Human-Machine Relationship from the Perspective of Labor Market Under the Background of Human-Machine Symbiosis

Yihan Zhang[1], Guiqing Li[1,*] and Rongjian Mao[2]

[1]*School of Management, Chengdu University of Information Technology, Chengdu, Sichuan 610103, China*

[2]*School of Economics, GuiZhou University of Finance and Economics, Guiyang, Guizhou 550025, China*

*Corresponding author. Email: e2001011@163.com

ABSTRACT

The purpose of the work is to find a more objective human-machine relationship. Through the theoretical analysis of the relevant literature at home and abroad, the characteristics of humans and machines in their respective work are summarized and compared. From the above analysis results, it is concluded that there is indeed a relationship of competition and cooperation between humans and computers, and a human-machine relationship model of "development power transfer" is proposed, possible methods to deal with the impact of the machine on the labor market are also given.

Keywords: *human-machine symbiosis; labor market; development power transmission; competition and*

cooperation mode

1. INTRODUCTION

With the extensive application of artificial intelligence, the idea of human-machine symbiosis has been widely recognized. Shortly after the concept of artificial intelligence was put forward, Lee Clyde put forward the idea of human-machine symbiosis, pointing out that deep cooperation and interaction between humans and machines should be made to achieve common progress[1]. Nowadays, it has become a consensus that artificial intelligence and human beings are interdependent and develop together. However, most of the researches focus more on the development of artificial intelligence technology and how it serves human beings, but pay less attention to the challenges from artificial intelligence itself. Even if the ethical issues of artificial intelligence application are considered, researches on human-machine relationship analysis still need to increase.

Artificial intelligence refers to the intelligence created by human beings, which is the simulation of human brain through computer. According to the concept of artificial intelligence, the theory of human-machine symbiosis and the application status of artificial intelligence, questions are raised: What is the impact of artificial intelligence on human employment pattern? What principles should the application of artificial intelligence maintain while ensuring work efficiency? And what is the relationship between human and artificial intelligence?

2. COMPLEX IMPACT OF ARTIFICIAL INTELLIGENCE ON THE LABOR MARKET IN THE ERA OF HUMAN-COMPUTER SYMBIOSIS

2.1. Research on the Impact of Artificial Intelligence on the Labor Market

As a specific technology, artificial intelligence is bound to have a certain impact on the current labor market. Shuai Yuan and Xiaomeng Zhao explained the role of artificial intelligence technology in promoting economic development through the theory of creative destruction and endogenous growth. However, at the same time, it will have a series of negative effects on the labor market, such as structural unemployment, the widening gap between the rich and the poor, the tension between labor and capital, and the decline of the share of labor income. Through data analysis, Yao Gong and Xizhe Peng show that there are differences in the potential risk of being replaced in different occupations, and point out the significant negative correlation between the education level and the risk of being replaced[2]. Dan He analyzed from the perspective of the number of the relevant population, and pointed out that the reduction of working

age population in China at the current stage will also promote the application and popularization of artificial intelligence technology in the field of labor[3].

Many research results express a variety of views[4-7], which can be summarized as follows: Pessimistic, that is, artificial intelligence technology will reduce employment, which will have an impact on the existing employment situation, leading to the polarization of the employment workforce; Uncertain, that is to say, the development of artificial intelligence technology has uncertain or not significant impact on the labor market; Double sided, this part of the view is that the impact of artificial intelligence technology on the labor market will have differences in the results due to different occupation, different region or different action time.

2.2. Analysis of the Impact of Artificial Intelligence Technology on Labor Market in China

By summarizing the above views, the impact of artificial intelligence on the labor market can be analyzed from the macro and micro perspectives. According to the endogenous growth theory, under the background of macroeconomic environment, artificial intelligence technology, as a kind of technological progress, will make more room for economic development. Artificial intelligence technology does have certain negative impact on the labor market, such as structural unemployment and technical unemployment. However, such negative impacts are not sustainable and large-scale, and the application of artificial intelligence technology in the labor field can provide more jobs[8]. This can drive workers to actively improve their quality through training, learning and other means to avoid the risk of occupation substitution, which is conducive to the overall improvement of the quality of the labor force in China.

