

Research on Future Industries and the Mechanisms of Disruptive Innovation Realization

Jia Guo

College of Business Administration, Anhui University of Finance and Economics, Bengbu
233000, China

2212713098@qq.com

Abstract

Future industries are the result of the industrialization of major technological innovations, and disruptive technological innovation is the direct driver of their development. With the continuous change of innovation paradigms, disruptive technological innovation in future industries is also accomplished between the turnover of old and new innovation ecosystems. This paper explores the mechanisms of future industries and disruptive innovation from the perspective of innovation ecosystems, and concludes that there are two approaches: technology supply-driven and market demand-driven. In either case, however, the process of disruptive innovation in future industries is realised in different ways through the behaviour of innovation factors such as entrepreneurial innovation, government policy support, market demand cultivation and industrial organisational innovation.

Keywords

Industry of the Future; Disruptive Innovation; Realisation Mechanisms.

1. Introduction

With the acceleration of the new round of global technological revolution and industrial change, future industries will become a key force to seize the high ground of international competition, lead economic and social development and achieve "overtaking". Disruptive technological innovation, as a direct driver of future industrial development, has caused creative destruction to some traditional industries and technologies. The report of the 19th National Congress of the Communist Party of China (CPC) explicitly proposes to "highlight disruptive technological innovation", and the 14th Five-Year Plan further emphasises the need to organise and implement future industry incubation and acceleration programmes around a number of frontier technologies, disruptive technological innovation and other areas of industrial change, and to plan and lay out a number of future industries. Disruptive innovation can not only help companies to quickly capture the mainstream market, but also to transform and upgrade the industrial structure, giving rise to new industries of the future.

As technology continues to innovate, the transformation and upgrading of traditional industries and the birth of future industries are intensifying, user needs and application scenarios are gradually diversifying, and the importance of innovation is becoming more and more prominent. Therefore, based on the perspective of innovation ecosystem, this paper explores the process of disruptive technological innovation in the new and old innovation ecosystems of future industries and reveals the process mechanism, in order to provide new perspectives and new ideas for the construction of future industries.

2. Literature Review and Research Framework

2.1. Literature Review

2.1.1. The Disruptive Innovation Process of Future Industries

Chen Jin (2020) believes that the future industry is the result of the industrialisation of major scientific and technological innovation, which plays an important leading and driving role in the development of economy and society and can represent the future direction of science and technology and industrial development. The People's Government of Shanxi Province mentioned in the 14th Five-Year Plan for the Development of Future Industries that future industries are dominant, forward-looking, disruptive and pioneering industries driven by the cross-fertilisation of cutting-edge technologies and industrial technologies. As such, disruptive technological innovation is at the heart of the formation and development of future industries. Based on the intense collision between mainstream technologies and pressing social needs, Christensen introduced the concept of disruptive technological innovation in 1997, aiming to replace existing mainstream technologies in unexpected ways and open up new product markets as new technologies continue to advance and improve. Some scholars (Huang, Rucheng, 2015), from the perspective of technology pathways, argue that disruptive technologies adopt a bottom-up approach, first entering from the low-end market to the high-end market and then gradually penetrating into the mainstream market. Other scholars (Danneels, 2004), based on user market demand, suggest that disruptive technology innovation relies more on market pull in addition to its own technological performance breakthroughs, and disruptive innovation is carried out from user demand. Foreign scholars (Anderson, 1990) also consider disruptive technology from the perspective of orbital variation as a disruptive technology that breaks the life cycle of the original product and can fundamentally change the performance of the product and replace the existing technology.

