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The Dynamic Mechanism and Realization Paths for High-quality Development of Manufacturing Enterprises in the New Era

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Abstract: The high-quality development of the manufacturing industry is a prerequisite and foundation for achieving high-quality economic development in the new era, and the high-quality development of manufacturing industry has to be achieved through that of the manufacturing enterprises. Based on the theory of competitive advantage and a literature review of organizational and technological innovations, this paper defines “high-quality development of manufacturing enterprises” and puts forward a dynamic mechanism analysis framework based on the “motivation–behavior” logic for such development. Based on this analysis, the paper proposes the realization paths for high-quality development of manufacturing enterprises, which are the embedding path of platform development based on technology import, the embedding path of platform development based on independent research and development (R&D), the embedding path of bilateral markets based on independent R&D and the embedding path of bilateral markets based on technology import.

Keywords: new era, manufacturing enterprises, high-quality development, platform-based organization

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Background and Literature Review

According to reports submitted to the 19th National Congress of the Communist Party of China, “As socialism with Chinese characteristics has entered a new era, the principal contradiction facing Chinese society has evolved. What we now face is the contradiction between unbalanced and inadequate development and the people’s ever-growing need for a better life.” It is a distinctive feature of economic development in the new era that China’s economy “has been transitioning from a phase of rapid growth to a stage of high-quality development.” “Manufacturing is the main pillar of the national economy, the foundation of the country, tool of transformation and basis of prosperity.” (*Made in China 2025*) In order to implement the new development concept, one of the key tasks in 2019 is to promote the high-quality development of the manufacturing industry, which was recommended by the Central Economic Working Conference in December 19-21, 2018. Ultimately, the high-quality development of the manufacturing industry will be achieved through that of manufacturing enterprises, which are the “guarantee” for the success in high-quality development of manufacturing industry. As a result, in the context of a new era, it is undoubtedly an important issue to study the high-quality development of manufacturing enterprises.

At present, there is very little literature regarding the development of the manufacturing industry at the micro level. Available studies are mostly focused on topics at the macro level, e.g. research on high-quality development from the perspective of economics. Focusing on this topic, certain research results have come into being, and mainly in the form of Chinese literature. As of April 2019, there were 235 pieces of literature that used high-quality development as a key word when we searched the China National Knowledge Infrastructure (CNKI) and Chinese Social Science Citation Index (CSSCI) data bases. We found one piece of directly related literature from 2017, and another 133 pieces that discuss the following questions: what high-quality development is (concept, content, significance and essential features) and why it is important (theoretical mechanisms and logic) and how to realize it (thoughts and paths). This existing literature can be divided into two categories based on the current analysis.

The first category is the significance and measurement of high-quality development. There are three types of cognitive perspectives to define high-quality development. The first is based on the “five concepts for development” (development that is innovation-driven, coordinated, green, oriented toward global progress, and beneficial to all) and society’s principal contradiction. Feng Zhenglin believed that high-quality development is a symbol of a new development concept (Feng, 2019, pp. 6-9). Ren Baoping and Li Yumo thought that to achieve high-quality development, the key is to address the problems of unbalanced and inadequate development (Ren & Li, 2018, pp. 105-113). High-quality economic development is another direction to define high-quality development. For example, Ren Baoping (Ren & Wen, 2018, pp. 5-16) held that high-quality development refers to low input in production factors, high efficiency in resource allocations, low resource and environment costs and good economic and social benefits. According to the definitions of Huang Sujian et al., the high-

quality development of enterprises is to pursue the creation of economic and social values at high levels, standards and efficiency to shape the development model and conditions for outstanding and continuous growth by developing their ability to create value (Huang, Xiao & Wang, 2018, pp. 19-41). The development quality has been studied by Wang Yiming at the micro, medium and macro levels (Wang, 2018). There is scarce literature on the measurement of high-quality development, among which Zhu Qigui established an evaluation index system for high-quality development at the macro level, covering 62 indexes on six aspects, namely, reform in driving forces, industrial upgrading, structural optimization, quality reform, efficiency reform and people's livelihood development (Zhu, 2018). The evaluation index system for high-quality development in development zones established by Liu Weilan consists of 31 indexes on five aspects, namely, output efficiency, structural optimization, scientific and technological innovation, opening up and cooperation and green ecology (Liu, 2018). Li Jinchang et al. built an evaluation index system for high-quality development at the macro level, which involves 27 indexes on five aspects, economic vitality, innovation and efficiency, green development, people's livelihood and social harmony (Li, Shi & Xu, 2019, pp. 4-14).

