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The Impact of Artificial Intelligence Development on the Logistics Industry Talent Demand and Countermeasures

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Abstract: In the past decade, artificial intelligence technology has developed rapidly and continues to be applied to various industries, of which the logistics industry is particularly obvious. The application of intelligent equipment has profoundly impacted the logistics industry's labor supply and demand structure. For the practitioners, some of them will face the problem of unemployment or transfer, and for the enterprises, the lack of talent in some positions makes the operation efficiency not to be maximized. The purpose of this study is to enable practitioners to effectively improve their vocational skills and reduce the risk of unemployment while enabling enterprises to better achieve staffing and promote their development and progress so that the labor supply and demand in the logistics industry can be balanced and the development of the logistics industry can be better promoted. This study analyzes the data of the China Statistical Yearbook for the past ten years and conducts questionnaires and interviews with nine logistics and express companies such as Shentong Express Company and Yuantong Express Company, and the research subjects include the heads of outlets, personnel heads of regional branches and HR of the head office, etc. The analysis is combined with the annual reports of corresponding companies and relevant domestic and foreign literature, because of the changing situation of talent demand in the logistics industry, we propose to enterprises re-match human and job positions and the introduction of talent, to the universities to improve the curriculum system and the cooperation between schools and enterprises, and to the government to improve the relevant industry standards and social security.

Keywords: Artificial intelligence; logistics; talent demand; job changes

1. Introduction

With the advancement of artificial intelligence technology and new industries such as e-commerce and new retail, the logistics industry has seen explosive growth in the number of companies and business forms. In recent years, logistics equipment has fully integrated the advanced nature of intelligent technology, such as the application of intelligent equipment such as smart courier cabinets, unmanned vehicle delivery, and automatic sorting machines. According to the statistical analysis of data from 2010-2020 China Subscribe to DeepL Pro to edit this document. Visit www.DeepL.com/profor more information. Statistical Yearbook, it can be seen that the total output value, added value, freight volume, and cargo turnover of China's logistics industry, in general, have

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maintained a continuous rise, mostly thanks to the rapid development and application of artificial intelligence in China in the era of the digital economy[1]. At present, China's logistics industry is in the scenario of deep integration with artificial intelligence for the completion of tasks such as collaboration, division of labor, cooperation, and increasingly close links. However, the use of artificial intelligence equipment has a certain impact on the current position setting, and its “substitution effect” and” creation effect” are gradually manifested, which has an impact on the labor market of the logistics industry and makes the labor market structure change. The labor market structure has changed. Therefore, this study focuses on the impact of the development of artificial intelligence on the changes in jobs in the logistics industry and the changes in talent demand behind these job changes and proposes relevant suggestions and methods to achieve a dynamic balance in the labor market of the logistics industry[2].

The current research on the logistics industry in the context of artificial intelligence is mainly divided into technology-based research and management-based research. This study starts with the application of artificial intelligence technology and explores the changes in the demand for talent behind the job changes, which is different from the existing studies[3].

2. Logistics industry trends and job changes

The current logistics enterprises are developing in the direction of intelligence, digitalization, human-machine collaboration, and customer-centeredness. To obtain data on the job change status of the logistics industry in the context of artificial intelligence, this study conducted questionnaires and interviews with nine logistics and express delivery companies, including Shentong Express Company and Yuantong Express Company, and the research subjects included the heads of outlets, the personnel heads of regional branches, and the head office HR, etc. Combined with the corresponding company annual reports and relevant domestic and international literature, this study summarizes and predicts the characteristics and development trends, and job changes in the logistics industry[4].