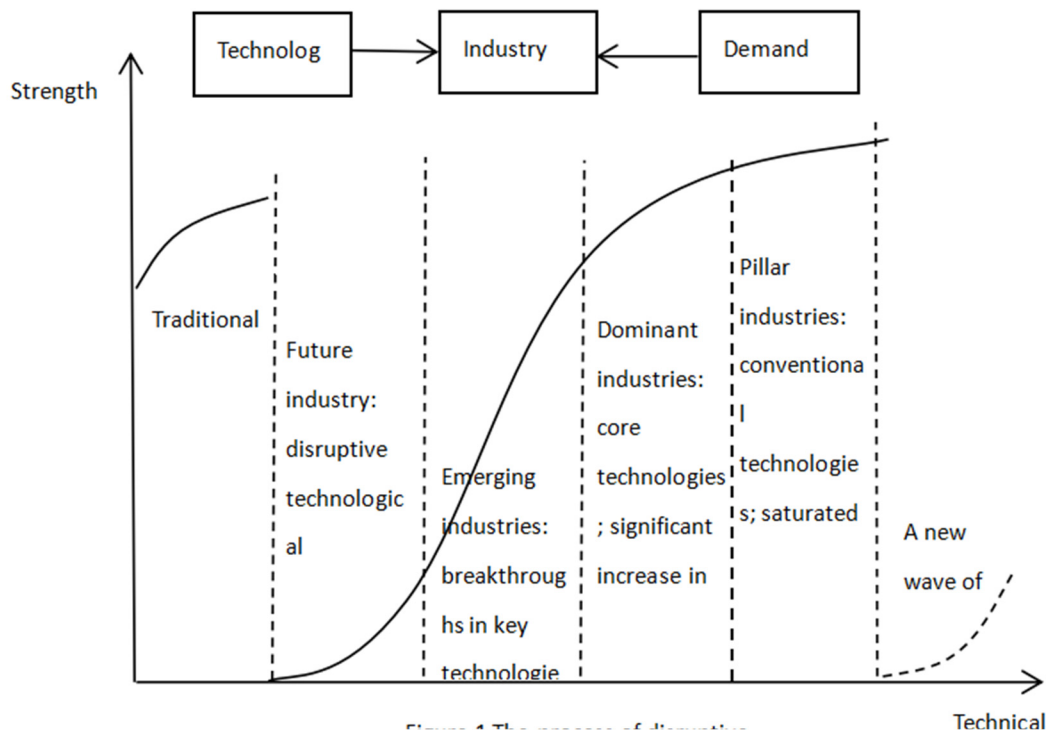


Figure 1. The process of disruptive

Since disruptive technology innovation is an alternative to mainstream technology, future industries with disruptive technology innovation as the core and traditional industries with

traditional technology as the mainstay represent different stages of industrial evolution respectively. According to the industrial life cycle theory, the development path of future industries can be summarised as follows, as shown in Figure 1: (1) disruptive technological innovation drives the formation of future industries and leads to new market demand; (2) as the technology continues to mature and the scale of the industry continues to expand, future industries gradually transition to leading industries; (3) as technological innovation and market demand are closely integrated, future industries, with their (3) With the close combination of technological innovation and market demand, the future industry will lead the development of local related industries with its strong drive and correlation, gradually evolving into a regional pillar industry, and market demand will tend to saturate. (4) When complete disruption of the mainstream market is achieved, the original disruptive technologies begin to be transformed into conventional technologies, and the next round of disruptive innovation in future industries is ready to take off.

2.1.2. The Connotation and Evolutionary Process of Future Industrial Innovation Ecosystem

In the 1990s, in order to maintain the long-term competitiveness and sustainable development capability of organizations, American scholars put forward the concept of innovation ecosystem. The innovation ecosystem (PCAST, 2008) is a complex system based on innovation system and ecology theory that integrates multiple innovation species, communities and innovation chains, and the participants in the system cooperate and compete with each other and co-evolve to achieve value co-creation. As a strategic emerging industry with strong drive, the future industry aims to lead and drive the development of related industries, forming a "1+N" type of industrial cluster, shaping a complete industrial innovation ecosystem and influencing the development direction of advanced industries (Yu, Donghua, 2020). Therefore, the future industrial innovation ecosystem can be understood as a space in time and society where innovative industrial organisations and other related parties in the same vicinity, based on disruptive technologies, are guided by government policies and market demand, with the aim of seizing the high ground in science and technology and industrial development and promoting high-quality economic development, through coordinating the relationship between innovation subjects in the region and the internal and external environment and effectively integrating innovation resources within the ecosystem. It is a dynamic and balanced system that realises the symbiotic evolution and value creation of economic, organisational and environmental subsystems.