The second category is the influence factors and implementation paths of high-quality development. Most research is based on the following perspectives: First, from the institutional perspective, the studies mainly analyze such issues as systematic and consistent policies on the business environment and environmental protections based on the logic of the government, market and society due to the promoting effect of policies and regulations on high-quality development (Zeng, Yan & Zhou, 2019, pp. 5-12; Li, et al., 2019, pp. 59-63); Second, from the technological perspective, based on the progress of big data technology and the application of industrial development, researchers discussed the new driving force and new model of high-quality development (Cao, 2018, pp. 99-104; Li, 2019, pp. 52-59); Third, from regional and industrial perspectives, the adjustment and optimization of industrial layouts have been analyzed to promote high-quality development (Luo & Zhao, 2019, pp. 27-36; Xu, Zeng & Wang, 2018, pp. 133-140); Fourth, from a comprehensive perspective, Ren Baoping and Wen Feng'an put forward the quality and structure of population, the quality of resources and environments, that of capital accumulation, that of technological innovation, that of opening to the outside world, and institutional factors. They also believed that high quality development could be realized through the aspects of scientific and technological innovation, industrial innovation, institutional innovation, strategic innovation, and promoting all-round development of humans; Fifth, from the micro view of enterprises, Huang Sujian et al. proposed that state-owned enterprises should be fostered to seek high-quality development from the aspects of dynamic transformation, strategic transformation, efficiency reform, ability reengineering, management innovation, image remolding and environmental support. Also, Jian Peiru qualitatively discussed the role of social capital factors in promoting the high-quality development of enterprises (Jian, 2019, pp. 64-72).

The influential factors of high-quality development include both the enterprise factors at the micro level and the systemic factors at the medium or macro level. From the above research perspectives, researchers have created valuable research results, but there are two shortcomings: First, the research

on high-quality development is more from the macro level. Although Huang Sujian et al. defined the concept from the micro level, the analyses were obtained mainly based on the comparison and analogy between the macro-economic meanings of condition of the target and high-quality development. Therefore, their understanding is based more on the requirements of macroeconomic development and the recognition of ought-to-be targets of micro enterprises, but the essence of high-quality development has not been analyzed from the micro perspective. This is of limited help when exploring and deconstructing whether the enterprise subjects will choose this new development paradigm and how to realize it at the micro level. Second, high-quality development has become the focus of many researchers. However, the existing research is still mainly in the stage of qualitative discussions of theoretical meanings and related influencing factors, and there is a scarcity of empirical research and effective suggestions by which to guide enterprise practices. Considering the existing research to be insufficient, we start from the real situation of the new era and explore the meaning of high-quality development of manufacturing enterprises and its driving mechanism and realization paths in the new era at the micro level according to the theories of enterprise competitive advantage, and organizational and technological innovation.^① Our objective is to figure out “what” high-quality development of manufacturing enterprises is, “why” manufacturing enterprises should adopt the high-quality development paradigm, and “how” to realize and promote the high-quality development of manufacturing enterprises, thus providing effective references in this regard.

The Meaning of High-quality Development of Manufacturing Enterprises

The manufacturing industry is the main body of the real economy, and manufacturing enterprises act as the “carriers” to meet people’s ever-growing needs for a better life. Therefore, manufacturing enterprises were selected as the research object. If we analyze the high-quality development of manufacturing enterprise from a direct semantic perspective, “high quality” is the definition of the development level and state of manufacturing enterprises. Therefore, to understand the connotation of high-quality development of manufacturing enterprises, we must first grasp the semantic meaning of high-quality. In addition, the relationship between high quality and the development of manufacturing enterprises should be clarified. In this way, we may explain “what” the high-quality development of manufacturing enterprises is more precisely from the micro perspective. Thus, we will analyze high-quality development on the following aspects:

① In some literature, such as *How Does Strategic Learning Affect Organizational Innovation—A Perspective Based on Dynamic Capabilities* by Lu Qicheng, Liang Linlin and Jia Fei, organizational innovation is defined to include management and technological innovation. However, more scholars believe that organizational innovation does not include technological innovations and that they are different based on the classification of technical and non-technical factors. Besides, organizational innovation mainly includes non-technical dimensions such as organizational structures and external environments. They also study the contribution of innovation activities to enterprises’ performance from the perspective of the matching relationships between organizational and technological innovations (This view is also shared by Wang Chenggang, Shi Chunsheng and Li Kun in their article, *A Research on the Matching Decision Relationship Between Organizational Innovation and Technical Innovation*). This paper adopts the latter view.

