

A Review of Research on Technological Change and Industrial Dynamics

—Based on Information Technology Perspective

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Abstract: Throughout the existing studies at home and abroad, based on the information technology perspective, many scholars have analyzed the correlation between technological innovation, industrial change, and economic growth. This paper reviews and organizes the relevant studies from the perspectives of the intrinsic nature and development characteristics of the information technology revolution, the specific manifestations of industrial change, and the driving force of economic development.

Keywords: Information Technology; Technological Innovation; Industrial Change; Economic Growth

1. Introduction

We are currently in the information age, which depends on the current high-speed development of information technology, and the modern information technology revolution has a particularly profound impact on human civilization. Driven by modern information science, information technology is changing day by day, and the wave of informatization characterized by digitization, networking and intelligence is flourishing. The multi-scenario use of information technology makes modern life colorful, which also indicates the importance of information as a non-physical element in current life. Information technology, as a collective term for a group of technologies that take information as the object of technological action, is profoundly changing and shaping the entire human world. From a broad perspective, the information technology revolution in human history cannot be limited to the current modern information technology revolution. In human history, there have been five recognized information technology revolutions, namely: the use of language, the creation of writing, the invention of printing, the invention and popularization of telegraph, telephone, radio and television in the electric power revolution, as well as the information technology revolution represented by computers and the Internet. Each major breakthrough in information technology has positively contributed to the process of human civilization.

2. Literature Review and Organization

2.1 Current status of domestic research

In recent years, many scholars have expanded and supplemented the nature and development characteristics of technology and information technology. In the diverse academic circles, there are differences in the definition of technology, which on the one hand indicates the complexity of technology itself, and on the other hand shows the diversity of perspectives in the study of technology. Placing technology under the technological revolution to explore is the result of synthesizing technology with productivity, production relations, economic base and superstructure. Based on the perspective of technological evolution, Ye Weiwei (2015) reviewed the course of technological evolution in the prehistoric era, the agrarian economic era, the industrial economic era, and the knowledge economy era, and reflected on the four essential attributes of technology, namely, the nature of knowledge, the attribute of learning, the attribute of innovation, and the attribute of property rights. Wan Shuquan (2021) recognizes the essence of technology from the perspective of the interactive relationship between technology and society, which can lead to the conclusions of the dependence of technology on human beings, the social process nature of the display of the essence of technology, and the systemic nature of the evolution of technology. With the development of information science and computer hardware, Internet technology has risen rapidly in a few decades, and the information technology revolution with computers and the Internet as the dominant technology has created the information age, and information technology has become the focus of many scholars' research.

Xiao Feng (2017) defines information technology philosophically in *Information Technology in Philosophical Perspective*, while exploring the nature of information technology, which is categorized into body information technology, appliance information technology and electronic information technology, and in giving a philosophical dimension to the new problems of society arising from information technology. Xu Kunyin summarizes the essence of information technology as the unity of human nature and physical nature, the unity of social attributes and natural attributes and the unity of subjective initiative and objective regularity.

A number of scholars have already found that technological innovation and organizational innovation are crucial to industrial dynamics, economic growth and development. Zou Tanyong (2021) argues that technological innovation is the endogenous driving force of industrial high-quality development, and progressive technological innovation is an important driving force for industrial change. And there is a lot of literature that is positive on whether there is a correlation between information technology and industrial change and economic growth. The study of Ma Wenjun and Cai Yuezhou (2020) shows that the new generation of information technology has become an important support to promote the power change of China's economic development, but mainly through the industrial mechanism. Li Xiaohua (2018) found that under the conditions of the "new economy", the new generation of information technology promotes the renewal of industry and the transformation of old and new kinetic energy through its own development and growth and the deep integration with other industries, which is specifically manifested in the industry in the form of product form, business process, industrial form, business model, production mode, organizational mode, subversive changes in the governance mechanism and labor-management relations. Chen Guotie's (2017) research shows that under the continuous evolution of information technology, based on the internal and external driving force and new mode of innovation-driven, industrial transformation and upgrading has also undergone new changes. Through innovation drive, supported by information technology, the value supply chain of industry is re-decomposed and integrated, elements and resources inside and outside the region are absorbed, the benign interaction of advanced manufacturing industry, advanced service industry, high-tech industry, and advantageous traditional manufacturing industry is promoted, and new industries, new forms, and new modes are cultivated, which forms the innovation circle of the supply chain system, and promotes the transformation and upgrading of industry. Sun Yahui (2021) takes geographic information technology as an example to corroborate that technological innovation is the surging power of industrial change. Shi Lele and Zhao Jun (2018) found through empirical research that regardless of whether factors such as the intensity of environmental regulation change, as long as the level of technological innovation increases, it can promote industrial structure upgrading. Zhou Xuan and Tao Changqi (2021) showed that as the backbone and key driving force of industrial structure optimization and upgrading, technological innovation always plays the role of changing the ratio between industries and transforming the structure of industrial demand, and efficiently transforms China's traditional industries, promotes the formation of new industrial sectors, and makes the ratio between industries gradually tend to be coordinated.