At the same time, disruptive technological innovation in future industries will be completed between the old and new innovation ecosystems, and the interaction between the various elements of the system has been the focus of research by scholars at home and abroad (Chen Na, 2013). The core technologies, complementary supporting technologies and infrastructures on which each innovation agent in the innovation ecosystem relies are a dynamic process of change that will drive the overall evolution of the system at different stages (Zhang, Lifei, 2014). Through a case study, Chen Yantai et al. (2015) proposed that the two phases of industrial innovation ecosystem "construction-management" are also a process to achieve value co-creation and value capture.

The literature review provides a theoretical basis for the subsequent research, but it is also found that most of the existing research has been conducted at the enterprise level on disruptive technology innovation, but less at the industry level; moreover, there is little literature that combines disruptive technology innovation with innovation ecosystems, and even less with future industries. Therefore, based on the perspective of innovation ecosystem, this paper explores the process of disruptive technology innovation in the old and new innovation ecosystems of future industries and reveals the process mechanism in order to provide new perspectives and new ideas for the construction of future industries.

2.2. Research Framework

Li et al. (2021), after summarising the views of academics on future industries, proposed that "future industries are driven by frontier technologies in the exploration period, aim to meet the continuously upgrading needs of the economy and society, represent the long-term development direction of science and technology and industry, will develop and mature and achieve industrial transformation in the future and form an important support and huge drive to the national economy, but The paper will also focus on the new industries that are still in the incubation stage. Combined with the previous analysis, this paper summarises disruptive innovation in the future industry as a process that takes the future industry as the main body of innovation, takes disruptive technological innovation as the basis, takes market demand as the guide, takes scientific discovery and technological breakthrough as the starting point, and finally realises the healthy development of the future industry. On the one hand, the development of disruptive technological innovation in future industries can be divided into three stages according to the technology life cycle and the "technology-product-market" combination: technological breakthrough, market disruption and paradigm formation, which indicates that disruptive technologies will eventually be developed into future industries after a layer of screening. This suggests that disruptive technologies are filtered through layers to develop into the industries of the future. On the other hand, the process of disruptive innovation in future industries is divided into four stages from the demand side, including market breakthrough, technological innovation, market disruption and paradigm formation.

In the technological breakthrough stage, the technological system based on core technologies and complementary supporting technologies needs to ensure the completeness and feasibility of the technologies through the innovative collaboration of various innovation agents within the system; while the market breakthrough stage is oriented towards user needs and technological improvement and innovation to achieve market breakthrough. Whether it is technology or market breakthrough oriented disruptive innovation, the latter two stages require the value co-creation of upstream and downstream suppliers, distributors, manufacturers, users and other system participants to join together to form a value adoption chain that will drive the formation of future industries and achieve market disruption. Based on this, a research framework is proposed in this paper (Figure 2).

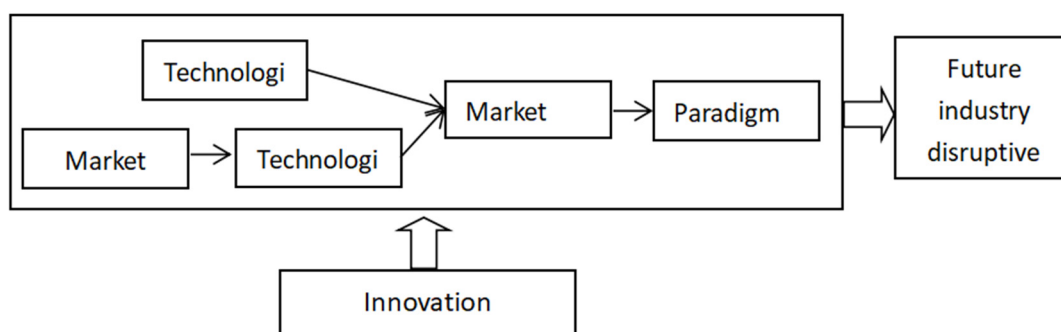


Figure 2. Research framework

3. Future Industrial Disruptive Innovation Processes

The ways to drive the formation of disruptive technologies mainly include supply-driven and demand-pull (Chengliang Zhu, 2020). Based on this, this paper summarizes the development process of disruptive innovation in future industries as follows: technological breakthrough → market disruption → paradigm formation and market breakthrough → technological innovation → market disruption → paradigm formation.

