



The influence of Industrial Transformation on Firm-Level Innovation

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Abstract. Industrial transformation is driven by the digital economy, sustainable development, and policy changes. This process changes how companies innovate. It affects innovation through market competition, government policies, and how resources are distributed. Companies face more competition and changing market needs. This is especially true in areas like green energy and digital services. These changes push companies to invest more in innovation. They must do this to keep their market share. At the same time, people want more digital and eco-friendly products. This encourages companies to develop new and higher-value products. A more competitive and increasing market, especially in green energy industry, digital service and high-tech innovation, leaves pressure on companies and force companies to add the innovation input. With the level-up digital service and the awareness of eco-friendly increasing, more updated requirements are generated, which inspires the native motivation of foresee innovation and encourages companies to run after high value-added products. Policy also helps companies innovate. Green finance, laws, and talent incentives make innovation easier. These policies help move resources from low-value to high-value industries. This supports broader industrial upgrading.

Keywords: Industrial Transformation, Firm-Level Innovation, Sustainable Development, Impact Mechanism

1 Introduction

Industrial transformation is fundamentally reshaping the innovative landscape within which companies operate. This profound shift is not merely a response to isolated trends but is driven by a powerful convergence of forces: the relentless advance of the digital economy, escalating imperatives for sustainable development, and continuous policy adjustments. We can observe, for instance, how manufacturing firms are integrating IoT sensors and AI-driven analytics not only to optimize production efficiency but also to meticulously track their carbon footprint in real-time, a dual benefit that aligns with both economic and regulatory pressures. Many countries have taken actions to consider industrial level-up strategy as important components of countries' development. The transform takes traditional low value-added industry to modern high value-added department is speeding up due to the corporation of policy guidance, industrial

innovation and resources reallocation. The transform is critical to developing country with industrial clusters which is facing pressures in regard to global economic recovery and climate governance at the same time. For example, industry once relied on tradition fossil fuel is gradually steps to intelligent creation, which emphasizes the global tendency to the development of recycle low-carbon economic. Totally it is considered as a good approach of realizing sustainable development guidance by UN. Industrial innovation is key of the industrial transformation. It is both native motivation and considerable progress of industrial level-up. Innovation enables companies to fit the competitive market, increasing strict environmental standard and rapidly changing customers' requirements. Digital, automatic and high-tech have become the most competitive and attractive components of innovation. They prominently increase the productivity and give aids to revolving global valuable chains, especially in foreland like AI and clean energy industry. This paper aims to figure out the principle of how industrial transformation has an impact on Firm-level innovation. It contains three different core methods: market mechanism, policy intervention resources reallocation. Market competition and updated requirements inspire enterprises to add innovation input, greenery financial and public policy like five-year plan provides innovation with inspiration and decrease the accident of failure. The application of industry clusters and frequent flow of talents and capital accelerate high-tech knowledge application. By analyzing the mechanism, this academic paper reveals how do industrial transformation facilitates innovation, sustainable development and forms high quality economical construction which offers valuable reference to policy makers and company's managers.

2 Literature Review

Industrial transformation is not only a tendency of macroeconomic, but also the key factors of determining the companies how to create, search for and conduct modern knowledge to compete and prosperity. It is motivated by several factors like digital service, sustainable development and the updated shift of the policy. The digital economy has greatly changed how companies innovate. It aims to help low-carbon industries grow and boost the economy [1]. But this change also has a downside. It can move carbon emissions to different places, which creates a problem called 'carbon leakage'. So, industrial innovation must now achieve two things: economic growth and environmental protection. This means companies need to focus on both making money and protecting the environment. For example, in the construction industry, this shift brings big challenges like higher wages, new technology, and more competition from abroad. These pressures force businesses to innovate. They must adapt to survive and try to move up in the global supply chain. At the same time, society is moving from Industry 4.0 to Industry 5.0. This new phase adds a focus on human skills and sustainability into industrial innovation. The competences include interoperability, Virtualization, Decentralization, real-time data and processing, they commonly strengthen enterprises' ability of adapting to the changing requirements [2]. The technical shift is critical to construct the innovative resilience due to the reason that

