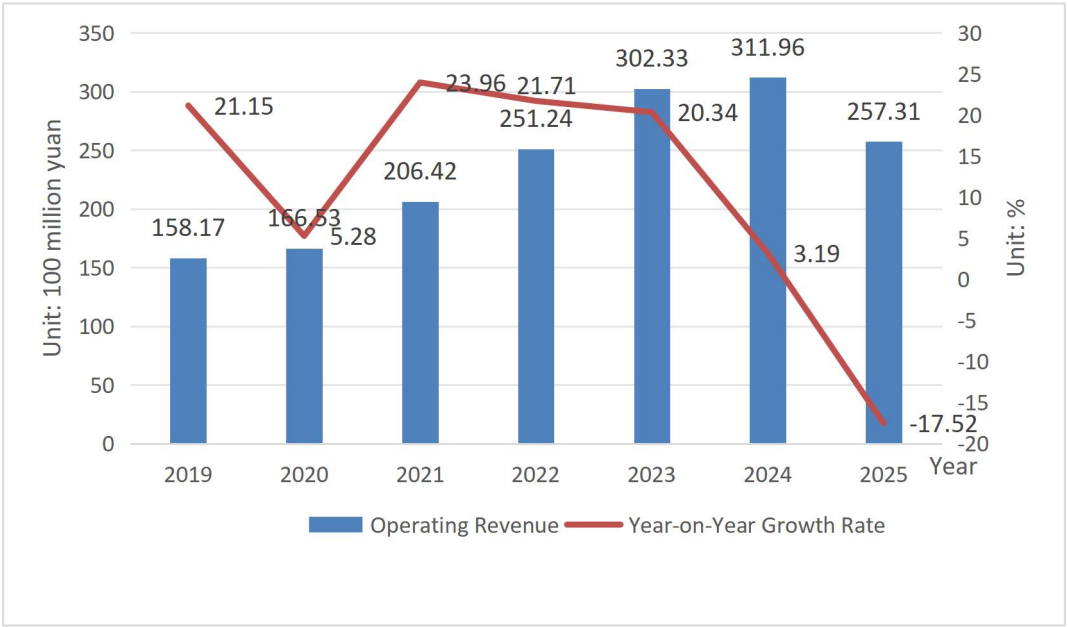

Figure 7 Operating Revenue and Corresponding Year-on-Year Growth Rates, 2019-2025

Source: Annual Reports of Luzhou Laojiao for Respective Years.

Meanwhile, the net profit attributable to parent company shareholders increased by 12.91% annually (CAGR) to RMB 10.86 billion in 2014, up from RMB 4.642 billion in 2013 (Figure 8). The higher growth rate of net profit compared to operating revenue shows that digital intelligent transformation has successfully boosted corporate profitability. The gross profit margin of the company has improved from around 80% to around 87%, with mid-to-high-end liquor products generating a gross profit margin of over 91% in 2025, one of the highest in the industry. The net profit margin increased from 29.35%in 2019 to 42.21% in 2025, an increase of 12.86percentage points (Figure 9). These indicators confirm that digital intelligent transformation not only increases the scale of revenue but also provides efficient control over costs and expenses (Juleiti, Ge, & Zhang, n.d.).