3.1. Technological Breakthrough-Market Disruption-Paradigm Formation Process

Technological breakthrough-market disruption refers to the innovation process of disruptive innovation stemming from new discoveries, new understanding or breakthroughs in key core technologies of basic principles, and meeting the needs of users in the target market by continuously providing new products and services or continuously improving the technical performance of products, first introducing them from the low-end market or penetrating the high-end market, and then gradually transitioning to the mainstream market (Bao Mengmeng et al. 2019).

1. This paper first analyses the technological breakthrough-low-end market disruption process, in which the industry makes a major technological breakthrough to meet the market demand of the target market of low consumption groups and gradually invades the mainstream market from the low-end market. These consumer groups are sensitive to changes in product prices and cannot afford the high costs associated with high technology research and development investments, so they are forced to optimise their technology performance to meet user needs. Firstly, the manufacturer invests a certain amount of human and financial resources to create the corresponding value. Subsequently, dealers buy out the producer's products or services for value transfer, making the performance and quality of different products flow into each other and achieving mutual benefit and win-win situation for all subjects in the system. When the products reach the target market users, user experience feedback points the way for further optimisation and upgrading of products and technologies, and generates a good word-of-mouth effect through continuous improvement of user experience in order to attract the attention of mainstream market users, form new demand and achieve market disruption. However, as low-end market disruption is limited by low consumer groups, its key core technologies are less competitive in the market and can easily be imitated and surpassed by other latecomers. Therefore, to achieve market disruption, it is necessary to promote the joint participation of multiple actors, integrate innovation resources within the system, effectively transfer value in a timely manner, improve the value adoption chain formed by the joint value co-creation behaviour of system participants, and do a good job of building system stability and thus promoting paradigm formation. At this stage, disruptive technologies that quickly adapt to the new environment will gradually replace traditional mainstream technologies and give rise to new industries of the future. After the breakthrough of the disruptive technology, a large number of related "technology clusters" begin to emerge, and large-scale innovation will take place, forming an industrial organisation system that integrates technology, products, markets and management, and as the innovation continues to penetrate all aspects of the economy and society, it will eventually change the original socio-economic system and form a new industrial As innovation continues to penetrate all aspects of the economy and society, it eventually changes the original social and economic system, forming a new industrial paradigm and presenting itself as the industry of the future.

The development of the Internet in China kicked off in 2009, when the number of 3G base stations built nationwide exploded. To this end, Wang Xing, founder of Meituan, took advantage of the east wind of the mobile Internet to create Meituan Group Buying, a mobile group buying that catered more to the needs of users' consumption scenarios with the rise of smartphones. Following the further development of the disruptive technology of the mobile internet, Meituan realised that the group-buying model was not enough to stand out in the restaurant industry, and Meituan Takeaway, a value-added business focusing on LBS (a value-added business that can capture user location information), emerged. The success of Meituan stems from the deep integration of mobile internet technology and the local lifestyle services industry, with the overall layout showing a T shape, with "-" for group purchase and "|" for specific vertical categories, taking Meituan takeaway as an example, by The platform works closely with

merchants, using offline restaurants as the base agents and relying on the "Meituan Special Delivery" logistics support system to deliver goods, which has a complete value ecological chain and greatly enhances the user experience with an integrated online and offline approach (Han Rong, 2017). Based on the "flywheel effect" proposed by Jim Collins, each business module of a company will bind together like a gear, and the rotation of any one business module will drive the rapid development of the whole company. Since 2013, Meituan has also been building its business flywheel around "food, accommodation, travel, tourism and shopping", gradually becoming a giant in the life service sector. Even in 2020, the worst year of the epidemic, its annual revenue increased by 17% compared to the previous year, and its annual number of users exceeded 500 million, making it the No. 1 player in the takeaway market, which shows that its disruptive innovation market disruption phase has been completed, and provides successful experience for the future transformation and upgrading of the takeaway industry and catering enterprises.

