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Automation and Universal Basic Income: Employment Options under Technological Shock

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ABSTRACT

Automation is impacting the world of work, with many low-skilled jobs being lost to technology in areas such as manufacturing, services and healthcare. However, new roles have also been created, such as robot maintenance and programming, as well as data analysts and AI trainers. The job market is experiencing a coexistence of both "difficult to find" and "difficult to recruit" jobs. To cope with this, the concept of universal basic income (UBI) has been proposed. UBI is based on the theory that it provides economic security for all members of society and encourages choice. It is not linked to work incentives, means tests, etc., and recipients can spend the money as they wish. Alaska's dividend system has been linked to improvements in financial and psychological well-being, as well as employment and poverty reduction. Finland's basic income experiment aimed to boost employment, but its effect has been modest. While UBI is valuable, it should be combined with other employment policies, such as retraining and career transition support, to achieve social stability and sustainable economic development.

KEYWORDS

Automation; Universal basic income; Technology impact; Employment outlet

1. INTRODUCTION

Automation technology has become an important driving force in the development of today's society, and its widespread application in industrial production, services and other fields has greatly improved production efficiency. However, this technological change has had a profound impact on the labour market. A large number of traditional jobs, especially those characterised by repetition and regularity, are at risk of being replaced by automated devices and intelligent algorithms. This trend towards displacement is leading to a significant increase in job instability and the risk of unemployment, which in turn is exacerbating social inequality. In this context, Universal Basic Income (UBI) has received widespread attention as a policy idea to address employment shocks and social inequality (Thompson, 2022). This study aims to examine automation's impact on employment and explore the role of UBI in dealing with the employment crisis caused by automation.The study will systematically examine the impact of technological change on the labour force across industries and skill levels, using international cases on UBI to evaluate its potential to alleviate unemployment, ensure social equity and promote employment transition.The study will propose strategies to build an inclusive and stable employment system that can deal with the challenges posed by technological change and achieve sustainable socio-economic development.

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2. THE IMPACT OF AUTOMATION ON EMPLOYMENT

2.1. Reconstruction of Employment Structure

The widespread use of automation technology in manufacturing has significantly changed the employment structure of the industry. Many repetitive and regular jobs are being automated, replacing humans with robots and automated production lines, as seen in the automotive and electronics sectors (Ajiga et al., 2024). Welding, assembly, and other tasks in car production, for example, have been replaced by automated equipment, leading to higher efficiency and lower labour costs. However, there is a decrease in employment due to this technological change. But not all aspects of automation in manufacturing are negative; the demand for highly skilled workers is on the rise. These high-skilled jobs require workers to have more advanced technical knowledge and operational skills, thus promoting the upgrading of the employment structure in manufacturing. This upgrading not only contributes to the overall competitiveness of manufacturing, but also provides new career opportunities for workers (Figure 1).