The Meaning of High Quality

To understand the meaning of high quality, we need to analyze it within the context of high quality development. High-quality development is a new expression first put forward in the *Report on the Work of the Government in 2018*. It is used to describe the state of “high-quality” economic development in a certain period of time (Jin, 2018, pp. 5-18). A conclusion can be drawn that high-quality development falls into a historical category. Stepping into the transition period in the new era, economic development has the following characteristics:

First, resource constraints and environmental pollution have become serious. Technological innovation contributes little to economic growth, and labor productivity and total-factor productivity are declining (Wang, 2017, pp. 1-14). It is urgent that we replace the present extensive economic growth mode which relies on high energy consumption, high pollution and low-cost labor. In this case, the Fifth Plenary Session of the 18th CPC Central Committee put forward a new development concept featuring innovation, coordination, green, openness and sharing.

Second, people’s consumption needs have the characteristics of high quality, individuality and diversity. The extensive application of “Internet Plus” has greatly shortened the distance between production and consumption. Whether consumers’ demands can be quickly responded to, and whether consumers are provided with more customer-oriented value have become important factors influencing the competitiveness of enterprises. Market competition now includes the effective realization of consumer utility. The social economy has developed into an era with customer economy as its main component. Therefore, the competitive advantages of enterprises are supposed to emphasize at least satisfactory quality which evolves into superior quality.

Third, in the new era, emerging technologies such as the internet, artificial intelligence, big data, and blockchain platforms have been developed. They are widely applied to industries, and “resonate” with them, through which new business models are being created and developed with unique capabilities and resources, examples of which are cloud computing, highly digital operational capabilities, capabilities to provide personalized services and value creation mechanisms with user involved participation (Song, 2018). These technologies are likely to redefine the economic functions of the manufacturing sector, and to restructure the resource base and factor structure on which national and corporate competitiveness depends, as well as the competitive landscape of global industries.

Fourth, in order to cope with the VUCA (Volatile, Uncertain, Complex and Ambiguous) environment, enterprises are tending to develop into platform-based organizations driven by innovation. Since the 1980s, developed countries in North America and Europe have entered a period of industrial structure adjustment. Their enterprises’ development mode has shifted from investment-driven to innovation-driven, and the allocation of material resources has also shifted to the agglomeration of innovation factors and competition in innovation efficiency (Cheng & Lu, 2014, pp. 174-187). Meanwhile, with the integration of information and Internet technologies, the development

pattern and competitive situation of enterprises have changed. Since James F. Moore proposed the “business ecosystem” and the cooperative and symbiotic relationship between enterprises, competition no longer lies in an isolated link on the industrial chain, but in a platform-based organizational ecosystem that connects stakeholders by integrating internal and external resources of the enterprises (Chen & Yang, 2016, pp. 45-52).

According to the background analysis of high-quality development, high quality mentioned here is discussed based on the original extensive economic growth mode, the change in people’s consumption habits, the application of emerging technologies and the change trends of enterprises themselves caused by the complex and changeable environment. Therefore, the essence of high quality is to pursue high economic, social and environmental benefits with the help of emerging technologies and applications. Hence, an important feature of “high quality” development at the present stage is that with the development and application of emerging technologies, technology and organizational innovation are adopted to cope with the complex and changeable environment to achieve low energy consumption, low pollution, and high efficiency to better meet the new demands of consumers.

The Characteristics of and Relationship Between High Quality and Development of Manufacturing Enterprises

Although “the authenticity of economic development is essential to seek higher quality under certain economic quality conditions” (Jin, 2018, pp. 5-18), and the existence of enterprises is to ultimately improve social welfare, the concept of “high-quality development of enterprises” is a micro concept. For individual enterprises, as long as competition exists, self-sustaining “development” is the direct purpose of enterprises. There is no development without high quality. Therefore, “high quality” is not the purpose of micro enterprises, but “high quality” can be the means by which enterprises achieve “development”.