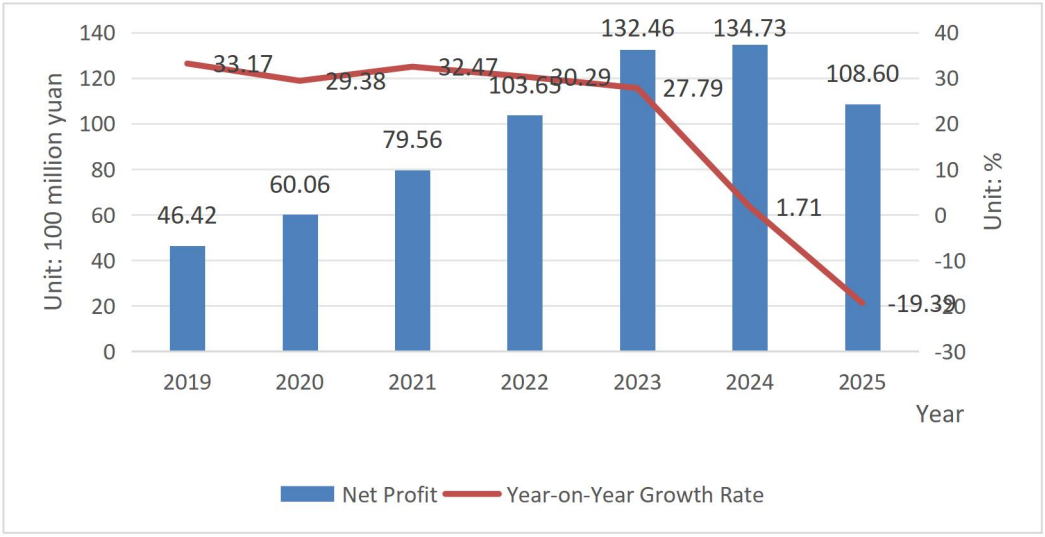

Figure 8 Net Profit and Corresponding Year-on-Year Growth Rates, 2019-2025

Source: Annual Reports of Luzhou Laojiao for Respective Years

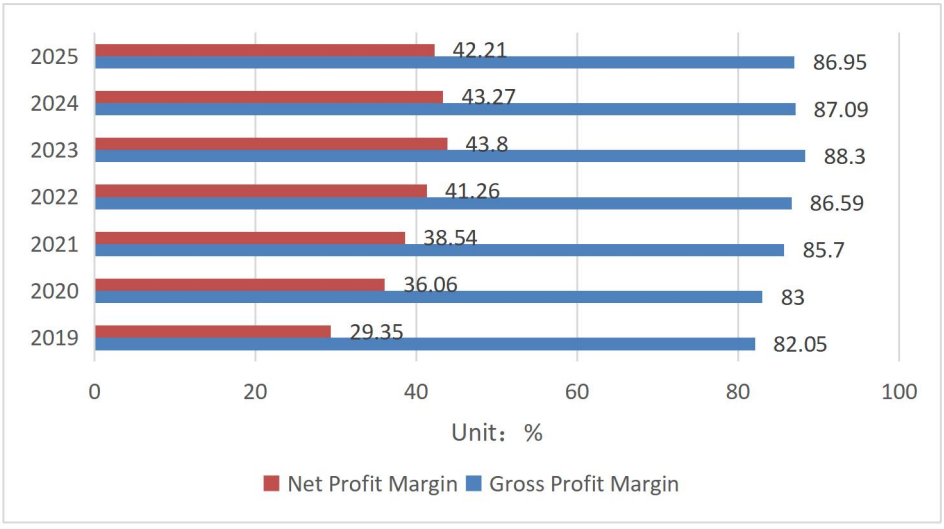

Figure 9. Gross Profit Margin and Net Profit Margin, 2019-2025

Source: Annual Reports of Luzhou Laojiao for Respective Years.

The intelligent digital supply chain has enhanced the financial performance of the firm to a great extent. On the revenue front, digital transformation enhances supply-demand matching, resource scheduling and market responsiveness. It allows accurate market demand capture as well as ensuring stability in product supply. This strong supply chain capability increases market share, speed of delivery of products, consumer brand loyalty and trust, which translates to long-term growth of operating revenues (Song, 2025). A virtuous cycle is created: increase in revenue leads to cash flow that is reinvested in digital intelligent infrastructure, leading to an increase in revenue in the long-term.

In terms of profitability, the intelligent digital supply chain is not just about revenue growth; sophisticated management brings cost and efficiency benefits, leading to significant improvements in profitability (Zhu & Li, 2020). First, digital intelligent technologies streamline production processes and accurately control production flows, increasing the output rates of high-value products, directly driving product mix modernization and improving overall gross profit margins (Chen, X. Y., Wang, Z. W., & Chen, J., 2025). Second, real-time intelligence allows for dynamic cost control across all supply chain nodes, effectively reducing wastage. These two factors together drive net profit margins up significantly, implying that the company achieves both scale-up and efficiency improvement, thus achieving high-quality financial growth.

4. Conclusion and Prospect

4.1 Research Conclusion

This article uses the digital and intelligent supply chain of alcoholic beverages with Luzhou Laojiao as an example to conduct a systematic analysis of implementation paths, operational logic, and value outcomes of how such supply chains enable the transformation of traditional manufacturing under the leadership of alcohol enterprises. The study shows that the digital and intelligent supply chain is based on a three-stage evolution: “basic digitization-system intelligence-ecosystem collaboration” which is quite consistent with national policy directions and indicates a two-way relationship between policy guidance and market practice. The core operational support is the dual mechanism of the application of digital and intelligent technology + data governance: the former spreads throughout the process to increase the level of intelligence, whereas the latter provides the credibility of data by standardizing and securing it, forming a closed loop where technology enables business activities and data facilitates technological progress. Digital and smart change has a considerable positive impact on the financial performance and efficiency of the supply chain operations, resulting in the decrease of costs and an increase in revenue and profitability.

4.2 Future Expectations

Future studies should also consider the differentiated implementation strategies of digital-intelligent supply chains in different industries and types of stakeholders, test the relevance and adaptation mechanisms of practical results in such sectors as fast-moving consumer goods and electronics, and in situations where the private and multinational enterprises prevail. At the same time, it must intensify

research on the synergistic dynamic evolution patterns between the development of organizational resilience and the construction of data ecosystems.