2.1 Characteristics and development trends of the logistics industry in the context of artificial intelligence

2.1.1Shift from repetitive mechanical work to intelligent work

With the development of artificial intelligence technology, intelligent equipment is gradually applied to the workplace, which makes operation efficiency effectively improved. According to the data analysis of the China Statistical Yearbook, from 2010-2020 the total output value and added value of China's logistics industry generally maintained an upward trend, with an average annual growth rate of about30%, indicating that this period in the intelligent equipment The logistics industry is developing well under the wide application of intelligent equipment. In warehouse operations, handling, loading and unloading, and sorting have been done by robots to a greater extent. In the distribution operation process, the application of drones, unmanned vehicles, and intelligent courier cabinets has largely solved the problem of distribution in remote areas and improved operational efficiency[5]. The widespread application of intelligent

equipment has catalyzed the change and upgrade of technology, and the whole logistics industry is steadily developing in the direction of intelligence.

2.1.2Shift from traditional manual work to digital work

Modern society is in the era of digitalization and deep integration of information technology, and the combination of digital and IoT, and artificial intelligence will simplify the operation process and improve the efficiency and quality of operation. Many positions with only simple operational needs for workers have been replaced by artificial intelligence equipment. In the process of object sorting, it has also changed to intelligent equipment directly scanning the barcode on the goods for sorting, etc. The entire logistics order processing process profoundly reflects digitalization and informatization. In the current logistics company, the use of electronic single-sided has long been widely popular, including Shentong Express's electronic single-sided coverage rate has reached 99.51%. Based on this, the future demand for talent will develop towards higher quality and higher skill requirements, and digitalization will gradually become a significant feature of the logistics and express industry[6].

2.1.3Shift from heavy physical work to human-machine collaboration

In the process of intelligent development of the logistics industry, although the phenomenon of artificial intelligence equipment replacing the labor force has arisen, there is still a need for manual work in some positions, and in this case, the human-machine collaborative operation makes efficiency maximized. In warehouse operations, human-machine collaboration frees labor from heavy physical work and improves operational efficiency. For example, exoskeleton robots, following robots, composite robots (AGV + robot), etc. have been used in the logistics industry. In the delivery process, the cooperation between delivery personnel and intelligent delivery cabinets, drones, etc.; in customer service operations, the cooperation between customer service personnel and intelligent robots, intelligent devices will summarize and answer repetitive and similar questions, while the problems that cannot be solved by intelligent devices will be solved by human customer service[7]. Human-machine collaboration not only can significantly improve operational efficiency but also allows practitioners to engage in more growth-worthy work.

2.1.4Shift from operational process optimization to customer centricity

The current logistics industry does not only focus on the optimization of operational processes to minimize costs but also on the customer's experience. The logistics industry is a service industry, so in the current competitive market, user experience is gradually becoming an important concern and a winning point for companies. Whether it is the emergence of intelligent courier cabinets or online booking of delivery time, it is to facilitate customer pickup and improve customer experience. In the delivery process, customers can check the transportation information in real-time. In the process of placing an order, customers can fill in the order information on electronic devices and make appointments for door-to-door pickup time[8]. This series of intelligent applications improve the customer's experience.

2.2The application of artificial intelligence devices places higher demands on job settings

With the continuous application of artificial intelligence equipment in the logistics industry, the type of jobs, the number of jobs, as well as the content and mode of labor in the industry have changed. Among them, R&D technical positions with technical and innovative characteristics and equipment maintenance positions gradually increase, operation positions with physical and repetitive characteristics decrease and show a trend of gradual disappearance, and the work content and mode of service positions change (as shown in Figure1).