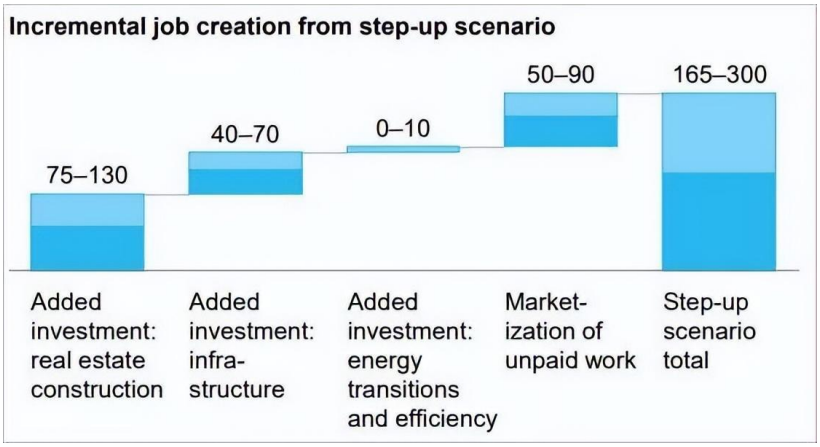

Figure 1. Incremental job creation from step-up scenario

The service industry is also undergoing the baptism of automation, and the employment structure has significantly differentiated. On the one hand, some simple service jobs, such as cashier jobs in the retail industry, have been impacted by the popularity of electronic payment and self-checkout systems. The decline in these low-skilled jobs reflects the penetration of automation technology in the service sector. On the other hand, emerging service fields such as digital marketing, big data analytics, artificial intelligence ethical consulting, etc. have increased demand for highly skilled and creative talents. This kind of employment differentiation leads to the imbalance of the employment structure within the service industry, with the gradual shrinking of middle-skill jobs, and the polarization of high-skill and low-skill jobs.

2.2. Changes in the Number of Jobs and Risks

The future of automation will change the existing work scene and trigger a transformation of the workforce. McKinsey's report shows that few occupations (less than 5% according to the data) can be fully automated, but in about 60% of occupations, 30% of the job content can be automated. This means big changes in the workplace. The McKinsey report states that by 2030, nearly 1 billion people worldwide will lose their jobs due to automation, and nearly 400 million workers (15% of the global workforce) will need to switch occupational categories (Figure 2) (Badiuzzaman & Rafiquzzaman, 2020).

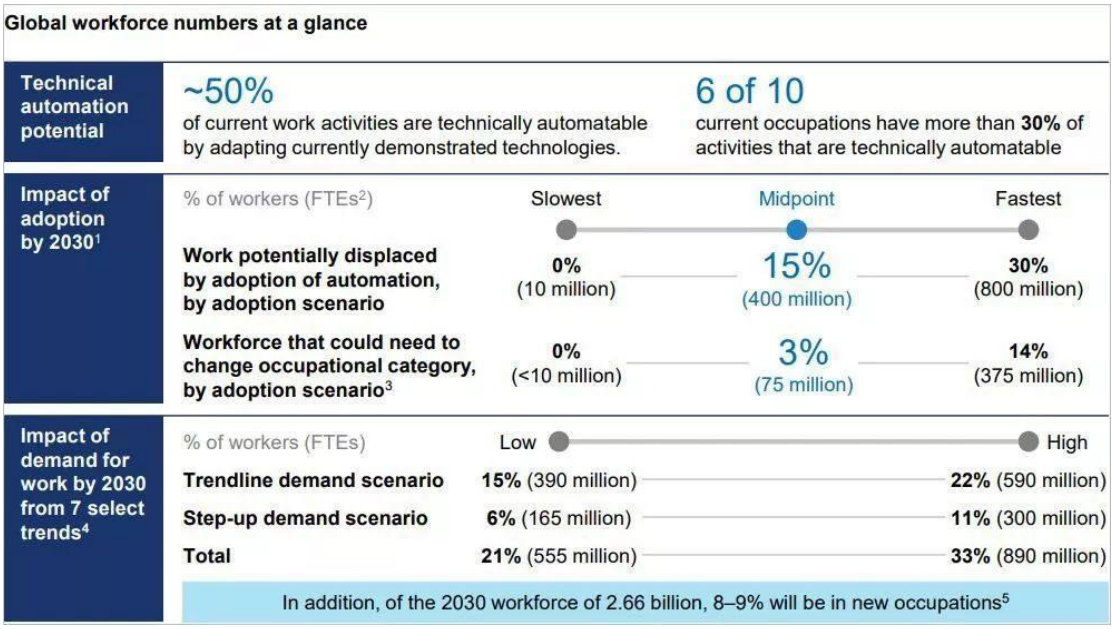

Figure 2. Global workforce numbers at a glance

The rapid application of automation technology has led to a significant decrease in the demand for labor in some enterprises in the short term. After enterprises introduce automation equipment or optimize the production process, the original jobs that rely on labor are replaced by machines, making a large number of workers at risk of unemployment. This unemployment risk is more prominent among workers with single skills, who often have difficulty in adapting to new jobs or industries in a short period of time, resulting in difficulties in re-employment. Short-term unemployment not only brings economic pressure and psychological burden to individuals, but also may lead to a series of social problems, such as family economic difficulties, increased social welfare expenditure, etc., which poses a potential threat to social stability. Therefore, how to mitigate the risk of short-term unemployment brought by automation technology has become one of the important challenges facing the current job market.