2. The second part of the analysis focuses on the technological breakthrough - high-end market disruption process. Christensen believes that there are only two ways of thinking about disruptive innovation, either opening up new markets or rooting in low-end markets. Govindarajan et al. (2006), on the other hand, argue that disruptive innovation can also focus on high cost-high performance and disrupt from the high end of the market. Thus, the process of technological breakthrough-high-end market disruption can be understood as a major technological breakthrough for users with high payment power and high performance requirements, which leads to a significant improvement in product performance or the emergence of new features through a major technological breakthrough away from the original sustained technological trajectory. market as product technology stabilises and costs and prices fall (Cao Yangchun et al., 2022; Zhou Yang et al., 2017). As disruptive technologies are highly uncertain and strongly linked to future industries, they need to be tracked and predicted on an ongoing basis to reduce their riskiness. Subsequently, an independent R&D department was set up, a professional research team was brought in, and a technological innovation system based on the company's key core technologies, complemented by components and complementary supporting technologies, was explored to ensure the viability of the technologies. In addition, as high-end users are less sensitive to price, R&D investment should be increased to strengthen the top-level design of the enterprise. With the completion of technical performance, it provides strong support for the proliferation of disruptive products to the high-end market. The launch of new products or new functions has obvious advantages over existing products in the market, which meet the requirements of high performance and quality user experience in the high-end market and are presented in the form of future industries, but it is often difficult to penetrate into the mainstream market due to immature technology, supporting infrastructure and service systems, etc. When the technology becomes stable, the performance continues to improve and the price gradually decreases, it can gradually cater to the upgrading needs of mainstream users, thus occupying the mainstream market and completing the disruption, and promoting the future industry of the early stage to become the current dominant industry. In addition, in the process of high-end market disruption, the innovation collaboration chain and the value adoption chain have been in a state of continuous interaction and upgrading. Based on the complexity of disruptive technologies, it is necessary to rely on multiple participating subjects in the innovation chain to collaborate in the research to feed back the knowledge and innovation results to the value adoption chain, while the adoption chain further integrates the information on resources and results and transports related talents, equipment and funds to the innovation chain to achieve the interactive integration of the two. The expansion of the value adoption chain further promotes the function and perfection of the innovation collaboration chain.

The commercial application of 3D printing technology (additive manufacturing) can be traced back to the launch of Scott Krupp's 3D Modeler in the 1990s, which overturned the traditional concept and method of equimaterial and subtractive manufacturing and enabled a breakthrough in the flexibility and predictability of the design of complex structural parts. Due to the high price of the product and the limitations of customer awareness, it was initially only used in high-end markets, such as vehicle component replacement, mould making and engine engine repair. With the gradual improvement of technology, customer awareness and market acceptance, 3D printing technology has played a decisive role in many industries, especially in biopharmaceuticals, aerospace and defence security, successfully achieving penetration from the high-end market to the mainstream market and completing market disruption, not only rewriting the traditional manufacturing process, but also laying a solid foundation for the development of 4D printing technology that changes the state of existence of objects.

3.2. Market Breakthrough - Technological Innovation - Market Disruption Process

Unlike the previous section, which focuses on the future of industry based on the laws of technology development, this section focuses on the goals of future industry, starting with the exploration of the escalating needs of the future economy and society. Therefore, the market breakthrough-technology innovation-market disruption process can be understood as a market and public demand-oriented process of analysing and identifying future products that are in line with economic and social development, and then introducing corresponding disruptive technologies based on the key characteristics of the new products, in order to meet real demand, create new demand and guide potential demand, so as to realise the disruption of existing products. The process of disrupting existing products, industries, markets and technologies. The disruptive innovations developed in this process vary according to the disruptive needs. On the one hand, for new needs that are unknown to society or potential needs that are still being explored, the corresponding industry should first be selected according to future development trends and products that can be expected in the future period should be clearly identified. On the other hand, in response to the technological research needs of known products in reality, a technological innovation system should be built with key industry enterprises as the main innovation body and collaborative cooperation between industry, academia and research institutes, so as to explore new technologies and products oriented by market demand and form a new product technology paradigm framework system to promote the development of future industries and complete market disruption.