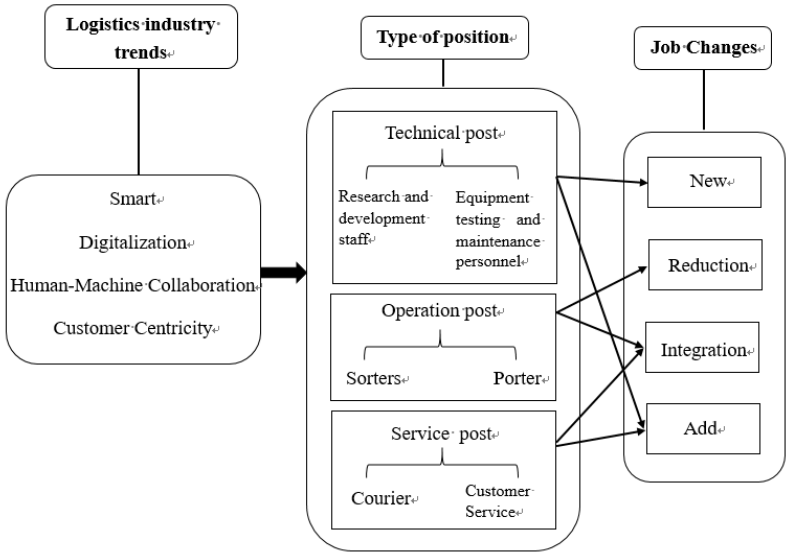

Figure 1. Job change chart

2.2.1R & D technical posts and artificial intelligence equipment maintenance and repair posts increased

The current application of artificial intelligence equipment in the logistics industry is still in its infancy, the overall proportion is still low, and there is still more room for the development of relevant artificial intelligence equipment[9]. Therefore, to further improve operational efficiency and operational quality, reduce labor costs, logistics, and express companies through independent or cooperation with technology companies to develop artificial intelligence equipment, then the corresponding for such research and development positions and equipment testing and maintenance of the number of positions increased.

Among them, SF Express, which is a leading company in the industry, has an independent R&D team with more than 5,000 R&D positions, and although the number of researchers decreased in 2019 compared with 2018, its share in the overall enterprise increased by 0.61%, and the research funds invested in 2019 exceeded3.6 billion yuan, an increase of 34.65% compared with 2018. Other logistics companies also have more than 100 R&D personnel. Among them, Shentong Express Company has the most obvious increase, with its R&D personnel increasing from 16 to 246, an increase of

1437.50%, and R&D funds also exceeding 40 million, an increase of 29963.96%compared to 2017.

Table 1..R&D investment of SF Express

	2019	2018	Change ratio
Number of R&D staff (People)	5058	5139	-1.58%
Number of R&D personnel as a percentage	4.41%	3.80%	0.61%
Amount of science and technology input (Yuan)	3667768156.92	2723826721.78	34.65%
Investment in science and technology as a percentage of operating revenue	3.27%	3.00%	0.27%
Of which: Amount of R&D investment (yuan)	2565400199.63	2156124907.13	18.98%
R&D investment as a percentage of operating revenue	2.29%	2.37%	-0.08%
Of which: amount capitalized for R&D inputs (yuan)	1308367385385.13	1112962837.84	17.56%
Capitalized R&D investment as a percentage of R&D investment	51.00%	51.62%	-0.62%

2.2.2Sorting positions are gradually being replaced by courier positions and customer service positions

In the context of artificial intelligence, the trend of replacing practitioners with intelligent equipment has developed in all operational processes and is exceptionally evident in sorting operations. With the massive use of automatic sorting equipment and automatic handling machines, the corresponding sorters and handlers have been significantly reduced and even tend to disappear. 95% of the respondents indicated that they have transferred redundant employees to sorting positions, of which 80% have been transferred to courier positions and 75% to customer service type positions.

As of June 2019, the company has purchased and installed 57 sets of automated cross-belt sorting systems, of which, 24 sets were newly purchased. Compared with Shentong Express Company, China Express Company has increased its investment in automatic sorting equipment, even more, having increased from 120 sets of automatic sorting equipment in 2018 to 265 sets in 2019, an increase of 220.83%. By promoting the installation of automated sorting equipment, bubble counters, weighbridges, and other facilities, Yuan Tong Express Company has effectively promoted the accuracy of billing, and the efficiency of human-machine collaboration, and has also made important contributions to the company's intellectualization and automation level improvement.

2.2.3Increased demand for service posts and changes in the way and content of operations

To improve the operational efficiency and delivery time efficiency in the distribution process, intelligent equipment such as smart courier cabinets, drones, and intelligent customer service have been applied to distribution and customer service operations in recent years, changing the mode and content of logistics industry operations. However, as the entire logistics and express delivery industry is still in the development period, so the demand for such positions is not reduced but increased, and the mode of operation has also been innovative[10].