In the long term, automation may lead to a reduction in total employment, but it is also possible to create new jobs through the development of new industries. However, these new employment opportunities often require higher skills and knowledge levels of employees, and there are greater barriers to employment conversion. For example, although fields such as artificial intelligence and quantum computing are developing rapidly and have great employment potential, only a small number of people with relevant knowledge and skills are currently able to enter these industries. This skill mismatch has left many workers powerless in the face of new job opportunities, further exacerbating uncertainty in the job market.

3. THEORETICAL BASIS AND PRACTICAL CASES OF UNIVERSAL BASIC INCOME

3.1. Connotation of Universal Basic Income

A Universal Basic Income (UBI) is a cash income that is paid to all citizens on a regular basis without any qualifications (such as employment status, household income level, etc.). Its purpose is to ensure that everyone has enough money to meet the basic needs of life and protect the basic economic rights and interests of citizens. The distribution of such income has three main characteristics: individuality, universality and non-obligation (Daruich & Fernandez, 2024). Individuality means that the basic income is identified and paid out individually to each member of the household rather than uniformly to the head of the household. Universal means that everyone, rich or poor, gets a basic income without

any prior income or means testing; Non-compulsory means that the beneficiary is not required to work or prove his willingness to work, and the beneficiary can receive the basic income regardless of whether or not he is currently employed.

3.2. Economic Logic of UBI

Universal basic income (UBI), as an economic strategy to cope with technological shocks, has multiple economic logic. First, UBI can effectively solve the problem of technical unemployment. With the widespread application of artificial intelligence and automation technology, large-scale structural unemployment has become a real threat. The 2017-2018 UBI experiment in Finland showed that the mental health level of the unemployed who received UBI increased by 17%, and the enthusiasm for job hunting was not significantly affected, indicating that UBI, while providing an economic safety net, did not weaken the employment willingness of workers, but helped to alleviate social unrest. Secondly, UBI can effectively stimulate consumer demand. Low-income groups have a high marginal propensity to consume, up to 70%. The implementation of UBI provides a stable income for this part of the population and releases the consumption potential. The International Monetary Fund (IMF) estimates that if the United States issues $1,000 of UBI per month, the annual GDP growth rate will be increased by 1.5 percentage points, which fully demonstrates the potential role of UBI in promoting economic growth. Finally, UBI can help simplify the existing welfare system. In the United States, the administrative costs of existing welfare programs such as food stamps and housing subsidies account for 30% of total expenditures. The implementation of UBI can integrate these projects, save at least $200 billion per year in management expenses, improve the efficiency of the welfare system, reduce the waste of administrative resources, and make social welfare funds flow more efficiently to the people in need.

3.3. Ethics and Social Value of UBI

Universal Basic Income (UBI) has important ethical and social values. First, UBI guarantees fundamental human rights. Article 25 of the United Nations Declaration of Human Rights emphasises that "everyone has the right to a basic standard of living", and UBI is an effective tool to realise this goal by providing members of society with a basic standard of living that protects them from poverty and threats to their survival, and embodies respect for the dignity of the individual. Second, UBI promotes social justice. In the context of rapid technological development, technological dividends are often monopolised by a few people, and UBI can partially offset this inequality through a redistribution mechanism. Bill Gates proposes a "robot tax" to fund it.UBI also unleashes potential for innovation by providing individuals with economic freedom to pursue activities without having to worry about making a living, as the "Mincome" experiment in Manitoba showed, with a 20% increase in higher education participation amongst UBI recipients (King, 2023).