Under the micro labor market environment, the population distribution shows significant regional characteristics, which is the result of the comprehensive effects of the imbalance of social and economic development and the natural environment between regions[9]. The application of artificial intelligence technology can effectively alleviate the imbalance between supply and demand of labor market in underdeveloped areas in a relatively short period of time. However, it will have an impact on the labor market in developed regions where there is an oversupply of labor force, resulting in the unemployment of more labor force and intensifying employment competition. In this case, the share of labor income of occupations with more procedural cognitive activities may continue to decrease for some time, until it is lower than the expected range of workers, and this period will not be too long due to the rapid development of computer technology and artificial intelligence. In the long run, as the main trend of China's population flow is from underdeveloped areas to developed areas, the number of basic labor and high-level labor in developed areas is more, which makes artificial intelligence more popular in

developed regions. In this case, it is difficult for the low-end labor force to continue to work in developed regions, they are more likely to find another way out in relatively underdeveloped regions. Therefore, artificial intelligence technology plays a more significant role in optimizing the labor force structure in developed regions.

Based on the above macro and micro perspectives to analyze the impact of artificial intelligence technology on the labor market, the existing low-level labor force should improve their own quality and seek for timely transformation. At present, the aging population in China is increasing, and the number of working age population will continue to decline in the future. If the labor force structure transformation is not carried out in a timely manner, it will be difficult to match a large number of new positions brought by artificial intelligence technology in the future, thus intensifying the contradiction between supply and demand of social labor force, resulting in "no one is on duty".

3. IMPLEMENTATION CONCEPT OF ARTIFICIAL INTELLIGENCE UNDER THE CONDITION OF HUMAN-MACHINE SYMBIOSIS

3.1. Decision Making and Its Influencing Factors

Indeed, it can effectively improve work efficiency to entrust a part of the work to an artificial intelligence system or machine. However, artificial intelligence makes decisions based on the results of data analysis, this makes it can obtain the "optimal decision" under the current data and continuously optimize the subsequent decisions through its perception and learning ability, but it is still difficult to make decisions that are consistent with the intentions of all members of the organization each time[10]. When there are conflicts of interests or other aspects among members of the organization, some decisions may lead to the escalation of such internal conflicts within the organization, which will not be conducive to stability and unity within the organization.

The decision of artificial intelligence is also affected by other objective conditions. Guangsheng Zhang[11] summarized the influencing factors into data quality and algorithm in their research, and cited the research of Thomas Bolander and others as explanations:(1)As AI is a decision made based on data analysis, the quality of data will directly affect the quality, correctness and interpretability of the decision. The existing methods are mainly to eliminate wrong data through data management and integrate data format and type to improve data quality and correctness[12]. (2)The improvement of data quality plays an irreplaceable and decisive role in improving the quality of organizational

decision-making[13]. (3)Algorithm is the core of artificial intelligence data analysis, and its quality will directly affect the quality of artificial intelligence decision[14].

3.2. Ethics of Decision-making and Work Execution

There are many researches on the ethical issues related to artificial intelligence, and the academic community has different views and opinions on the ethical issues of artificial intelligence. Qingfeng Yang summarized the research system of AI ethics and Morality:In the research of artificial intelligence ethics and morality, there are multiple paths, the theoretical path of regarding human rights as the core is very typical, which regards human dignity and human welfare as the core of moral considerations. With the gradual development of this theoretical path, the problem of AI agents embedded in moral principles has presented a dual dilemma of humanism and technicalism. Yang divided the difficulties brought by artificial intelligence into philosophical difficulties in intelligence and transcendence, social difficulties in machine replacement and deep learning as well as technical difficulties in incomprehensibility[15].

From a labour market perspective, when AI replaces human practice, if AI follows the same logic in the human knowledge base (i.e. human logic), transformation from high-level form to low-level form behavior will be completed by artificial intelligence with the gradual maturity of artificial intelligence technology and the increasingly high level of personification. People who are replaced by AI are less efficient than AI agents and belong to a relatively low-level form of existence. Not all of them have the conditions (such as older age, limited physical conditions, poor economic conditions, etc.) to improve their own quality. The resettlement of these people is a problem itself that cannot be ignored. If all consequences are borne by the replaced, social stability may be caused; If it is fully borne by the government, it may cause excessive pressure on the government, and this method cannot be applied to all regions;If it is jointly undertaken by the government and the replaced, the determination of fair proportion will be too difficult. Therefore, in addition to the development of artificial intelligence technology, how to maintain the labor market and even social stability, this aspect of research also needs to be followed up.

From the perspective of specific application scenarios, there are great differences in the business environment and moral standards of various countries, the moral standards of various regions are also easy to cause problems when artificial intelligence is making decisions[16]. In terms of technology, the embedding of artificial intelligence ethical standards is also a problem that needs further research and development. At present, there are some mathematical methods to restrain the artificial intelligence business unethical decision-making[17]. However,facing the increasingly complex international situation, artificial intelligence decision-making ethics also needs more

flexibility. With the application of artificial intelligence technology in more and more fields, the work tasks become more and more complex. Problems such as the embedding of AI ethics and morality, and the establishment of relevant legal systems need to be solved, so as to be conducive to the safe and reliable application and development of artificial intelligence technology.

