

The Employment Impact of Digital Transformation in the Logistics Industry in the Age of Artificial Intelligence

--Take Shunfeng as an Example

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Abstract: This paper presents the application of artificial intelligence in the logistics industry and its impact on employment as well as countermeasures. Shunfeng Logistics has enhanced efficiency and precision with intelligent distribution and warehousing applications. It is important for logistics enterprises and practitioners to pay attention, adapt, and acquire the necessary skills and knowledge to meet the demands of the AI era. The article suggests countermeasures like acquiring new skills, changing jobs, or transforming, along with government support. AI has significantly influenced the logistics industry by enhancing efficiency and accuracy and generating new employment opportunities resulting in some job transformations and upgrades. In the future, the logistics industry will require more highly skilled and specialised professionals and will strive for enhanced intelligence and efficiency. Professionals in traditional logistics practices will need to continuously learn and improve their skills and expertise to keep pace with the evolving challenges and changes in the industry.

Keywords: logistics industry, artificial intelligence, employment

1. Introduction

Artificial intelligence technology has seen rapid growth in recent years, with a gradually growing impact on various fields, including transport, education, finance, logistics, and catering. Artificial intelligence technology is a decisive factor in the development of modern society and industrial change, with a significant impact on contemporary employment. As science and technology progress, the integration of artificial intelligence and industry has improved the social structure, leading to the development of new artificial intelligence products such as driverless cars, Alpha Dog, Chat GPT, drone delivery, and more.

Artificial intelligence technology has led to the rapid development and maturity of the logistics industry towards intelligence, digitalisation, and automation. The application of AI technology benefits the logistics industry as it results in improved efficiency, accuracy, and employment opportunities. We can examine the employment impact of the logistics industry in the age of artificial

intelligence by investigating a prime example, such as Shunfeng, one of China's largest logistics companies.

Shunfeng has implemented AI technology to optimize its logistics operations as a leading logistics company. Shunfeng uses its intelligent transport and warehouse management systems to monitor the location and status of goods, thereby improving transport efficiency and accuracy in real time. Moreover, Shunfeng utilizes AI technology for data analysis and forecasting to optimize route planning and resource allocation, improving cost-effectiveness and logistics efficiency.

AI technology may cause some traditional positions in the logistics industry to be impacted. As an illustration, automation may replace some arduous manual tasks, reducing the need for certain manual operators. Despite this, AI development also brings with it new job opportunities. The logistics industry requires experts to design and sustain intelligent systems, conduct data analysis and forecasting, and address challenges associated with AI technologies. Additionally, the logistics industry requires skilled persons to oversee and manage the operation of intelligent systems to guarantee their safety and accuracy.

Moreover, AI can enhance the logistics experience and provide value-added services, generating more employment opportunities. Logistics firms can offer more accurate shipment tracking and delivery information through AI technology to boost customer content. Simultaneously, AI technology can enable logistics companies to provide customized marketing and customer service, potentially creating additional employment opportunities.

AI technology's rapid growth and maturation have significantly influenced the logistics sector. While some traditional positions may be impacted to a certain degree, the development of new positions and job opportunities will follow. By logically utilising and advancing AI technology, the logistics industry can enhance efficiency, accuracy, and customer satisfaction, positively influencing the job market.

2. Artificial Intelligence in Logistics

Artificial Intelligence (AI) refers to using computers to simulate human thinking and intelligent behaviour. AI can partly replace manual human labor and enable autonomous learning, reasoning, and thinking. During the summer of 1956, a group of visionary young scholars, led by McArdle, Minsky, and Rochester at the Dartmouth Conference in the United States, first coined the term "Artificial Intelligence". The phrase 'artificial intelligence' was initially introduced by a group of ambitious young researchers led by McCarthy, Minsky, Rochester, and others at the Dartmouth Conference in the United States. The expression 'artificial intelligence' gained more recognition when Alpha Dog achieved decisive victories over many of the world's leading Go players in the game of Go. Since then, artificial intelligence technology has increasingly become visible and applied.

Although there is still some distance from people's ultimate expectations, artificial intelligence technology has achieved significant breakthroughs in various fields. These breakthroughs have contributed to the innovative development of science and technology and significantly impacted the development of various industries.

2.1. Intelligent Distribution

The Shunfeng Group achieves intelligent planning and optimisation of delivery routes utilising artificial intelligence (AI) technology. Traffic and historical order data are analysed to intelligently adjust delivery routes in real-time according to traffic conditions and order volume changes, thereby improving efficiency and accuracy. In 2017, Shunfeng's airspace application for the drone demonstration operation area established with the Nankang District of Ganzhou City was approved. It is currently the only enterprise in China that declares logistics drone flights in strict accordance

with military and civil aviation requirements. The first-ever business trial operation flight was carried out successfully. Furthermore, Shunfeng Group has made significant strides in unmanned technology and developed unmanned delivery vehicles that solve the urban distribution's "last kilometer" issue. The unmanned delivery vehicle uses high-precision GPS mapping points to plan its route. The vehicle operates within a 5-kilometer radius of the delivery point and can deliver between 1 to 8 orders per hour [1].