2.2 Current status of foreign research

There are also many related researches on technological innovation, industrial change and economic growth in foreign countries. Yang W and Yang M (2017) based on Schumpeter's innovation cycle theory found that the overall trend of technological innovation-led economic growth is stable, but the actual level needs to be rapidly improved, and the driving force of technological innovation is in urgent need of enhancement. Liu and Xia (2018) showed that technological innovation is the key to an important driving force for a country's sustainable economic development and social progress, which can be realized through R&D investment to achieve sustainable economic growth. Zhou et al. (2021) study the direction of technological innovation and structural drive of China's economic growth with provincial data from 2000-2014, and find that there is an inverted U-shaped relationship between technological progress and economic growth, and that technological innovation through technological innovation and structural change promote sustainable economic growth. There are also many studies based on information technology perspective, Lee and Barry (2012) found that the degree of information technology innovation and South Korea's economic growth show a significant positive correlation. Zhang et al. (2014) concluded that there is a long-run cointegration relationship between investment in information technology and China's economic growth through vector autoregressive modeling, and in the short run, investment in information technology promotes China's economic growth without time lag. Hofman and Aravena (2016) found that the increase in IT investment spending is an important reason for the acceleration of economic growth in the U.S. The study of Neil and Setia (2019)

showed that the government's investment spending on information technology has a positive impact on Indonesia's economic growth.

2.3 A brief review of the current state of domestic and international research

Combining and summarizing the above literature, it is found that a number of scholars at home and abroad have carried out in-depth understanding of the relationship between technological innovation, industrial change and economic growth, and achieved fruitful research results, which have made great contributions to the study of the two-two relationship. With the rapid development of information technology, the relevant studies focusing on the relevance of information technology innovation to industrial change and economic growth have become more and more comprehensive.

References

- [1] Ye WW. The nature of technology and educational revelation[J]. Research on Higher Engineering Education,2015(5):40-45.
- [2] Wan SQ. Exploration of the Social Roots of the Nature of Technology-- Transcending Technological Determinism[J]. Journal of Culture,2021(2):31-34.
- [3] Ma WJ, Cai YZ. Can New Generation Information Technology Become an Important Support for Power Change? -An empirical analysis based on emerging industry classification and enterprise data mining[J]. Reform,2020(2):40-56.
- [4] Li XH. "New economy" and the disruptive change of industry[J]. Research on Financial Issues,2018(3):3-13.
- [5] Shi LL, Zhao J. Environmental regulation, technological innovation and industrial structure upgrading[J]. Research Management,2018(39):119-125.
- [6] Xu KY. The nature of information technology and its value in foreign language teaching[J]. Hubei Social Science,2013(4):180-181.
- [7] Zhou X, Tao CQ. Horizontal Knowledge Spillover, Technology Embedded Innovation and Industrial Structure Harmonization---Taking China's Manufacturing Industry as an Example[J]. Research Management,2021,42(7):126-136.
- [8] Zhou XX, Cai ZM, Tan KH, Zhang LL, Du JT, Song ML. Technological innovation and structural change for economic development in China as an emerging market[J]. Technological Forecasting and Social Change,2021(6).
- [9] Liu C, Xia GJ. Research on the Dynamic Interrelationship among R&D Investment, Technological Innovation, and Economic Growth in China[J]. Sustainability, 2018, 10(11):4260.
- [10] Yang W, Yang M. The measurement research of the short and medium cycles of economic growth driven by scientific and technological innovation in China ---based on the perspective of boom state[J]. Studies in Science of Science, 2017(35): 1240- 1252.
- [11]Zhang ZG, Yu R, Shi YB. The Information Technology Investments and Chinese Economic Growth : An Analysis Based on Vector Auto Regression Model[J]. Systems Engineering, 2014,32(5):75-81.

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