Taking the new energy vehicle industry as an example, in the macro background of increasing environmental pollution and scarce resources, through the analysis of future development trends, it is clear that the development of renewable energy is the only way to solve the problem of energy security, and choose to start from the traditional fuel-consuming automobile industry, taking new energy vehicles as a predictable product, while defining the key characteristics of energy saving and emission reduction of new energy vehicles, and extracting from them The "three electric" key core technologies that support the key features are then grafted onto traditional models to tap potential users through innovation chain integration, and with increased policy support and breakthroughs in components and complementary supporting technologies, the collaborative innovation chain and value adoption chain of new energy vehicles is continuously upgraded and supplemented (Liu Jiayang, 2016), pushing market demand to expand from public service institutions to private users, thus causing a disruptive revolution in the traditional fuel vehicle industry.

4. Mechanisms for Realising Disruptive Innovation Processes in the Future Industry

Based on the previous research on the disruptive innovation process of the future industry, the disruptive innovation system of the future industry can be summarized as an organic whole composed of various elements such as entrepreneurs, government, market, innovative industrial organizations and their associates, etc. Through the effective integration of various resource elements in the system, the disruptive innovation of the future industry is promoted.

4.1. Analysis of Entrepreneurial Innovation and the Realisation of Disruptive Innovation in Future Industries

Entrepreneurial innovation is a complex process, involving many aspects such as innovation spirit, innovation system and innovation capability. Among them, entrepreneurship, as the core, has been the focus of research by scholars at home and abroad. Schumpeter regarded entrepreneurs as innovators who "engage in creative destruction", and scholars such as Drucker believed that entrepreneurship is the core of innovation and is crucial to the continuous growth of innovation in enterprises (Zhou Xijun et al., 2016). In the process of disruptive innovation, apart from following the changing needs of users to continuously improve and optimise products and their functions, entrepreneurship is also an important driving force for continuous innovation. As a long-term industry cultivated for the future, the future industry has strong traction and pioneering qualities, and is prone to explosive growth and a large concentration of entrepreneurs in the cluster. Therefore, in the process of disruptive innovation in future industries, entrepreneurs are important subjects of economic activities and disruptive innovation, organising various market resources into production factors for production and operation, carrying out a series of disruptive creations, constantly leading industrial and technological changes, and realising changes in economic growth, which have an important influence on the realisation of the process of disruptive innovation in future industries.

4.2. Analysis of Market Demand Cultivation and the Realisation of Disruptive Innovation Processes in Future Industries

Disruptive innovation is not random or unstructured, it is a purposeful innovation activity carried out by gaining deep insights into the market, existing products and users. Disruptive innovation is a complex and dynamic process that is influenced by a range of factors, including technological progress, changing demand and the social and cultural environment, as disruptive innovation is often formed by a deep intersection of multiple disciplines and fields, where the uncertainty of science, technology and market demand makes it take on different characteristics at different stages. In addition, the emergence and identification of disruptive technologies does not mean that disruptive innovation has been successful; it should also be combined with the company's reality and analysed to see if the disruptive product can meet market demand. From the perspective of the development path of disruptive innovation, the development of disruptive innovation needs to be based on the market and public demand, and then determine the direction of disruptive product invasion according to different market demands, first eroding non-mainstream markets and then gradually spreading to mainstream markets to achieve market disruption. As a future industry with high investment, high embeddedness, high technology and high added value characteristics, in order to play its first-mover advantage in market expansion, it is necessary to cultivate a sound underlying R&D infrastructure for the future industry in response to a more certain market demand, so as to lay a solid foundation for the subsequent development of the future industry. Therefore, for the future industry disruptive innovation system, market demand cultivation is a necessary precondition for the realisation of the future industry disruptive innovation process.

4.3. Analysis of Government Policy Support and the Realisation of Disruptive Innovation Processes in Future Industries

Due to the strategic, disruptive and positive externality characteristics of future industries, governments at all levels are required to attach great importance to their cultivation and development, and introduce a large number of industrial policies to compensate for the high transaction costs and high innovation risks of innovation agents within the industry. Under the national innovation-driven development strategy, the first prerequisite for companies to develop disruptive innovation is to identify which technologies are growth-oriented and can be nurtured as disruptive technologies to disrupt existing industries and develop them into future industries. However, due to the limitations of enterprises' own resources, it is difficult for them to break through the market consumption habits and institutional barriers alone (Zhang, Jing et al., 2022). The support for the development of some future industries is provided through supply-side policies (providing talent, technology, financial support, sound public services and infrastructure development), environment-side policies (financial subsidies, laws and regulations, standard setting, tax incentives, etc.) and demand-side policies (policy procurement, tax incentives, etc.), thus leading more enterprises to develop disruptive innovations and forming a number of future industry clusters. Therefore, government policy support has an important impact on the realisation of disruptive innovation processes in future industries.