2.2. Intelligent Warehousing

The Shunfeng Group uses artificial intelligence technology to achieve intelligent warehousing process management, monitor goods storage in real-time through the Internet of Things (IoT) technology and sensing equipment, automatically allocate shelves and cargo spaces, and improve warehousing efficiency. Through technological breakthroughs and innovations, Shunfeng Group has progressed in control algorithms, industrial design, mechanical structure, electrical design, and application scenarios. Logistics robots, which including handling robots, shelf shuttles, sorting robots, stacking robots, six-axis robots, and unmanned forklift trucks, create a comprehensive intelligent logistics system suitable for small and medium-sized items. Several companies, including Shunfeng and Jingdong, have made substantial progress in developing unmanned warehousing projects and have set up a foundation for the advancement of artificial intelligence as well as intelligent logistics [1].

3. The Impact of Employment on Logistics in the Era of Artificial Intelligence

3.1. Impact of the Developments in Artificial Intelligence on Job Opportunities

3.1.1. The Short-term Impact of Artificial Intelligence on Employment

To begin with, automation could affect some traditional logistics jobs, for instance, in the case of the Shunfeng Collection.

A significant number of traditional operators, warehouse workers, and drivers in the mission are at risk of losing their jobs. They could be replaced by Logistics robots, automated equipment, and driverless technology (as shown in Figure 1) [2].

Moreover, applying AI could reduce the demand for middle management positions. Shunfeng, for instance, has researched intelligent scheduling systems and path-planning technology that reduces the need for manual scheduling. This development could result in unemployment among employees in management positions [3].

3.1.2. The Long-term Impact of Artificial Intelligence on Employment

Artificial intelligence implementation will create new employment opportunities. As intelligence and automation advance, logistics companies will require more skilled professionals to develop and maintain AI systems. Digital transformation in the logistics sector, comprising data analytics, supply chain management, and customer service roles, will further boost the need for specialized talents. The World Economic Forum's 2018 The Future of Employment report indicates that machines will displace 75 million jobs over the next five years. Nevertheless, the report notes that it is heartening to know that during the same period, 133 million job openings will be created in tandem. Additionally, by March 2023, AI has already replaced more than one job [3]. Following the gradual spread of AI, Shunfeng Group has created various new roles, such as unmanned transportation equipment operators, equipment inspectors, and other positions responsible for running and protecting AI equipment (as depicted in Figure 1). Shunfeng's digital capabilities have significantly improved, and the company's

revenue has grown significantly due to continuous research and development investment. According to the financial report, in 2022, Shunfeng recorded revenue of 267.490 billion yuan, a year-on-year increase of 29.1%; the net profit attributable to shareholders of listed companies was 6.17 billion yuan, a year-on-year increase of 44.6%; the net profit after deducting expenses was 5.34 billion yuan, a year-on-year increase of 191%.

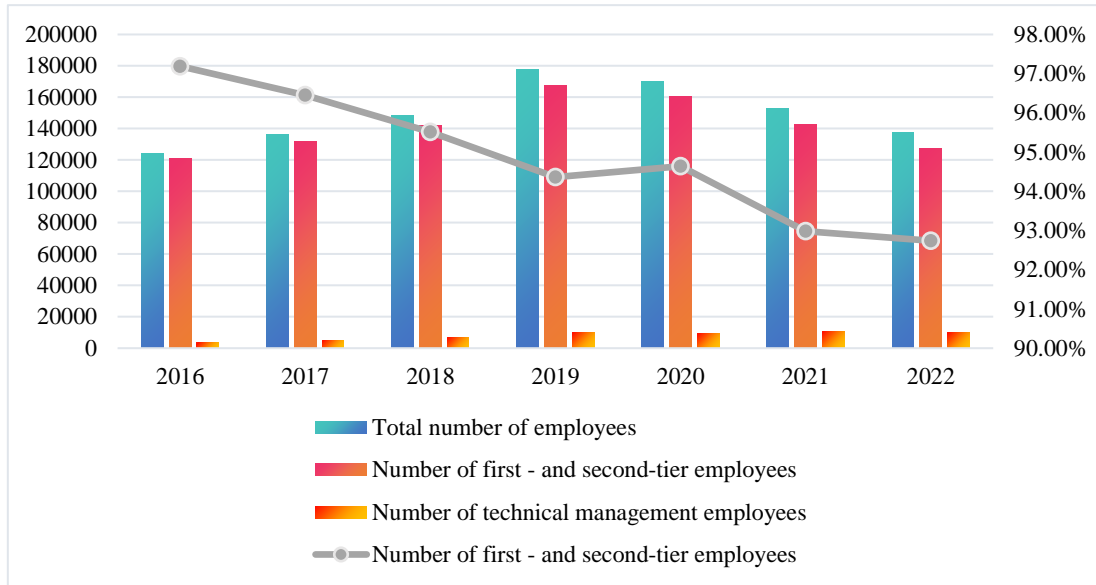


Figure 1: Number of employees of Shunfeng Company.