digital transformation provides long-term sustainable fields, infrastructures regarding to the enterprises' innovation and the decision ability of data driving [3]. Additionally, industrial transformation is strongly guided by policy and green financial tool, like green loan policy, which aims to lead enterprises to environmental protection by developing sustainable program and adding pollution cost [4]. The support of supervision takes industrial industry as main character of reducing carbon emission and connects them with corporate strategy [5]. As a result, now more and more companies rely on its competence of carrying out digital green knowledge search. Generally industrial transformation has a profound impact on innovation at the enterprise level in many ways. It is not only a destructive power of creating competitive pressure, but also sources of digital competence and knowledge. Companies have no choice but to move forward surrounded by a complex background. Their success depends on the unanimous of combining technologies, searching information and sustainable development. Above all, Firm-level innovation could not realize without industrial transformation.

Industrial transformation is a process of traditional industry to modern industry and low value-added to high value-added by Policy guidance, firm-level innovation and resources allocation, it aims to accommodate the tendency of Economic Globalization. Sustainable and eco-friendly industrial system combines clean energy with carbon neutrality which generate green global economic [5]. Taking China as an example, a developing country who is forced to change its industrial structure to accommodate the saturated and competitive market under the background of industrialization [1]. Taking power industry as an example. It has relied on the fossil like coal, oil and natural. It causes too much pollution and damages the environment. As a result, searching for a renewable clean energy to replace fossil fuel, like wind power energy, is very significant. Based on the industrial transformation of clean energy industry, Information Age bring countries all over the word together, it makes it easier to conduct product comparison which intensifies market competition. It brings drawbacks of the draft trade. However, it sounds the alarm of developing high value-added industry in order to make more profits and take up certain proportions of global market.

Innovation is considered as the native motivation to the development of the society. With the support of the innovation, intelligent manufacturing empowers industrial development to accelerate [6]. Digitalization, networking and intelligence are its core elements which provides the industry with perfect industrial chain and advanced industrial structure. As a result, it finally contributes to high quality development [7]. Innovation takes role in developing digital transformation and automation of manufacturing, including independent thinking driven by AI. Intelligence is the trend of the future: partly modern industry is an ecosystem of smart factories with highly decentralized, intelligent, autonomous, and proactive components driving the production control processes [8]. An article shows that in an industry that seeks to make more profits, creative opinions are critical to be developed [9].

3 Mechanisms of Industrial Transformation's Impact on Film Innovation

3.1 Market Mechanism

Several scholars have revealed that intensifying competition and evolving market demands are compelling companies to undergo industrial transformation. Based on the researches, the technical level of China's high-tech manufacturing industry is deficient and is constantly being outpaced by Western technology. The transition and upgrade of China's manufacturing sector are facing significant obstacles amid ongoing competition in the manufacturing industry, saturation in several markets, external trade friction, issues with trade rules, and other factors. Firstly, the competitive pressure generated by supply chains. With the decline of traditional industries and the emergence of core technological revolutions, competition has accelerated the obsolescence of low-cost strategies and further compressed profit margins, forcing firms to make strategic choices about transformation [10]. The old-fashioned companies have no choice but to make decisions if transform or not. Take the electric car industry as an example, traditional car industry is involved in the creation and innovation of the batteries and autonomous driving technology in order to become more competitive even in order to reserve their proportion of the car market. This "creative destruction" urges companies to add up investment and protect their interests by applying for patents. The secondary part of the market mechanism is to be inspired by requirements. In another word, the market mechanism is driven by the demand side. It is concluded to the requirements of domestic and foreign market. It represents that the economic development is now becoming more and more tight all over the world. Anyway, the requirements are considered as active behavior of meeting the extended market. Industrial transformation creates new market requirements and chances. The consumption upgrade, awareness of the environmental protection and digital life inspire the native impetus of high-tech, high value-added and new service market, which takes insight to the active innovation by the companies [3]. Under the target of the carbon neutral, many companies start to take actions on the study and innovation of the clean energy industry to compensate the shortage of core technology which increases the relevant patents. This shift reflects a form of proactive innovation aimed at capturing emerging markets and gaining a first-mover advantage.