With the development of e-commerce and the change in people's consumption patterns, the current logistics and express delivery industry show seasonal characteristics. During promotions such as 618 and Double 11, the volume of express business increases significantly, enterprises will transfer sorting employees who are replaced by smart

devices to distribution positions, in addition to Crowdsourcing delivery to alleviate the temporary employment demand.

The mode of operation is also changing. Such as the popularity of smart delivery cabinets, unmanned delivery vehicles that frequently appear in the public eye, With the application of intelligent customer service, the way of working customer service posts has also changed to human-machine collaboration.

In addition to changes in the mode of operation, the content of the operation has also changed. Most domestic logistics courier companies have launched a door-to-door delivery business, so couriers are responsible for the delivery of express mail, but also for obtaining the express mail ordered by customers at home[11].

3. Changes in demand and training of talents in the logistics industry in the context of artificial intelligence

3.1Changes in the structure of talent demand ability in the logistics industry in the context of artificial intelligence

In the context of artificial intelligence, the development trend of the logistics industry and the changing situation of jobs have put forward new demands for logistics industry talents (as shown in Figure 2).

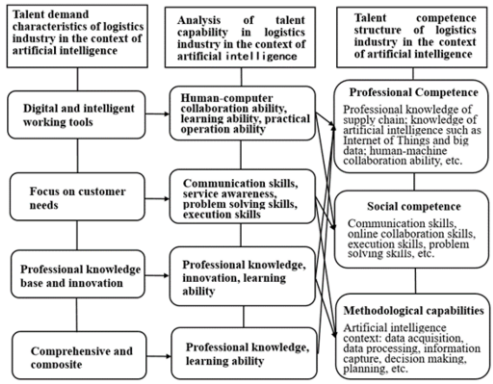

Figure 2. Talent demand capability structure

R&D technical personnel needs to master partial or complete supply chain knowledge. For example, R&D personnel responsible for intelligent devices in sorting links such as automatic sorters, palletizing robots, and following robots, in addition to having the corresponding AI technology, must fully master the supply chain knowledge involved in sorting links and be familiar with the operation process [12]. At the same time, such talents should be able to keenly capture the demand for artificial intelligence equipment in the corresponding logistics link, and develop and innovate artificial intelligence equipment according to market demand and expertise. In addition, such talents should also have strong learning abilities.

The mode of operation of couriers, customer service, and other service positions has changed, practitioners need to master the operation of relevant intelligent devices and improve human-machine collaboration. The current work content of the courier position is responsible for courier delivery service, but also includes order processing, door-to-

door pickup, and certain problem courier processing. In addition, some couriers also undertake to expand customer resources, these work content on the courier and other related practitioners of service awareness, communication skills, problem-solving ability, and decision-making ability to put forward higher[13]. Customer service class for comprehensive problems to deal with the work content is increasing, and the practitioners need to communicate with upstream and downstream buyers to deal with problems, so the comprehensive problem handling ability, communication ability and corresponding decision-making ability of the personnel in such positions, Therefore they have higher requirements for the comprehensive problem handling ability, communication ability, and corresponding decision-making ability.

3.2Artificial intelligence development to promote the logistics industry job demand capacity changes

3.2.1 Shift from scale operation capability to human-machine collaboration capability.

In the background of artificial intelligence, the application of artificial intelligence equipment in the logistics industry is becoming more and more extensive. For the practitioners of relevant positions, mastering the use of relevant intelligent equipment and working effectively with them is an inevitable requirement to improve operational efficiency and comply with the future development of the logistics industry. At the same time, the application and renewal of artificial intelligence devices also put forward new requirements on the learning ability of front-line operators and service personnel[14]. The personnel of such positions needs to learn and master the artificial intelligence devices applied to the positions quickly enough, and with the upgrade of intelligent devices, the personnel of such positions also need to update their professional skills to meet the development trend of the industry, so the person needs to have strong learning ability.