(Source: Shunfeng Annual Report)

3.1.3. Summary

In summary, the short-term impact of artificial intelligence on the logistics industry will reduce certain traditional logistics jobs and create new employment opportunities. The greater implementation of AI in companies has substantially expanded the employment scale and income of logistics companies in China. A mechanism analysis concludes that the primary factor contributing to increased employment is expanding enterprise scale and providing a more efficient method for modernized logistics distribution [4]. The usefulness of drone distribution was highlighted during the COVID-19 pandemic, particularly due to its advantages of contactless distribution. For instance, the U-GCS operation and control system, developed by Shunfeng Group, can monitor the flight status of drones in real-time, airspace role authority control, and accessory lifecycle management. Despite the impact of the COVID-19 pandemic, Shunfeng Group maintained a positive and substantial increase in business volume during the first quarter of 2020 with the help of drone delivery (as depicted in Figure 2) [5]. Logistics companies and practitioners must pay attention to this trend. They need to develop relevant skills and knowledge to adapt to the requirements of the AI era [6].

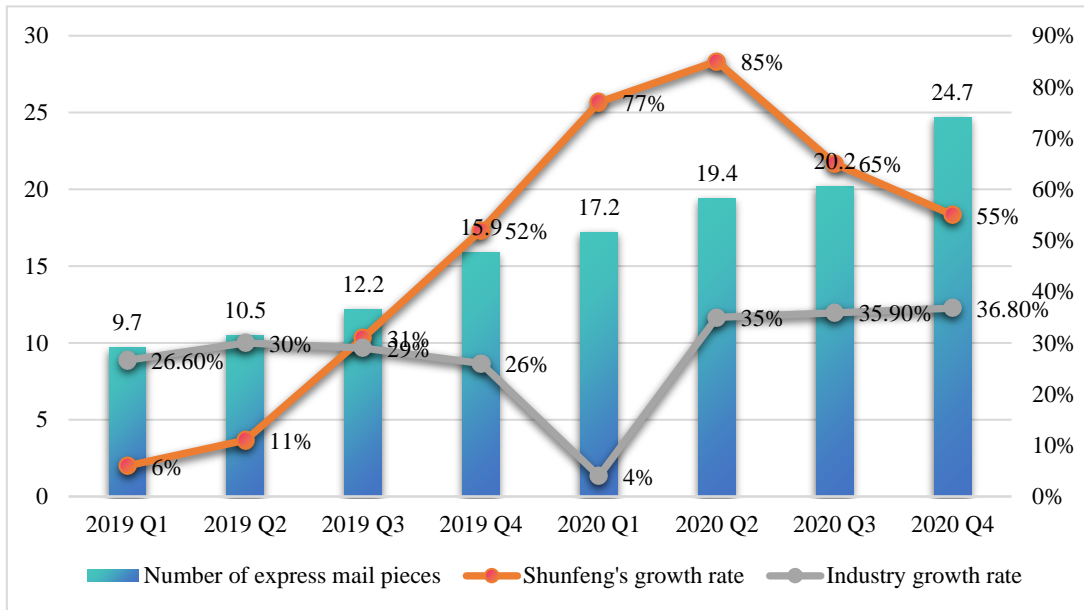


Figure 2: Shunfeng Logistics 19-20 business volume.

(Data from: Shunfeng Business Report 2020)

3.2. Challenges Impacting the Logistics Industry

3.2.1. The Automation Industry Replaces a Significant Amount of Labor

Logistics companies can utilize artificial intelligence to automate their processes. Shunfeng Group has implemented artificial intelligence equipment such as automatic picking and unmanned storage warehouse to reduce the reliance on manual labor. This shift to automation may increase the unemployment rate for traditional manual-based jobs [7].

3.2.2. The Quality of the Labour Force Must Be Enhanced

Due to the development of artificial intelligence, logistics professionals ought to master more skills and knowledge. Shunfeng Group has organized internal training for its 600,000 employees to adapt them to the employment environment in the era of AI. The group has also intensified the recruitment of high-tech talents, constantly bringing in fresh ideas and improving its employees' overall skill-level.