Generally speaking, the ethics of artificial intelligence should first meet the basic principles of safety, freedom and reliability, and must be controllable. On this basis, we should also consider the issues of fairness, justice, responsibility and sustainability.

4. THE PROMOTION-COMPETITION RELATIONSHIP BETWEEN HUMAN AND ARTIFICIAL INTELLIGENCE

On one hand, artificial intelligence needs a number of other disciplines and computer branch technologies to support its role, and is vulnerable to the development of materials science, neurology, biology and other disciplines. On the other hand, human beings can continuously discover and form new knowledge (innovation ability). At present, artificial intelligence does not have the same social attributes as human beings, and it is difficult to fully simulate human emotions. In terms of decision-making, human beings are still the main part of society. Though human emotions will affect people's decision-making, and sometimes such decision-making is not necessarily based on rational thinking, it may also have better results. Therefore, the judgment made by artificial intelligence based on data may differ from the actual situation.

Artificial intelligence still has aspects that cannot replace human beings. Artificial intelligence technology has a greater impact on the occupation with more procedural cognitive behavior. However, in the field requiring more innovative ability and creative behavior, artificial intelligence is more likely to turn to the auxiliary role instead of completely replacing work. Based on these two situations, a mutual promotion model of artificial intelligence and human "development power transfer" is proposed.

Based on the summary of relevant literature, the development momentum of human and artificial intelligence has been compared through the five dimensions of creativity, experience, learning ability, computing ability, environmental adaptability and continuous working ability. "0" means relatively weak, "1" means relatively strong, and "-" means no comparison. The results are as follows (Table 1).

Table 1. Ability comparison between human and AI agents

Subject	AI	Human
Creativity	0	1
Experience	0	1
Knowledge reception	1	0
Internalization of knowledge	-	-
Computing power	1	0
Environmental adaptation	1	0

(1) As shown in the table, human creativity and experience are stronger than AI agents at present;

(2) AI agent has stronger ability to accept knowledge due to its different mechanism and principle from human;

(3) Due to different mechanisms, the level of knowledge internalization cannot be compared;

(4) In addition, AI agents are more adaptable to the objective natural environment.

At present, AI agents are unable to achieve human specific creativity and experience, but with the further development of AI technology, the comparative results of these aspects may change. The evolution of AI agent capability relies on the Internet and its excellent computing capabilities, and is naturally based on the existing knowledge base of human beings. Its mechanism also enables AI agents to quickly accept this verified and applicable knowledge at the current stage. For human beings, it is difficult to do the same. For human beings, the realization of knowledge internalization mainly depends on the summary of experience in practice, and then applying experience to practice. Only after repeated practice and verification, can correct knowledge be formed, and human beings cannot work or study for a quite long time because they need to rest and eat. In addition to natural conditions, the emotional needs and social attributes of human beings also make this process relatively long compared with AI agents.

Before the emergence of strong artificial intelligence, based on the theory of human-machine symbiosis, human and artificial intelligence should promote each other, compete for development and continuously improve each other. As the power source of human progress is different from AI, human innovation, knowledge development and internalization, experience summary, etc. The process is more complicated, and in the biological sense, the evolution of species is relatively long, so the power and efficiency of

human progress power source are relatively low; AI agents can directly acquire the current verified correct knowledge through network, data screening and analysis, the power and efficiency of AI agents' progressive power sources are relatively high. In the same case, if AI agent replaces part of human work, human needs to reduce the risk of occupation being replaced or match new positions by improving the overall own advantages, so as to improve and optimize the overall quality of human labor force. The improvement and optimization of labor quality will promote the development of human knowledge, enhance the power of human progress, enrich the knowledge base of human-machine sharing, and once again enhance the power of AI agent progress. In this way, human-machine interaction can be achieved and human-machine symbiosis can be achieved, as shown in Figure 1.
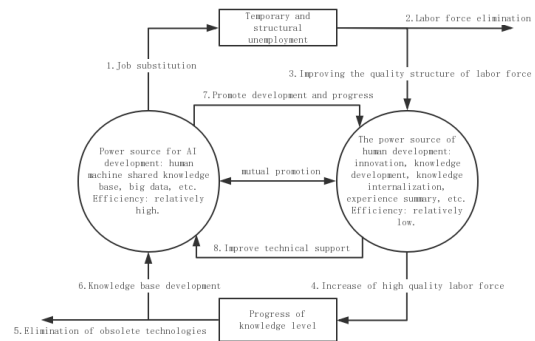