At this stage, both the new round of globalization, the “anti-globalization sentiments”, and the newly formed industrial revolution, have brought about uncertain factors threatening the very survival of enterprises rather than just reducing business competition. Therefore, although the competition mode between enterprises has changed dramatically, enterprises are still faced with an increasingly fierce competitive environment. Therefore, high-quality development can be a new development paradigm allowing enterprises to gain competitive advantages. Just like before, enterprises can gain competitive advantages through “product and process competition” but according to the meaning of high quality discussed above, “high-quality development” at present requires individual enterprises to consider how to meet consumers’ new demands in order to maintain continuous development through high-quality products or services without damaging the ecological environment, thus realizing the sustainable development of nature, the economy and society. However, this does not mean that individual enterprises can achieve their long-term survival just through high-quality development. Stead J. G et al. (2000) proposed that only when enterprises can expand their strategies to the ecological level of the earth, which turns out to be the ultimate stakeholder of all economic

activities, including enterprise activities, can they protect the environment while realizing their own sustainable growth (pp. 313-329). Obviously, in the existing theoretical system where competition is the basic characteristic of a market economy, competition is at odds with the integration of global business units. Platform-based organization can coordinate not only competition and integration among enterprises, but the relationships between enterprises and other stakeholders as well. In this way, platform-based organizations will make it possible for “high-quality development to become the new development paradigm for gaining competitive advantages”.

Besides, as to competition, Marx repeatedly stressed that it “acting as a coercive law of competition, forces his competitors to adopt the new method,” constantly improving labor productivity and realizing the ultimate goal of creating more surplus value (Meng, Gong & Xiang, 2012, pp. 5-12). When analyzing the high-quality development of China’s economy, some scholars also pointed out that economic growth and development must be achieved based on the improvement in the factors of production, productivity and total-factor efficiency. Moreover, the contribution of total-factor productivity (TFP) to economic growth, since China’s reform and opening up, is still far behind that of developed countries. Therefore, at the present stage, improving TFP is an important approach to high-quality macroeconomic development. It is also an important way for micro enterprises to achieve high-quality development and an important measurement index for gauging their high-quality development. In order to improve enterprises’ TFP, technological innovation is an important approach, and green technological innovation provides a dual contribution to the economic benefits of enterprises to the environment. Organizational and technological innovations are the “glue” and “propeller” through which to integrate and propel high quality and enterprise development.

The growth of manufacturing enterprises themselves is a combination of quantitative and qualitative growth. “The goal of industrial development is more likely to consciously promote social welfare” and to promote “industrialization from the era of ‘law of the jungle’ to the era of civilization” (Jin, 2014, pp. 51-64). Although the productivity level that decides the generation of overall “social enterprises” has not been reached, the current enterprises are more in line with the definition of a citizen enterprise, which requires manufacturing enterprises to take more social responsibilities while improving their competitiveness. The reason behind this is that the development paradigm of manufacturing enterprises needs to be transformed based on industrial missions.

The development of manufacturing enterprises to a high-quality levels is not only pushed by external factors (natural resources, demands and technologies), but also led by the inner requirements of the law of economic development, which also reflects that enterprises themselves develop to the advanced form. That is, the high-quality development of manufacturing enterprises is reflected as the transition from instrumental rationality to value rationality of economic production in the process of human civilization. Based on the above analysis, high-quality development of manufacturing enterprises can be defined as a development paradigm that aims to realize environmental, social and economic benefits by connecting stakeholders, integrating the internal and external resources of enterprises, improving green total-factor productivity and providing products or services through

the new resources and capabilities caused by emerging technologies, as well as organizational and technological innovations, and its purpose is to meet high-quality, personalized and diversified needs.

The Dynamic Mechanism of High-Quality Development of Manufacturing Enterprises

High-quality development is proposed based on China's national conditions and the law of economic and social evolution (Huang, Xiao & Wang, 2018, pp. 19-41). It is the direction and paradigm that enterprises are willing to choose and follow. Organizational and technological innovations are the “glue” and “propeller” by which we can integrate and propel high quality and enterprise development. Then, in practice, how can we stimulate the vitality of enterprises, drive them to carry out organizational and technological innovations, and unify them with the goal of high-quality economic development?^① It will be necessary to explore the motivation of manufacturing enterprises to innovate and the internal mechanisms that promote high-quality development and growth in manufacturing enterprises, namely the dynamic mechanisms for high-quality development of manufacturing enterprises.

In order to explore such dynamic mechanisms, we will focus on the highly competitive market environments. The premise and purpose for the existence and development of enterprises is that profit is the basis for the survival and development of micro enterprises, while obtaining and maintaining competitive advantages is the core of enterprise development. The most typical theory of enterprise competitive advantages is M.E. Porter's theory. An enterprise has the ability to surpass or precede its competitors in the operations of a specific business. The essence is that companies can offer higher value to consumers in a way that is more effective than their competitors; to be specific, low cost at the same value or higher value at the same cost. In addition, the enterprises must ensure that the level of profits obtained in a certain period of time is higher than the average level of the industry. In this sense, if the high-quality development paradigm of manufacturing enterprises can create competitive advantages, manufacturing enterprises can be encouraged to independently choose the high-quality development paradigm.