With the increasing marketization of data elements, specific efforts should be made to develop mechanisms of data ownership verification, circulation, and value evaluation systems, as well as explore collaborative opportunities of data assetization and governance innovation. A multidimensional analysis framework that combines geopolitical factors, technological cycles and market demands must be formulated.

In the case of traditional manufacturing industries, it is important to continue monitoring digital-intelligent supply chain transformation results in order to measure the long-term effects of data connectivity, technological integration, and enhanced data governance on organizational performance. In the case of traditional enterprises that are mainly implementing digital technologies, additional studies are needed to develop sustainable processes of constructing industry-wide platforms and coordinated development between upstream and downstream partners to confirm how industrial chain digitalization can improve traditional logistics models.

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References

Chen, J., & Liu, Y. H. (2021). Digital Intelligence Enabling Operational Management Transformation: from Supply Chain to Supply Chain Ecosystem. *Management World*, *37*(11), 227-240+14.

Chen, X. Y., Wang, Z. W., & Chen, J. (2025). Manufacturing Transformation and Upgrading and the development of new quality Productivity: Evidence from the “Management Analysis and Discussion” text of Enterprises. *Industrial Economic Review*, (01), 28-48.

Han, X. F., Zheng, Z. J., Xiao, Y. F., & Wang, M. Y. (2025). Government Data Element Governance and Enterprise Breakthrough Digital Innovation: Empirical Evidence from the Establishment of Big Data Management Institutions. *Modern Finance Research*, *30*(05), 59-73.

Juleiti, S., Ge, L. M., & Zhang, C. B. (n.d.). Enterprise digitalization, financing dilemma and sustainability. *Journal of Southwest Minzu University (Humanities and Social Sciences Edition)*, *45*(03), 98-108.

Li, L. Y, & Luo, S. P. (2025). Digital Intelligence Empowering Industrial Chain and Supply chain: An analysis of empowerment models, paths, and matching. *China Science and Technology Forum*, (06), 140-147.

Liu, W. H., Wang, H. X., Hu, J. B. et al. (2026). New Trends and New thinking in Supply Chain

Development in the Digital Age. *Supply Chain Management*, 1-14[2026-04-07].

Liu, X. D. (2025). The Development Pattern of Lighthouse Factories in China and the Shaping of global Value chains. *People's Forum*, (08), 52-56.

Peng, X. L., Zheng, M., Xu, W. T. et al. (2025). Research on Opportunities, Risks and Trends of Digital and Intelligent Procurement and Supply Chain in China. *Supply Chain Management*, 6(09), 5-22.

Song, H. (2024). Theoretical Exploration and Prospect of AI Digital Supply Chain. *China Circulation Economy*, 38(1), 44-54.

Song, L. (2025). The Impact of Brand Competitiveness on the Operating Performance of Time-honored Enterprises: An Analysis Based on the Moderating Role of Technological Innovation. *Business Economics Research*, (14), 172-175.

Sun, K. T. (2023). Research on Strategic Inventory in Supply Chain Management. *Intellectual Property Publishing House,*12.173

Tang, D. M., Liu, C., & Chen, J. H. (2024). Reconstruction of Sales Logistics Model with New Quality Productivity: A Case of Sichuan Liquor Transportation and Distribution Based on Green Supply Chain. *Contemporary Economic Management*, *46*(10), 65-75.

Tao, F., Wang, X. R., Xu, Y. et al. (2023). Digital transformation, industrial chain and supply chain resilience and enterprise productivity. *China Industrial Economics*, (05), 118-136.

Wang, Y. N., & Zheng, X. Y. (2025). The impact of Digital and Intelligent transformation on dual Innovation in Commercial Circulation Enterprises: Considering the mediating effect of Financing constraints. *Business Economics Research*, (18), 114-118.

Xie, J. P., Zheng, Y. S., & Dong, Q. (2024). Supply Chain Digital and Intelligent construction empowers new quality productivity for Manufacturing Enterprises: A quasi-natural Experiment Based on the Construction of Pilot Cities for Supply Chain Innovation and Application. *Journal of Shanghai University of Finance and Economics*, *26*(05), 15-29.

Zhao, R. (2018). Research on the Model of Intelligent Supply Chain based on Commercial Big Data Technology in the Era of Industry 4.0. *Business Economics Research*, (06), 30-33.

Zhu, Y. J., & Li, Z. S. (2020). Construction of Capability Maturity Model for Digital Transformation of Energy Enterprises: From the Perspective of Industrial Data Elements. *Science and Technology Management Research*, *45*(13), 17-24.