Figure 1. The process of mutual promotion between human beings and artificial intelligence through power transmission

Now we can make a specific description of the dynamic transmission model of human and artificial intelligence development. During a certain period, human and artificial intelligence are respectively set as 2 modules that are in contact with each other and each has its power source, while the power source of artificial intelligence technology is from the development of all human existing knowledge base and other disciplines (as shown in Figure 2). The development of AI can promote human progress, and human progress, in turn, can reduce the resistance of AI development, making the development of AI more rapid and powerful.
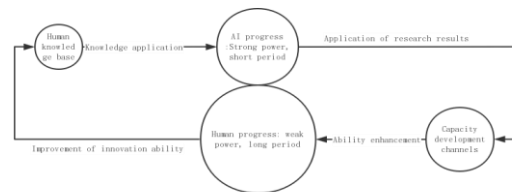

Figure 2. Summary of Development Power Transmission

However, with the continuous development of AI technology, the ability of AI is also constantly improved, and the impact on the labor market caused by artificial intelligence will continue, and the human ability will be continuously replaced and abandoned[18]. Nowadays, more and more people are concerned about the strong ability of artificial intelligence. As shown in the development power transfer model, compared with human beings, when AI has too strong capacity, too much power and too fast development speed, it may lead to too much promotion for human development. As a result, most people's technological capabilities are abandoned, which may also lead to strong contradictions within human beings or instability of human internal structure, resulting in the potential risk of internal and external disruption.

5. MEASURES

5.1. Reasonable Improvement of Education Mode

The effects of structural unemployment and labor force structure optimization brought by artificial intelligence vary with different regions. China has a large population, and most of the industries engaged in are simple and repetitive labor, this contains a high risk of being replaced. China is in the stage of an aging society, the impact of artificial intelligence on the labor market has a great negative impact in the short term, and some unemployment will also cause great pressure on the government. From the perspective of the agricultural labor force, taking two documents in 2004 and 2013 as examples, by comparing the two documents, it is found that the agricultural surplus labor force in China has changed from redundant to insufficient in the past 9 years. It is not difficult to see that reducing the labor market transaction costs, technological progress and education popularization play a greater role in improving the quality of labor force and promoting the transfer of surplus labor force. Therefore, on the one hand, we should continue to deepen education reform, popularize basic education and increase financial investment in education; on the other hand, we can encourage the development of higher and medium education, and at the same time, we should keep pace with the times to reasonably improve the existing model and content of higher and medium education.

5.2. Persistence in Ethical Research

Artificial intelligence should be subject to ethical constraints in the implementation of its work. It should not only aim at pursuing profits or seeking the best results. It should develop and progress in accordance with the principles of safety, reliability and people-oriented. Firstly, it is necessary to research and build the ethical system that artificial intelligence should follow, which is not against human ethics and dignity, but also can effectively, promote the

optimization of human labor force structure and achieve the goal of mutual promotion with human beings. Secondly, it is necessary to conduct in-depth research on the technical means by which the human ethical system is effectively embedded in the machine. In addition to the ethical constraints, it is also necessary to carry out technical constraints, so as to ensure the safety and reliability of the application of artificial intelligence. Due to the hardware migration of artificial intelligence system, it is very important to study the technology constraint means, and it is necessary to increase the investment in the security research of artificial intelligence.

5.3. Giving Full Play to the Power of the Government

Before the arrival of the era of strong artificial intelligence, the relationship between human and AI agents tends to be more human-computer symbiosis, and there are more uncertainties after the arrival of the era of strong artificial intelligence, so this paper only discusses before the arrival of strong artificial intelligence. The mode of human-computer symbiosis is more conducive to the mutual promotion of human and artificial intelligence. Although there is a certain competitive relationship between human and artificial intelligence in the labor market, this competitive relationship is not impossible to transform. Therefore, the government should be prepared for the possible impact of artificial intelligence on the labor market, make timely deployment and control, and promote the improvement of labor structure as soon as possible. For example, continuing education reform, improving teaching content and other ways to cultivate comprehensive talents, developing new occupation, carrying out new vocational public welfare training, etc., striving for the seamless connection of the unemployed from unemployment to re-employment, and reducing the impact of artificial intelligence on China's labor market.