With regard to competitive advantages, Porter (2013) classified these into cost advantage and differentiation advantage based on his idea of competition strategy, with special emphasis on the importance of technology. But technological innovations cannot guarantee the success of a product or service in the marketplace (Shao & Hu, 2016, pp. 81-88). And the same technology has significantly different economic value due to different organizational configurations (Wang, Li & Hou, 2015, pp. 96-104). In order to gain competitive advantages in the complex and changeable environment, technological and organizational innovations should be given the same priority. As a result, in view

① What needs to be explained here is that at the micro level, the high-quality development paradigm is a means for enterprises to realize their own purposes for survival and development; at the macro level, the development of enterprises is also a means to achieve the goal of high-quality economic development.

of the above theoretical analysis and practical scenarios, in order to adapt to the changes in external environments and realize the development needs of manufacturing enterprises, based on the theory of competitive advantages, and the motivation for organizational and the technological innovations, we will mainly answer “why” manufacturing enterprises should adopt the high-quality development paradigm on the basis of the logic of “motivation-behavior” to construct a theoretical framework for the high-quality development of manufacturing enterprises in the new era. Based on external environmental and organizational factors, we explore the motivation that drives manufacturing enterprises to develop organizational and technological innovations. Combined with the growth logic of emerging enterprises proposed by Priem, R. L et al. (2013, pp. 471-489), which is “market–business model–value creation–value acquisition”, we present an internal mechanism for practicing the high-quality development of manufacturing enterprises.

Innovation Motivation

Innovation is an important way for manufacturing enterprises to gain competitive advantages. The main driving factors behind the innovation of manufacturing enterprises include:

The demand factor

Consumer demands are always the fundamental basis for manufacturing enterprises to conduct production because consumers influence enterprises through their product choices. Consumer demands often change. If so, in order to maintain competitive advantages and obtain more market opportunities, enterprises will seek and take advantage of technological progress to carry out product and process innovations (i.e. technological innovation), to meet the new needs of their consumers and to make their enterprises invincible. At the same time, consumer demands will also be affected by external environments, for instance, technological development. At present, the rapid development of the new generation of information technology is changing the characteristics of consumer demands for products and the related demands to product consumption extension, making consumer demands more complex. This change requires manufacturing enterprises to innovate their operational mode, but it is difficult for them to respond to the new demands of consumers by relying solely on their internal resources. Thus, it is necessary to build a business ecosystem through organizational innovation and the cooperation with stakeholders. That is why the change in consumer demands will also promote the organizational innovation of enterprises. In this sense, the demand factor drives enterprises to carry out technological and organizational innovations.

The technical factor

At present, the new generation of information technology represented by the internet, big data and cloud computing is developing rapidly and being applied in a new technological revolution. With the help of emerging technologies and combined with closely related industries such as the manufacturing industry to generate new forms of technology–intelligence and other innovative technologies, the integration of intelligence and the manufacturing industry will further promote the transformation of production modes in manufacturing enterprises, that is, technological innovations. The application

of emerging technologies is not only reflected in the promotion of technological innovations in manufacturing enterprises, but also changes a series of activities in the enterprise value chain with its influence on the enterprise organization, gradually blurring and breaking the boundaries and limitations of geographic space (Wang, Liang & Li, 2018, pp. 13-21), and promoting the formation of new organizational forms, that is, organizational innovation.

The market structure factor

The market structure, as the external market environment for the survival of manufacturing enterprises, not only directly affects the performance of enterprises, but also reflects the degree of competition that will have a great impact on the production and operation decisions of manufacturing enterprises, thus affecting the performance of enterprises. Based on the research on the CDM model, Fulvio Castellacci (2011, pp. 637-658) found that the market structure has a great influence on the innovation activities of enterprises: companies in the monopolized industries are, on average, more likely to innovate and invest more for research and development; the innovation input of enterprises in competitive industries has a greater impact on their technological and economic performance. Generally, in the case of high degrees of competition, R&D investment of an enterprise will exert certain pressure on its finance, leading to the enterprise's reluctance to undertake the risk of innovation investments. This attitude, to a certain extent, inhibits the enterprise's technological innovation behavior. When the market concentration is high, enterprises need to make continuous R&D investments to maintain their positions in the market, thus maintaining their monopolistic advantages through technological innovation.