3.2.3. The Digital Transformation of the Logistics Industry Leads to Changes in its Structure

The implementation of artificial intelligence has the potential to alter the logistics industry structure. Since the start of 2016, Shunfeng Group has been gradually enhancing its big data platform and expanding its team from less than 100 scientific and technological personnel to over 5,000 people. This has significantly spurred the progress of the Shunfeng Group toward becoming a digital logistics enterprise [8].

3.2.4. Summary

The logistics industry is gradually adopting digitalisation and intelligent transformation with the growing development of artificial intelligence technology. Although these technologies may reduce the demand for certain traditional positions, it will create new positions and opportunities. Practitioners must adapt to new technological and business changes to improve their capabilities and competitiveness [9]. Logistics practitioners can improve their technical level and ability to respond to the market by mastering new technologies such as human-machine collaboration, big data analysis, and intelligent scheduling. They can also improve their comprehensive quality and market competitiveness by acquiring new business knowledge and expanding their interpersonal relationships.

4. Addressing Employment Challenges in the Logistics Industry

Due to the swift progress of artificial intelligence (AI), many conventional roles are being automated, and the logistics sector is not immune to this trend. In logistics, AI can significantly enhance the industry's efficiency by utilizing intelligent scheduling, automated warehouses, and autonomous driving, among other technologies. However, we must also acknowledge that AI substantially impacts employment in the logistics sector. As a result, we must take appropriate actions to tackle this issue.

4.1. Training New Skills for Employed Workers in the Logistics Industry

The logistics industry has become increasingly digitalized and automated, creating a demand for a large number of skilled workers. To meet this demand, new skills should be trained. Logistics companies can organize training courses for employees to learn new technologies, such as intelligent scheduling, automated warehousing, and automated driving. Such training can enhance the employees' skill level, allowing them to better adapt to the new work environment [4]. Moreover, training can help increase employees' job stability and career competitiveness. Training improves the competitive advantage of enterprises, expands their scale, and indirectly promotes employment.

4.2. Logistics Employees Changing Jobs or Transitioning

Furthermore, automation may replace certain traditional logistics roles, including operators and warehouse workers in logistics centers. Employees can explore the possibility of changing roles or adapting to new careers. For instance, IT departments and technology research and development units within logistics firms may offer opportunities for technology development and management roles. Alternatively, they may transition to related industries such as the e-commerce or express delivery sectors. In such sectors, employees can utilise their skills and experience while continuing to expand their opportunities for career development.

4.3. Government Support for Employment Within the Logistics Industry

The government can encourage logistics enterprises to implement intelligent and automated production by formulating relevant policies. Relevant training and support for transfer and transformation can also be provided. To encourage logistics enterprises to invest in intelligent and automated equipment, subsidies and incentives can be provided as an example. Relevant policies can also be formulated to encourage employees to improve their professional competitiveness through participation in training and transfer, and transformations.

4.4. Summary

Intelligent logistics is expected to be a significant future driver for the logistics industry. However, some obstacles are hindering its further development. To resolve these development issues, it is crucial to establish a solid, smart logistics infrastructure and Internet facilities with planning guidance and policy support. Additionally, it is important to strengthen the open sharing of logistics information platforms and collaborative services, enhance the level of intelligence of logistics platforms, improve the integrity system involving the government, enterprises, and the community, form a trans-regional logistics information superhighway, a one-stop service window for cross-sectoral information sharing, and a cross-transportation mode of information exchange hub as well as a multi-tiered logistics information platform. Moreover, it is essential to increase collaboration between schools and enterprises, popularize and apply new technologies, develop standard systems, and actively promote cultivating and recruiting talented individuals with diverse skills. Smart logistics is expected to become the main driver for the rapid development of the logistics industry. Logistics professionals are striving to overcome the obstacles that lie ahead in this field [10].

5. Conclusion

5.1. Reaching a Verdict

The logistics industry's development in the era of artificial intelligence has led to significant employment effects. As a top company in China's logistics industry, Shunfeng Logistics has actively employed AI technology to enhance logistics efficiency and precision and generate new job opportunities. This sets a positive example for other conventional logistics companies.

The use of artificial intelligence in the logistics industry shows great promise. Artificial intelligence technology can optimise logistics operations, enhancing efficiency and reducing costs. Artificial intelligence technology has great potential to help logistics companies achieve smarter and more efficient logistics management. As artificial intelligence technology continues to develop and be applied, the logistics industry is expected to become more efficient and intelligent.

5.2. Future Study

Integrating artificial intelligence in the logistics industry will transform and upgrade employment opportunities and bring new challenges and opportunities to the job market. There are two major aspects to consider for the future of the employment market. Firstly, the logistics industry will require more technical and high-end position talents, making these positions more popular and in demand. Secondly, cross-boundary talents with multiple skills and advantages will be required and favored in the logistics industry. Traditional logistics practitioners will also need to continuously learn and improve their skills and knowledge to adapt to the changing and challenging industry development.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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