3.4. Case Analysis

(1) Finland's universal Basic income experiment

Finland conducted a two-year trial of universal basic income from January 2017. About 2,000 Finnish citizens between the ages of 25 and 58, drawn from a pool of people who have received unemployment benefits and minimum welfare payments, will receive an unconditional basic income of 560 euros per month from the state for the next 24 months. During the trial, participants will continue to receive a basic income of €560 per month even if they find a job. This experiment aims to study the impact of universal basic income on employment, health, happiness and other aspects, and although the results of the experiment are not yet completely conclusive, they provide valuable experience for the practice of universal basic income.

(2) Italy's "national basic income" program

Italy's populist Five Star Movement has long advocated a universal basic income and proposed a "national basic income" after coming to power. On December 30, 2018, the 2019 budget containing the National Basic Income plan was officially adopted. According to the bill, citizens with a monthly income of less than 780 euros can receive a corresponding amount of "national basic income", bringing the monthly income up to 780 euros. The scheme, which began in April 2019, receives a "national basic income" for a maximum of 18 months and can be renewed for another 18 months after it expires one month later, and is expected to benefit about 1.3 million households. Although Italy's national basic income program is not a full universal basic income, due to means testing, work requirements, and many other conditions, it is close to the core idea of a universal basic income.

(3) Switzerland's national basic income referendum

Switzerland held a referendum in June 2016, proposing that the Swiss government provide a basic income to all Swiss citizens and legal foreign residents who have lived in Switzerland for more than five years, with no strings attached. Under the proposal, the Swiss government intends to give a fixed monthly income of 2,500 Swiss francs per adult and 625 Swiss francs per child per month. The proposal failed, but was approved by nearly a quarter of Swiss voters. This incident shows that the idea of a universal basic income has gained a certain level of attention and support in Switzerland.

4. MECHANISM OF UBI IN RESPONSE TO AUTOMATION SHOCKS

First, economic cushion and consumption stimulus. The widespread use of automation technology has led to the displacement of a large number of jobs, especially those that are repetitive and regular. UBI provides basic economic security to affected workers, alleviating the economic pressure caused by unemployment, enabling them to maintain basic livelihoods and avoid falling into poverty. At the same time, the implementation of UBI can directly stimulate consumption, especially low-income groups, who are more inclined to use their extra income for immediate consumption, thus driving domestic demand and promoting economic growth. For example, Brazil's Bolsa Familia program has increased retail sales by 25 percent in poor areas, showing that UBI is effective in stimulating consumption.

Secondly, employment transformation and entrepreneurial incentives. Automation technology has changed the structure of the job market, prompting workers to shift from traditional positions to new fields. UBI provides workers with a "safety cushion" that reduces their economic risk of a failed transition and gives them more confidence to learn new skills and try a new career path (McGaughey, 2022). In addition, UBI has also provided initial financial support for entrepreneurs, lowered the threshold for entrepreneurship, and stimulated the innovation vitality of the society. For example, permanent fund dividends (similar to UBI) in Alaska increased the number of small businesses by 15%, indicating that UBI has a positive incentive effect on entrepreneurship.

Third, social equity and stability. The productivity gains brought about by automation technology are mainly concentrated in a small number of enterprises and groups with technological advantages, leading to further widening the gap between the rich and the poor. Through a redistribution mechanism, UBI transfers part of the new wealth to the general public, thereby reducing inequality and alleviating social contradictions. At the same time, the economic safety net provided by UBI can reduce crime rates and enhance social stability. For example, Canada's "Mincome" experiment saw an 8% drop in violent crime, suggesting that UBI plays an important role in maintaining social stability.

Finally, policy synergy and sustainability. UBI should not be seen as an isolated policy, but should work in tandem with employment promotion policies, social welfare systems, etc. For example, the basic income could be provided for alongside additional subsidies or incentives for those who actively participate in vocational training or seek work, to balance the possible impact of the basic income on

work incentives. In addition, the implementation of UBI requires a stable and sustainable source of funding, which can be addressed through tax reform, the establishment of sovereign wealth funds, etc.