The institutional environment factor

The influence of the institutional environment on manufacturing enterprises mainly comes from policy regulations. Different from other enterprises, manufacturing enterprises have significant production externalities, and technological innovation also has positive externalities. Enterprises' attention to policy regulations originated from the conflict between the production of manufacturing enterprises and environmental protection, which is also the reason why policy regulation factors are highly concerned in green innovation. Since 2008, Chinese enterprises have made remarkable achievements in technological innovations, which is largely attributed to incentive policies, according to some researchers. Policy regulations can not only guide and encourage enterprises' production and management behaviors, but also restrain their behaviors. Different policy regulations can produce different enterprise behaviors (Li, 2018, pp. 2270-2279). It is obvious that institutional factors significantly affect the technological innovation of enterprises. While establishing and implementing the concept that "lucid waters and lush mountains are invaluable assets," we must adhere to the basic national policies for saving resources and protecting the environment through relevant policy regulations, which will further encourage manufacturing enterprises to innovate.

The organizational factor

The organizational factor is the most fundamental factor that affects the innovation behavior of enterprises. Based on the resource-based view and dynamic capability theory, internal resources

are the foundation for innovation. These resources cover all the elements owned by the enterprise, including knowledge reserves, organizational models and social capital. But resources alone do not bring innovation and economic benefits to enterprises. Therefore, enterprises must also have the ability to integrate resources, or integrate and reconstruct original resources across levels and organizations to respond to changes in the external environment and enhance competitiveness. This leads to organizational innovation. At the same time, a large number of studies have also shown that governance characteristics, entrepreneurship and other factors are also important factors affecting enterprises' innovation behavior. The organizational factor is the basic factor that enables enterprises to conduct technological innovations and organizational innovations.

Internal Mechanism

These internal and external factors will drive manufacturing enterprises to carry out organizational and technological innovations. A large number of studies have proven the importance of technological innovations to gain competitive advantages. The reason why organizational innovations should adopt the platform-based organization model at present is that the platform-based organization is characterized by “connection” and “integration”. It is a networked organization mode that adopts a dual structure of trading and innovation. As a trading platform, such organization connects not only to the supply side, but also to the demand side; when a platform-based organization works as an innovation platform, the users, the demand side within such organizations, have a dual identity and can participate in value creation as producers. Therefore, the platform-based organization has the following two advantages: First, network-based platform organizations can make both parties in the market transactions enjoy scale and scope in economic effects. In addition, it forms a benign interaction between consumers and producers, “producing a positive feedback effect, which further reduces costs and improves benefits for both sides of supply and demand” (Feng & Chen, 2016, pp. 99-113). At the same time, the virtual network breaks through the physical space-time constraints, and on the platforms featuring an infinite extension of economic space and time, the interaction distance between enterprises and consumers within the platforms is reduced to zero. Thus, the transaction cost reduces and the time value of consumption and the whole society increases. In addition, platform-based organizations, based on the virtual market effect and digital technology effect of the internet, enables enterprises to realize seamless connections between customized products or services and large-scale standardized production through homogeneous deconstruction of personalized demands and modular production to meet consumers' personalized and diversified demands for products or services. Therefore, platform-based organizations can more effectively provide higher value to consumers and achieve a win-win result for multiple stakeholders on the supply and demand sides within the platform. Second, platform-based organizations connect the supply and demand parties by integrating them into one platform, which has a high degree of information symmetry, and this can promote resource reorganization through the competition and extrusion mechanisms of the network, as well as propelling resource reallocation through the bilateral market matching mechanism.