3.2 Policy-Driven Mechanism

Inspiration and guarantee play a critical role in the industrial transformation. Based on the study before, policy actually paved the way for the industrial transformation [9]. Taking Green finance as an example, it accelerates the formation of eco-friendly system, it is considered as a good approach of protecting the environment effectively. Moreover, clean energy provides the environmental transformation with native motivation [11]. Taking an insight into 2021, Chinese government issued the 14-th five-year plan which aims to form green production and lifestyle, decreases the peak of the carbon emission and improve the foundation of the ecological environment.

Additionally, it points out there is a necessity to form a new pattern of opening up to the outside and take active part in the corporation and competition globally. During the period of implementing the bill, Chinese government has provided the companies with tax credit and administrative convenience. Totally, the support is divided into three avenues. Firstly, the general guidance, which is issued to make the market stable and carry out the macroeconomic regulation. The 14-th five-year plan referred before is an excellent example, it used to point out the main industry which should get involved to the industrial transformation, like AI, biochemistry, scientific innovation and renewable materials. By clarifying strategic directions, the policy reduces uncertainty surrounding long-term R&D investments (Research and Development). The secondary avenue is supporting them with money directly and inspiring them with tax credits. The government sets up funds for industrial transformation, companies who satisfied the standard of the fund can be granted with reputation and money. It equals to the be supported with administrative convenience. The supportive policy leads to the deduction of the cost of the innovation and increase of the expected benefits. The financial support is highly important to the middle and small companies which enables the companies to conduct long-period and high-risk studies. More important is that the bill strengthens the protections of the patents. If the patents are easily tort, it might be difficult for companies to devote their expense into the innovation.

3.3 Resources Element Allocation Mechanism

The essence of industrial transformation is the reallocation of resources from in low-efficient fields to high-efficient fields, especially in the two innovative elements of talents and capital. Talents clusters is the one of main elements of the innovation. Modern industries usually provide the companies with higher productivity, salary, and opportunities for career which draws on scientists, engineers and technical experts from traditional sectors to modern high-tech industry, forming talent clusters with specific knowledge. The companies get access to the human resources for the innovation during the critical period of industrial transformation which accelerates the production of the patents and make them more reliable. It resists the drawbacks that many core technologies are limited by the foreign countries. Besides, the targeted capital flow to the high-growth, high-return fields in the transformation [2][4]. Venture capital (VC), private equity (PE) and stock market show their attention to the innovative enterprise in certain fields. For start-ups, VC and PC assist them to get through the high-risk R&D investment. The flow of the capital ensures a constant and stable supply of money and technology

4 Conclusion

Industrial transformation is a big economic change. It moves away from old industries that use a lot of resources and toward new industries that create more value. This change needs help from government policy, new ideas from companies, and smart use of money and workers. This shift is important for two reasons. It is needed for economic

growth, and it also helps solve big problems like climate change, technology races, and crowded markets. Developing countries are using this change to become more competitive globally. They are moving to cleaner ways of making things and fitting into world supply chains. Changes in green energy, smart factories, and recycling show that better industry helps both the environment and the economy. The market makes companies innovate. Competition is getting tougher and customers want more, especially in clean energy and digital services. Companies must create new things to meet these needs, or they will fail. The concept of “distractive innovation” is a common belief, especially in the fields of the electronic cars industry and clean energy industry, enterprises take actions to add up the funds of the investment and applies for patents in order to take up pattern proportion of the market. Meanwhile, policy interventions provide companies with essential guidance and support. Several measures of green finance and developing schedules have been take place, like 14-th five-year plan which is issued by the Chinese government, stabilizing the environment of innovation by financial inspiration, specific funds and patents protection. These measures significantly decrease the cost and risks of innovation, especially to the middle and small industries. Additionally, critical resources, especially the talents and capital. The reallocation of the resources shift from low-efficient field to high value-added industry further pushes for the innovation of the companies. The talents cluster in modern industries speed up the knowledge output and corporation breakthrough, VC and PE are considered as an important procedure of offering the long-term and high-risk program a large amount of funds. As a result, industrial transformation becomes the catalyst of innovation. It also forms sustainable and high-quality economical society consists of market requirements, market support, policy support, high efficiency resources allocation, high-tech innovation and competitive companies.

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