3.2.2 Shift from simple execution capability to communication service capability

The current logistics and express delivery industry are constantly shifting to customer-centric, successively launched a series of services such as booking orders, door-to-door pickup, network customer service, order tracking, etc. Customer-centric gradually become the winning point of logistics and express delivery enterprises. Then in the customer demand-centered orientation, the service consciousness and communication ability of the courier and customer service and other service positions have put forward new requirements. In their search conducted on the company, about the most important qualities of the enterprise, 90% of the respondents said, about the service positions they value communication skills, and service awareness, followed by the ability to implement and problem-solving skills, these two qualities accounted for 80% and 75%respectively. In addition to strengthening communication skills and service awareness, good problem-solving skills are also the new requirements for front-line operators and couriers, customer service, and other service positions in the logistics and express delivery industry in the context of artificial intelligence.

3.2.3 Shift from one-time learning capability to the lifelong learning capability

The current logistics industry is a sunrise industry and is booming in all aspects, but all aspects are still not perfect. In the entire logistics express operation process, that is,

picking, sorting, transportation, unpacking, and distribution, the most involved in artificial intelligence equipment is sorting, and with the continuous development of artificial intelligence technology, picking and distribution links also gradually have artificial intelligence equipment applied in the operation, then with the logistics industry for artificial intelligence equipment needs, the relevant artificial intelligence equipment will continue to upgrade and gradually develop and mature. Through the company's research, the word frequency statistics about the impact of artificial intelligence on the company's employment needs, in addition to "talent" and "company", mostly "high technology" "professional" and so on, and the interviewed companies said that for this kind of high technology talents need to master computer and artificial intelligence technology[15]. Therefore, the demand for artificial intelligence equipment in the logistics and express industry puts forward new requirements on the learning ability, professional ability, and innovation ability of R&D personnel and equipment maintenance personnel.

3.2.4Shift from the single technical capability to composite capability

In the background of the continuous development of artificial intelligence technology such as the Internet of Things and big data, the logistics industry is gradually developing into intelligent logistics, that is, artificial intelligence + logistics, in this industry development trend, the various jobs in the logistics and express delivery industry are becoming more and more closely linked, and the work content also began to appear cross phenomenon, so the logistics and express delivery industry for composite, comprehensive talent demand is gradually increasing. The interviewees pointed out that although the main employees of the company are frontline operation and service employees, comprehensive and complex talents are the most needed types of talents in the future.

To sum up, under the background of artificial intelligence, different types of job changes have put forward different new demands for the corresponding practitioners[16]. For practitioners in front-line operation positions and service positions, it is essential to enhance service consciousness and improve learning ability, operation ability, communication ability, and problem-solving ability. R&D positions should improve the level of professional knowledge, continuous learning ability, and change to comprehensive and composite talents.

4. Measures and suggestions to cope with the changing demand for talent in the logistics industry in the context of artificial intelligence

The current development of the logistics industry has led to an increase in the number of R & D technical positions, while the level of professional knowledge, learning ability, and comprehensive quality level of such personnel has put forward new requirements, then the training of such personnel should focus on the training of the above-mentioned capabilities.

4.1Enterprises to strengthen the quality of personnel training for service positions and technical positions

4.1.1Practical operation and related quality training

Training of couriers and customer service personnel on the operation of relevant intelligent equipment to enhance the operational ability of operators and their learning ability, such as the use of intelligent customer service systems, intelligent delivery cabinets, unmanned delivery vehicles, etc. In addition to the change in the focus of pre-service training, enterprises should also improve the customer complaint mechanism and reward system to strengthen the service consciousness and problem-solving ability training for such personnel. At the same time, enterprises improve the reward system, for different types of complaints to develop different reward methods and reward systems, such as express broken complaint rate of less than 1%, the logistics operators can be performance rewards, for the lowest complaint rate of the first few operators to performance rewards, etc., so as to motivate employees to standardize operational processes and methods.

In addition, enterprises also need to improve the problem-handling mechanism and formulate a standardized handling process for problems such as damaged, delayed, and lost express shipments, so that relevant personnel can handle them according to the perfect process, effectively improving the solution of related problems.