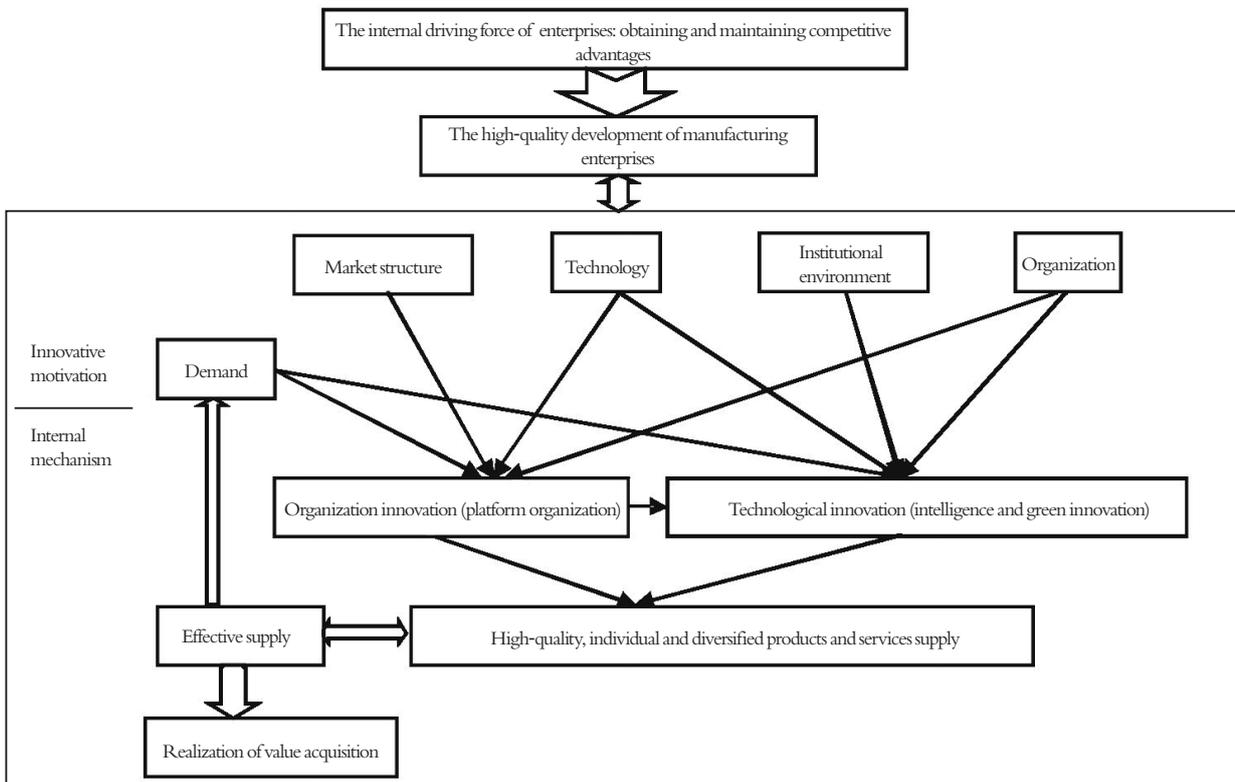


Figure 1 Dynamic Mechanism for High-quality Development of Manufacturing Enterprises

This characteristic directly makes manufacturing enterprises produce in a way that is closer to the ideal balanced state of supply and demand, reducing resource waste, enhancing social welfare and improving social benefits. The organizational innovation model based on platform architecture has attracted the attention of leading enterprises in the industries and its application has been further explored.

According to the growth logic of emerging enterprises proposed by Priem et al. (2013), after identifying high-quality, individual and diversified market demands in the new era of a social economy dominated by a customer economy, the platform-based organizational model, together with technological innovations to improve green total-factor productivity (TFP) for value creation, can simultaneously meet the market demands and ecological environment requirements. The realization of value acquisition through effective supply addresses the internal logic of enterprise development. The coupling of resources and the environment, social responsibilities and enterprise economic benefits have also been realized. This is because in promoting economic development, although the total-factor productivity of manufacturing enterprises fluctuates, technological change is an important driving factor for the long-term change in total-factor productivity. Moreover, green TFP growth can be promoted by technological progress. In addition, with regard to organizational and technological

innovation, empirical results show that organizational innovations can promote technological innovations. Through reasonable matching and optimization between them, the role of innovation can be better played, and the overall strength of enterprises can be promoted (Battisti & Stoneman, 2010, pp. 187-206; Wang et al., 2018, pp. 245-253). Therefore, combined with the advantages of platform-based organization and technological innovations, it can be seen that when manufacturing enterprises have addressed the internal logic of the growth of emerging enterprises, which is based on reasonably matching platform-based organization and technological innovations, they have simultaneously achieved a win-win situation for stakeholders while taking into account economic, social and environmental benefits. And this is the essence of high-quality development. Of course, this also proves that high-quality development is driven by innovation.

The dynamic mechanism for high-quality development of manufacturing enterprises is shown in Figure 1: Based on the coupling of innovative motivation, internal power, derived from obtaining competitive advantages, drives organizational and technological innovation and promotes high-quality development, which becomes the development paradigm of choice for enterprises to obtain competitive advantages and to realize self-survival.