5. COMPREHENSIVE STRATEGIES FOR EMPLOYMENT UNDER THE IMPACT OF AUTOMATION TECHNOLOGY

In the context of rapid technological development, especially the widespread application of artificial intelligence and automation technology, the job market is facing profound changes. To address these challenges, comprehensive strategies are needed, including education and training systems, industrial policies and innovation support, and the synergy of UBI with other policies (Filippi et al., 2023).

5.1. Reform of Education and Training System

The reform of education and training system is the key to cope with the technological shock. The focus of education should shift to developing skills for the age of automation, including digital skills (e.g., programming, data analysis), innovative thinking, and interpersonal skills. Schools and vocational training institutions should work closely with businesses and industries to adjust the curriculum according to market needs and improve the skill adaptability of the workforce. For example, the German government is working with industry associations to integrate AI skills into the vocational education system to improve the adaptability of employees and apprentices in smart manufacturing and AI-assisted production environments. In a rapidly changing technological environment, lifelong learning has become the key to maintaining competitiveness in employment. An institutional environment conducive to lifelong learning should be established, such as providing online learning resources and encouraging enterprises to carry out staff training, so that people can constantly update their knowledge and skills.

5.2. Industrial Policy and Innovation Support

Supporting the development of new industries is an important way to create new jobs. The government should actively support the development of emerging technology industries, such as artificial intelligence, new energy, and biotechnology, through industrial policies. These industries have a huge potential for job creation, not only to absorb some of the labor force lost due to automation, but also to drive the transformation and upgrading of the entire economy. For example, a report released by Pricewaterhousecoopers shows that AI is widely used in a number of industries, especially in the fields of finance, information technology and professional services, which have become "high penetration areas" of AI applications, creating new job opportunities such as AI trainers, data taggers, and ethics consultants.

Encouraging innovation and entrepreneurship is also an important strategy to cope with the impact of technology. We will create an environment conducive to innovation and entrepreneurship, lower the threshold for starting a business, and provide financial support and tax incentives for starting a business. Entrepreneurship can promote employment, stimulate social innovation vitality, and provide new ideas and opportunities for employment under the technological change. For example, some US states have offered tax credits to AI companies that create new jobs, helping boost vocational education coverage by 20 percentage points in low-income communities.

5.3. Synergy between Universal Basic Income and Other Policies

The universal basic income should not be seen as a policy in isolation, but in conjunction with employment promotion policies. For example, the basic income could be provided for alongside additional subsidies or incentives for those who actively participate in vocational training or seek

work, to balance the possible impact of the basic income on work incentives. Integrating universal basic income into the entire social welfare system and working in conjunction with other welfare policies (such as medical care, housing security, etc.) can avoid the fragmentation of welfare policies and improve the overall allocation efficiency of social welfare resources. In addition, a range of other measures are needed to address the employment challenges of the technology shock. For example, the establishment of an employment buffer mechanism, such as the pilot "AI unemployment security special insurance", set up a 6-12 month transition period for vulnerable positions. At the same time, educational resources should be tilted to the central and western regions, providing vocational training subsidies to help workers upgrade their skills.

6. CONCLUSION

The impact of automation technology on employment is multifaceted, including the reshaping of employment structure and the change of employment quantity. As a coping strategy, universal basic income has a certain theoretical and practical basis, and has shown positive effects in some practical cases, but it also faces controversies such as funding sources and work incentives. In conclusion, under the technological shock, the construction of employment opportunities requires the coordination of various strategies, including education and training reform, industrial policy support, and the coordination of universal basic income with other policies. Future research could further delve into the optimal funding source model of UBI in different socio-economic contexts, as well as more precisely measure its actual impact on work incentives and social moral hazard. At the same time, more empirical research and policy evaluation are needed to better adapt the employment and training system to the rapid development of automation, so as to ensure that the society can achieve stable and sustainable employment development in the wave of technological change.

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