4.1.2Transfer Training

When logistics companies introduce artificial intelligence equipment, it will inevitably have an impact on the existing staffing structure of the company. In addition to the direct method of firing employees and reducing redundant staff, logistics companies can also transfer their employees to other jobs. Through training, the low-skilled redundant staff is gradually upgraded to high-skilled personnel suitable for the company, which not only avoids unnecessary recruitment costs and the problem of moral hazard of new employees but also reduces the turnover rate of logistics enterprises and improves the degree of man-position matching.

4.1.3Talent introduction + on-the-job training

China's artificial intelligence technology research started late, and the current labor market for the supply of such talent is very limited, and there is still some talent and the current logistics business needs do not fully match, so the current logistics companies often can not recruit to the talent as needed. Because the application of artificial intelligence technology in the logistics industry is also earlier compared with China, so foreign countries have professional R & D talents and composite talents that meet the current needs of China's logistics industry, so logistics enterprises can introduce such talents from abroad to temporarily make up for the current gap in China's demand for this type of talent. For the internal R&D talents of logistics enterprises, enterprises can provide on-the-job training for them and let them go to countries or regions where the relevant technology is more perfect and mature for further study so that they can become the talents required for the future development of logistics enterprises.

4.2Colleges and universities improve the curriculum and strengthen the practical training of talents

4.2.1Improve the course system

Schools should focus on the professional knowledge training of logistics industry talents, and continuously improve the curriculum system according to the market requirements for professional knowledge of logistics talents so that the trained logistics talents meet the current labor market requirements.

Artificial intelligence + logistics. The current opening time of China's artificial intelligence majors is relatively short and the training of logistics majors is relatively independent, therefore, artificial intelligence courses can be appropriately added to the curriculum system of logistics majors, and some logistics majors courses can be added to the artificial intelligence majors in order to cultivate comprehensive and composite talents.

Domestic + foreign. China's artificial intelligence technology started late, especially in the logistics industry, there is still a gap between Europe and the United States, and other developed countries, so the training of R&D professionals in the logistics industry can take the combination of domestic teaching and foreign teaching to more quickly cultivate high-quality logistics industry talents that are more in line with the current labor market demand.

4.2.2School-Enterprise Cooperation

On the one hand, it can make the school understand more clearly the requirements of the employers for the professional ability and related quality of the logistics talents and adjust the training program in time. On the other hand, enterprises in the logistics industry can also predict the supply of talent in the labor market according to the student's internship, adjust the recruitment channels and methods in time, adjust the content and methods of logistics talents training in the enterprises, and give feedback to the school on the related talents so that the school can adjust the training program in time.

4.3Government to improve industry standards while providing social security

The department improves the logistics industry-related standards, such as the industry use standards for unmanned delivery vehicles, intelligent delivery cabinets, and other artificial intelligence equipment, and the professional skills standards for couriers and other related practitioners. So that logistics-related enterprises or logistics professional practitioners can operate in accordance with national standards or higher than national standards, regulate operations and promote the development of the industry.

Human resources and social security-related departments provide relevant social insurance for enterprises and workers, especially the risk of unemployment brought by the reference of artificial intelligence equipment for some logistics industry positions, such as sorters, porters, etc. For artificial intelligence equipment maintenance and repair and other related personnel to provide logistics and artificial intelligence corresponding vocational skills training and licensing examinations, for practitioners to improve their professional skills and professionalism to help.

5. Conclusion

In the era of rapid development of intelligence, the logistics industry faces both opportunities and challenges. Through analyzing the development trend and job changes in the logistics industry, this study finds the changes in the demand for talent in the logistics industry under the background of artificial intelligence and puts forward corresponding suggestions, in order to improve the structure of talents in the labor market, achieve the match between people and jobs, effectively improve the vocational skills of practitioners corresponding to the market demand, and at the same time make logistics enterprises We hope to improve the talent structure of the labor market, match the manpower with the jobs, effectively improve the vocational skills of the employees corresponding to the market demand, enhance the employment rate, and at the same time make the logistics enterprises better realize the staffing and promote the development of the logistics industry.

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