4.4. Analysis of Industrial Organisation Innovation and the Realisation of Disruptive Innovation Processes in Future Industries

For future industries, their pioneering nature means that they cannot draw on the development trajectory of traditional industries, which means that disruptive innovation will continue throughout their industrial development process. In the process of disruptive innovation in future industries, the development and diffusion of new technologies can give rise to future industries and markets with huge potential, and at the same time trigger innovations in industrial organisation and management models, product manufacturing and business operations (Sun et al., 2017). In the future industrial development, the new industries spawned by disruptive technological innovation are only small points at first. As the technology continues to mature and the industry continues to grow, the chain owners of major industries and sub-industries will not only have strong direct or indirect influence in resource allocation and application, but also drive a number of related supporting service enterprises and continuously emerge as "clusters". The "cluster" phenomenon. The future industrial clusters thus formed are based on innovation as the internal driving source for sustainable development of the clusters, and the various subjects within the clusters gather in a specific techno-economic space to form a competitive industrial organisation form through division of labour and internal and external interaction. In the future industrial disruptive innovation system, as technology accumulation and breakthroughs make the cross-border integration of industrial chains, the development and growth of industrial clusters and other industrial organisation innovations have a significant impact on the future industrial innovation effect. As the development of information technology greatly enhances industrial innovation capabilities and organisational value, industrial organisations such as industry-related enterprises and institutions will become more collaborative and complementary, gradually breaking through the original boundaries and extending to the outside world, enabling the cross-border integration of industrial chains and thus promoting the reconfiguration of disruptive innovation value networks. In addition, the development of industrial clusters can effectively promote the in-depth intersection and integration of disruptive technologies and help the generation and transformation of disruptive innovation results. Therefore, in future industrial disruptive

innovation, industrial organisation innovation has an important influence on the realisation of future industrial disruptive innovation processes.

5. Conclusion

Disruptive technology innovation, as an important tool to enhance national competitiveness, has attracted great attention from the Chinese government and ushered in a wave of policy dividends. In order to seize the initiative of innovation, provinces and cities are accelerating the research and development of disruptive technologies and the layout of future industries. This has also created an urgent need to reveal the logical relationship between future industries and disruptive innovation. In view of this, this paper briefly analyses the process of disruptive technological innovation in the future industries in the old and new innovation ecosystems on the basis of existing literature, revealing the process mechanisms involved, with a view to providing new perspectives and new ideas for the construction of future industries. This paper argues that the process of disruptive innovation in future industries is divided into two ways: technology supply-driven and market demand-pulled. The second market breakthrough-market disruption-paradigm formation process is demand-driven, identifying future products and their corresponding disruptive technologies, and ultimately forming future industries. In either case, however, the process of disruptive innovation in future industries is realised in different ways through the behaviour of innovation factors such as entrepreneurial innovation, government policy support, market demand cultivation and industrial organisational innovation. This paper only focuses on the process of disruptive innovation in future industries and its realisation mechanism, which leaves much to be desired. In the future, other organisations such as research institutions, financial institutions and upstream and downstream suppliers can be taken into account to further enrich and improve the process mechanism. At the same time, qualitative and quantitative research will be combined to analyse the innovation process in detail using actual data, so as to provide more targeted guidance on the realisation path and policy initiatives for future industries.

Acknowledgments

This thesis was completed under the careful guidance of Mr. Hu. Overall, writing the thesis was a difficult project and I encountered a lot of problems in the process of completing it, and it was Mr. Hu who gave me a lot of help.

Project name: Anhui University of Finance and Economics 2021 Postgraduate Research Innovation Fund Project. Project No.: ACYC2021142.

