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Impacts of Digital Labor on Allocation of Economic Resources in a Society on the Background of Artificial Intelligence

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Abstract: This essay focuses on impacts of digital labor on allocation of economic resources in the context of artificial intelligence. Digital labor directly impacts on labor structure and produces significant influence on economic resource allocation in a society. In this essay, impacts of digital labor on economic resource allocation are analyzed from three aspects including economic resource allocation between industries, regions and social classes. It aims to reveal the changing flows of economic resources and provide some useful references for a society to adapt to the fast development of artificial intelligence and the rising digital labor.

Keywords: Artificial intelligence, Digital labor, Allocation, Economic resources.

1. Introduction

Digital labor refers to work that is performed by robotic process automation (RPA) systems which significantly reshapes labor structure in the context of digital economy (Syarova, 2020). Artificial intelligence acts as a powerful engine for fast development of digital labor. It makes robots smart and qualified for complicated works. With more workloads transferred to robots, digital labor plays an increasingly important role in production and to some extent substitute human labor. On this background, flows of economic resources in a society are changed leading to reallocation of economic resources. This essay aims to examine impacts of digital labor and artificial intelligence on distribution of economic resources in a society. It focuses on three aspects. The first aspect focuses on economic resource allocation between industries. Digital labor reshapes structures and prospects of industries and consequently influences an industry's competence of attracting and getting economic resources. The second aspect concentrates on economic resource allocation between regions. Regions with diverse technical conditions have different competences to economic resources. In the context of digital labor and artificial intelligence, the role of technique rises to determine regional development. The third aspect focuses on economic resource allocation between social classes and groups. People who have access to digital technology and artificial intelligence are more likely to be wealthy. By combining the three aspects, the changing flows of economic resource in a society in the context of digital labor can be systematically analyzed and revealed in a comprehensive way.

2. Economic Resource Allocation Between Industries

Digital labor based on artificial intelligence produces meaningful influence on economic resource allocation between industries and sectors. In practice, digital techniques change labor productivity in industries (Romanova and Ponomareva, 2022). Industries with higher labor productivity tend to have better performance and more profits. Therefore, they have the competence to expand their sizes and attract more inflows of economic resources. In fact, in recent years, industries and companies with strong digital skills and good use of artificial intelligence are likely to perform well. Digital labor allows them to not only increase productivity but also save costs of labor. It is used to partly substitute human labor and makes positive contribution to profit margins. For example, Fumagalli et al (2018) made the empirical research on Facebook and found that digital labor produced significant benefits to this company. Facebook is the global leading social media with advanced digital techniques. It has invested in artificial intelligence and used digital labor to improve its effectiveness. Since digital technology is the gene of Facebook, it has achieved great business success in the era of digital economy. Not only Facebook but also other companies and industries which have used digital labor and artificial technology well tend to be winners and attract economic resources such as investments and talented employees. These industries and companies have accumulated abundant wealth and show big potential in future development. Digital labor plays an important role. It uses advanced techniques such as artificial intelligence and big data to achieve machine learning so that they are competent for complicated tasks. In many circumstances, digital labor is not only more efficient but also more accurate in working. It can reduce errors made by human beings and support decision making of managers.

For some traditional industries which pay attention to digital labor and artificial intelligence, attractiveness for economic resources can also be enhanced. For example, artificial intelligence is widely used in the energy industry and has been proved to produce meaningful contribution to promote firm performance (Lyu and Liu, 2021). The energy industry is a traditional industry. By using artificial intelligence and digital labor, companies in this industry can improve their business management, facilitate exploration, mining and refining of energy, and manage their value chains. The strong data analysis functions of digital labor are very important to this industry. In practice, not only the energy industry but also many other traditional industries such as the automotive industry have employed digital labor. They use digital labor to adapt to the trend of artificial intelligence and

upgrade their technological and skill structures. With upgrading of technological structures, the traditional industries can find new engines of business development. When investors perceive growth of these industries and their new engines of digital labor, they are more likely to invest on these industries and relative companies. As a result, economic resources tend to flow to these industries. In fact, digital labor and artificial intelligence are expected toreshape the traditional industries brining significant changes to their business models, labor structures and techniques. In this process, their productivity and competitiveness are improved allowing them to compete for economic resources in the market system. In other words, some traditional industries use digital labor and artificial intelligence as tools to acquire economic resources. Their proactive attitude to digital labor improves their flexibility and adaptability to technical changes and create supportive conditions for inflows of economic resources.