5.4. Keeping an Objective Understanding of Human-machine Relationship

In general, AI agent can help human beings to continuously develop and improve themselves, but at the same time, it is also running a competitive race with human beings. For artificial intelligence, it is necessary to extend the advantages of human beings while developing technologies, and enhance the core competitiveness and irreplaceable of human beings, just as the old saying goes: "born in distress, die in ease."

6. CONCLUSION

Although artificial intelligence technology can bring great help to human development, there are still some

aspects we need to pay attention to. Firstly, structural unemployment is one of the challenges brought by artificial intelligence, and how to improve the quality of existing labor force as soon as possible is also a problem. Secondly, artificial intelligence work should be subject to ethical constraints, and such constraints need to be achieved through moral research and technical means. Finally, we believe that the relationship between human and artificial intelligence is cooperation-competition. In addition to the development of artificial intelligence technology, human also needs to improve the sense of urgency to avoid artificial intelligence technology exceeding the development of ethical system.

REFERENCES

[1] LICKLIDER J.C.R.Man-computer symbiosis[J]. IRE Transactions on human factors in electronics, 1960(3);4-11.

[2] Yao Gong, Xizhe Peng. Occupational substitution effect of artificial intelligence technology application [J]. population and economy, 2020 (03): 86-105. (In Chinese)

[3] Dan He. The impact of artificial intelligence on labor and employment [J]. Journal of Shanghai Jiao Tong University (PHILOSOPHY AND SOCIAL SCIENCES EDITION), 2020, 28 (04): 23-26. (In Chinese)

[4] Kristina Matuzeviciute, Mindaugas Butkus, Akvile Karaliute, "Do Technological Innovations Affect Unemployment? Some Empirical Evidence from European Countries," Economies, Vol.5, No.4, 2017, pp.48-67.

[5] David Autor, David Dorn, "This Job is 'Getting Old':Measuring Changes in Job Opportunities Using Occupational Age Structure, " American Economic Review, Vol.99, No.2, 2009, pp.45-51.

[6] Minchun Han, Qingjiang Han. Impact of robot technology progress on labor market -- Analysis Based on dynamic random general equilibrium model [J]. modern finance and economics, 2020 (04): 3-16. (In Chinese)

[7] Xintong Zhao, Yansui Yang. Comprehensive governance of labor market in the era of artificial intelligence: challenges and policy tools [J]. China Administration and management, 2020 (03): 12-17. (In Chinese)

[8] Chunming Gao, Xiao Yu, Shikun Chen. The impact of artificial intelligence on China's future labor force employment: an analysis based on the perspective of labor supply [J]. Social Sciences front, 2020 (10): 249-254. (In Chinese)

[9] Xiangjing Zhang. Spatial distribution of occupational population in China: current situation and causes [J]. Journal of Chongqing University (SOCIAL SCIENCE EDITION), 2008 (02): 59-65. (In Chinese)

[10] Rai, A., Constantinides, P., and Sarker, S. 2019 "Editor's Comments: Next-Generation Digital Platforms: Toward Human-AI Hybrids," MIS Quarterly (43:1) pp.iii-ix.

[11] Guangsheng Zhang, Chundi Yang. The impact, challenges and prospects of artificial intelligence on organizational decision-making [J]. Shandong Social Sciences, 2020 (09): 100-105+113. (In Chinese)

[12] M.Janssen, H.van der Voort, A.Wahyudi, " Factors influencing big data decision-making quality", J.Bus. Res.70 (2017) 338-345.

[13] Bolander, T.(2020). "Correction to: What do we lose when machines take the decisions?". Journal of Management and Governance, 1-1.

[14] Masegosa ASR, Feelders AJ, Van der Gaag LC (2016) "Learning from scarce data in Bayesian networks with qualitative influences" Int J Approx Reason 69(C):18-34.

[15] Qingfeng Yang. Rethinking AI ethical principles from artificial intelligence problems [J]. philosophical analysis, 2, 020, 11 (02): 137-150+199. (In Chinese)

[16] Tizheng Zhu. Legal response in the era of artificial intelligence [J]. Journal of Dalian University of Technology (SOCIAL SCIENCE EDITION), 2, 018, 39 (02): 97-102. (In Chinese)

[17] Nicholas Beale, Heather Battey, Anthony C.Davison, Robert S.MacKay. Stop artificial intelligence from making unethical business decisions through mathematical methods [J]. Data analysis and knowledge discovery, 2, 020, 4 (07): 126.

[18] Ellul J. The Technological System[M]. Grand Rapids: Wm.B. Eerdmans Publishing, 1990:95