References

- [1] Huang Lucheng, Cheng Yu, Wu Fei Fei, et al. Exploration on the framework of disruptive technology identification[J]. *Scientific Research*, 2015(5):11.
- [2] Erwin, Danneels. Disruptive Technology Reconsidered: A Critique and Research Agenda[J]. *Journal of Product Innovation Management*, 2004.
- [3] Anderson p, Tushman M L. Technological discontinuities and dominant designs: A cyclical model of technological change [J]. *Administrative Science Quarterly*, 1990:404-633.
- [4] Chen N, Li HB. A study on the status of innovation in Shandong Province based on the perspective of innovation system[J]. *Technology and Management*, 2013, 15(5):4.
- [5] Adner R . Match Your Innovation Strategy To Your Innovation Ecosystem[J]. *Harvard business review*, 2006, 84(4):98-107; 148.

- [6] Zhang L F , Lu X S , Zhang Y S . Study on the impact of technology dependency structure of innovation ecosystem on the competitive advantage of integrated innovation of enterprises[J]. Journal of Management,2014,11(02):229-237.
- [7] Chen Yantai,Meng Yuanyuan,Zhang Lujia,Fan Haixia,Dimitris Assimakopoulos.Analysis of value creation and capture mechanisms in industrial innovation ecosystems--a cross-case analysis based on electric vehicles in China[J]. Scientific Research Management,2015,36(S1):68-75.
- [8] Li Xiaohua,Wang Yifan. Evolutionary mechanisms of future industries and industrial policy choices[J]. Reform,2021(02):54-68.
- [9] Lv Wendong,Zhao Yang,Wei Yuan. On resilient risk management-an organizational management technique for dealing with uncertain situations[J]. Management World,2019,35(09):116-132.
- [10] Williams C , Durst S . Exploring the transition phase in offshore outsourcing: decision making amidst knowledge at risk[J]. Journal of Business Research, 2018.
- [11] Gao Xintao , Chen Zhengli. The development status and application prospects of speech recognition technology[J]. Gansu Science and Technology Vertical, 2007(04):13+76.
- [12] Dahl G E , Yu D , Deng L , et al. Context-Dependent Pre-Trained Deep Neural Networks for Large-Vocabulary Speech Recognition[J]. IEEE Transactions on Audio Speech & Language Processing, 2011, 20(1):30-42.
- [13] Bao Mengmeng, Wu Jianlong. Research on disruptive innovation process in emerging industries - based on innovation ecosystem perspective[J]. Technology and Management, 2019, 21(1):6.
- [14] Han Rong, Guo Jia, Zhang Hongjuan, et al. Research on the business model innovation mechanism of takeaway O2O - an analysis based on the catering industry[J]. Special Economic Zone, 2017(6):6.
- [15] Vijay, Govindarajan, Praveen, et al. The Usefulness of Measuring Disruptiveness of Innovations Ex Post in Making Ex Ante Predictions[J]. Journal of Product Innovation Management, 2006.
- [16] Cao Yangchun, Zhang Guangyu, Dai Haiwen, et al. A cross-case study on the evolutionary characteristics of disruptive technologies[J]. Science and Technology Progress and Countermeasures, 2022, 39(3):10.
- [17] Zhou Yang, Zhang Qingpu. Technology evolution trajectory and market diffusion path of high-end disruptive innovation[J]. Research and Development Management, 2017, 29(6):10.
- [18] Zhu Chengliang. The interaction mechanism between disruptive technology innovation and industrial development: a dual perspective based on the supply side and demand side[J]. Inner Mongolia Social Science, 2020, 41(1):6.
- [19] Liu Jiayang. Research on the development model and mechanism of BYD's new energy vehicle innovation ecosystem[D]. Harbin Institute of Technology.
- [20] Zhou Xijun, Guo Shufen. The evolution of industrial innovation system theory and academic frontier[J]. Industrial Economics Review, 2016, 7(2):10.
- [21] Zhang Jing, Li Huajun, Zhao Yan, et al. Resource scraping, value creation and disruptive innovation in latecomer firms: a case study of Guangzhou Automobile Group's new energy vehicle industry[J]. Science and Technology Management Research, 2022.
- [22] Sun YF, Wang LH, Sun QT, Wang KunSheng, Hu LY, Cui JJ, Xu Yuan, Kang XY. Study on the connotation and selection of disruptive technologies that lead to industrial transformation[J]. China Engineering Science,2017,19(05):9-16.