Different from the digital technology companies and traditional industries which are sensitive to digital labor, some traditional industries which fail to adapt to the rising trend of artificial intelligence may face serious impacts and gradually lose their competitiveness for economic resources in a society. In practice, artificial intelligence and digital labor have been used in an increasingly broad range. In many industries, employees work with artificial intelligence-based systems though they may be unaware of these systems (Giering et al, 2021). However, some traditional industries or small and medium companies in these industries have not adapt to digital labor. They may be less sensitive to new digital techniques or do not have much competences to support their development and use of digital labor. As a result, their productivity gap with other industries and companies tends to be expanded. Such industries and companies are likely to face more difficulties in the context of digital economy. Investors usually are not interested in them. It is harder for them to acquire economic resources. In return, lack of economic resources further restricts their competence of using digital labor. It indicates that the traditional industries and companies should use their resources more efficiently to balance the short-term survival and the long-term development. In other words, they need to explore feasibility of digital labor and digital techniques in their business operation. If digital labor and artificial intelligence are feasible and valuable for their business development, they need to invest on them to achieve long-term survival. If they take indifferent attitude toward digital labor and artificial intelligence, they may lose in the competition for economic resources in a society.

3. Economic Resource Allocation Between Regions

Digital labor and artificial intelligence impact on economic resource allocation not only between industries but also between regions. Automation and artificial intelligence drive development of information society (Perez and Falotico, 2019). However, information society requires supportive conditions including both financial and non-financial conditions. In practice, artificial intelligence is a capital-intensive technology which requires heavy investment on R&D activities. For instance, it was estimated that the EU's investment on artificial intelligence in 2019 was around EUR 9 billion with a yearly growth rate of 39% (Benetta et al, 2021). As Benetta estimated, the artificial intelligence investment in EU will rise to EUR 22.4 billion by 2025. In other countries or regions, digital labor and artificial intelligence are also capital intensive which are expensive and require strong financial competence. In addition, use of digital labor requires knowledge employees. If a region has insufficient knowledge employees with strong digital skills, digital labor and artificial intelligence are hard to be used. It determines that digital labor is unevenly used between regions. In poor countries or rural regions, access to digital labor and artificial intelligence is limited. Therefore, they face more challenges to improve their productivity and attract inflows of economic resources. Take China as an example. The country is featured with binary economic structure which refers to the big economic gap between rural and urban areas as well as between the western region and the eastern region. The cities especially rich cities in the eastern region have fast economic development, good digital infrastructure and talented labor which strongly support their development of artificial intelligence and use of digital labor. At the same time, the western rural regions are generally lagged behind in the wave of artificial intelligence and digital technology development. This situation significantly influences flows of economic resources. Economic resources are more likely to flow to the urban and eastern regions while the rural and western regions face more serious challenges in the era of digital economy.

The gap of economic resource allocation caused by digital labor and artificial intelligence is closely linked to digital divide. Kitsara (2022) studied the concept of digital divide which means the unequal internet access and uneven development of digital techniques lead to socioeconomic gaps between developed and developing countries, and cities and rural areas. As Kitsara pointed out, artificial intelligence divide is caused by multiple factors such as competitive advantages, skillsets, development love and economic growth gap. Sujarwoto and Tampubolon (2016) provided some supportive evidences for the role of digital divide in expanding gap between regions. They used the data of Indonesia and observed that digital divide led to bigger gaps between urban and rural areas, city and country side areas, remote islands and mainland island areas. In other word, spatial inequality became worse with digital divide. It means the developed and urban regions accumulate more and more economic resources which strongly support their development while the developing and rural regions are likely to miss opportunities produced by digital labor and artificial intelligence. In fact, digital labor and artificial intelligence are both capital and technology intensive issues. As one of the most potential areas in industrial development, they have strong competence to attract economic resources. In the capital market, digital labor and artificial intelligence are investment hot spots which attract attention of investors. When the less developed, rural or remote regions are lagged behind in using digital labor and artificial intelligence, their attractiveness for investors are weakened to some extent.

Though digital divide puts bigger pressure on rural and less developed regions and may make economic resource allocation more uneven, it can be a dual-edged sword and produce some positive influence on rural regions. In some circumstances, artificial intelligence and digital labor can be used to support development of rural areas. For example, Kumar et al (2021) found that machine learning technologies could facilitate digital credit scoring in rural finance so that people living in rural areas were more likely to access to financial services. In fact, people living in rural areas usually

have limited access to financial services and goods. One of the reasons is that financial institutions are hard to judge their credit ratings and consequently delivering financial goods to them are of higher costs. Digital labor helps to solve this problem because it can use advanced digital techniques to analyze behaviors and credit ratings of customers and reduce costs of financial service delivery. Hence, people living in rural regions may have broader access to financial services so that they can get more economic resources. Consequently, the local economic development is also supported. In addition, digital labor helps to deal with gap of labor supply and demand. In the process of economic development and industrialization, labor usually flows from rural areas to urban areas which produces challenges for agricultural production (Vuppalapati, 2021). As Vuppalapati observed, artificial intelligence can be used to facilitate agricultural production in rural areas to improve productivity and solve the problem caused by the reducing labor. Since the agriculture industry often acts as the backbone of local economy in urban places, artificial intelligence and digital labor produce some positive influences on economic development of rural areas. With economic development supported, these regions can have stronger competence to attract inflows of economic resources.

4. Economic Resource Allocation Between Social Classes and Groups

Digital labor and artificial intelligence are meaningful for individuals. People in different social classes and groups may face various influences of digital labor and artificial intelligence. People at the upper class are usually beneficiaries of digital labor and artificial intelligence. For example, entrepreneurs can use digital labor and artificial intelligence to improve productivity and profit margins and earn more money. In this way, economic resources in a society are more likely to flow to them. However, for people at the working class, the situation is very different. Digitalization significantly impacts on employment opportunities of workers (Prause, 2021). Since digital labor and artificial intelligence have significantly improved functions of machines and robots, they can be used to substitute human labor in more and more circumstances. As a result, jobs which were previously completed by human beings are not transferred to digital labor. As a result, it is harder for human beings to find jobs. For many people, jobs are the major approach for them to get wages and economic resources. When they lose opportunities of employment, they are harder to get economic resources. Therefore, economic resources flow from workers to employers. In this context, the income gap between the poor and the rich may be further expanded. The rich tend to occupy more wealth in a society while the poor may face the big pressure of unemployment. To prevent social risks and injustice caused by such a situation, it is necessary for the policy makers to realize impacts of digital labor on unemployment.

An important mechanism for digital labor to reshape economic resource allocation between social classes and groups is that it changes structure of labor demand. For example, Folea and Kaeva (2019) made a case study on the EU banking industry and found that digital techniques largely impacted labor structures and requirements for skills. Digital labor directly and most seriously impacts low-skilled workers. Digital labor replaces routine and manual tasks reducing demand for low-skilled workers (Almeida et al, 2017). Low-skilled workers face the highest risks of unemployment in the context of digital labor and artificial intelligence. But in practice, not only low-skilled workers but also some higher skilled employees have to face job instability caused by digital labor and artificial intelligence. With development of artificial intelligence, digital labor is getting increasingly smart and can replace more complicated tasks. For example, some ordinary white-collar jobs can be completed well and efficiently by digital labor. Comparing with white-collar employees, digital labor is cheaper. Hence, employers may cut such jobs and turn to digital labor. As a result, these employees' competence to get economic resources in a society will be weakened since digital labor becomes their direct competitors. With the fast development of artificial intelligence, digital labor is expected to be increasingly smart and capable. They are likely to be used in a broader range. Therefore, reallocation of economic resource in a society will be accelerated.

Digital labor and artificial intelligence do not mean that demand for human labor is absolutely reduced. Instead, in the context of digital labor and artificial intelligence, innovation labor is more required because innovative employees contribute to digital innovation and strongly support technical development (Lee and Berente, 2012). In fact, self-learning of machines has not been fully achieved. It means that intelligence of digital labor is still limited. It is not qualified to do the innovative and very complicated jobs. In addition, to drive further development and improvement of digital labor and artificial intelligence, it is necessary for companies to hire innovative employees with strong digital skills. They act as designers, developers or engineers of digital labor and artificial intelligence. When digital labor is used in more areas, demand for such human labor will grow according. For example, in the energy industry, artificial intelligence is adopted and many energy companies have bigger labor demand for talented people in the area of artificial intelligence (Lyu and Liu, 2021). These talented people are usually well paid and have strong competitiveness in the labor market. They are able to get more economic resources. In this way, they are beneficiaries in the process of economic resource reallocation in a society.

5. Conclusion

This essay discusses how digital labor in the context of artificial intelligence impacts on economic resource allocation in a society. It is found that digital labor backed by artificial intelligence reshapes economic resource allocation through three approaches. One approach is that digital labor changes economic resource allocation between industries. The digital industries and traditional industries which pay attention to adopt digital labor are likely to attract more investments and economic resources. On the contrary, traditional industries which are lagged behind by digital technology are likely to lose attractiveness for economic resources. Another approach is that digital labor reshapes economic resource allocation between regions. Developed regions with advanced techniques and strong financial competence tend to attract more economic resources while developing or rural regions face challenges of outflows of economic resources. Still another approach is that digital labor impacts on economic resource distribution between social classes. Entrepreneurs and innovative people with strong digital skills may get more economic resources and low-skilled workers or employees engaged in routine works

tend to be difficult to acquire economic resources. In general, digital labor and artificial intelligence produce significant structural changes to economic resource allocation which should be noticed by policy makers.

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