Realization Paths for High-quality Development of Manufacturing Enterprises

Based on the analysis of the dynamic mechanism for high-quality development of manufacturing enterprises, manufacturers can achieve high-quality development through platform-based organizational and technological innovations. The platform-based organizational model is gradually becoming the foundation for the economic, social infrastructure, and business model (Wan et al., 2017, pp. 1-18). Therefore, how to build or engage a platform-based organization has become the first choice of organizational innovation. The platform-based organizational mode can be divided into two types according to the structural embedding modes of its constituent nodes: platform development embedding and bilateral market embedding (Jin & Pan, 2014, pp. 148-160). According to its source, technological innovation can be divided into innovation through introduction and through independent R&D. Therefore, according to the classification from two analysis dimensions, platform-based organization embedding and technological innovation, the realization paths for high-quality development of manufacturing enterprises are shown in Table 1.

Table 1 Realization Paths for High-quality Development of Manufacturing Enterprises

Source of technological innovation	Introduction	Platform development embedding based on technology import	Bilateral markets embedding based on technology import
	Independent R&D	Platform development embedding based on independent R&D	Bilateral markets embedding based on independent R&D
	Classification	Platform development embedding	Bilateral market embedding
Dimension	Platform-based organization embedding		

The Embedding Path of Platform Development Based on Technology Import

When the technological innovation of manufacturing enterprises have not reached the level of leading enterprises, they can promote technological innovations of their own by introducing advanced technologies from the outside and internalizing them in their enterprises to shorten the business gap with leading enterprises, creating comparative advantages. However, it is difficult to become a platform leader to undertake platform creation by virtue of this relative technical advantage. Therefore, if a technological catch-up manufacturing enterprise has a certain market base, it can follow the platform leader and participate in the development of platforms or platform complementary products to embed the platform-based ecosystem. With the help of the innovation platform function of the platform system, manufacturing enterprises can integrate the internal and external resources continuously to optimize and improve their technical innovation ability, and gradually realize “social production” with complementary advantages according to the “new barrel principle” (Luo & Du, 2018, pp. 82-99), to achieve a high-quality development paradigm for the entire platform-based ecosystem and complete the production of effective products or services.

The Embedding Path of Platform Development Based on Independent R&D

When manufacturing enterprises master high-end core technologies based on independent R&D and become leading enterprises, such enterprises have natural advantages to become platform leaders. In order to achieve sustainable competitiveness and to meet the rapidly changing market demands, with the help of information technology, leading manufacturing enterprises independently develop, create and provide resource platforms for other stakeholders to use at low cost or even free of charge. They also attract stakeholders to develop embedded platforms based on markets or platform complementary products through the natural value advantage of platform resources and low application costs. In this way, leading manufacturing enterprises can achieve more accurate innovation iterations in line with market demands through the platform-based organizational ecosystem, realize the incentives and constrains of the organization through the sub-platforms formed by self-fission and self-organization of the platforms based on empowerment and continue to evolve. This path can not only guide and help other manufacturing enterprises to develop high quality, but also continuously improve the level of high-quality development.

The Embedding Path of Bilateral Markets Based on Independent R&D

The emergence of platform-based organization still aims to build competitive advantages and to have a certain degree of strategic flexibility to deal with environmental uncertainties. It is still a relatively loosely coupled system. Therefore, it is important and decisive as to whether manufacturing enterprises can be actively invited by platform leaders and integrated into the platform-based organizational ecosystem, as well as whether manufacturing enterprises have the dynamic ability to form competitive modular product manufacturing based on their own technological advantages.

When a manufacturing enterprise has the advanced technology related to a certain procedure or component based on independent research and development, but it is not the core technology for the final product or service. The enterprise can be embedded into the platform-based organizational system through the transactions of products or services, so as to improve the production efficiency and benefits generated by the final product or service.

The Embedding Path of Bilateral Markets Based on Technology Import

When the manufacturing enterprises in a certain category have neither technical advantages nor enough market shares to participate in the development of platforms or platform complementary products, their products or services are mostly long-tail. This kind of manufacturing enterprise can be embedded into the platform-based organizational system by participating in the transactions of products or services. Mainly driven by pure commercial motivation, these manufacturing enterprises only hope to increase the sales of long-tail products through the platforms, through breaking the barriers of physical space and time and relying on the huge number of consumers on the platform. However, the network competition and extrusion mechanism and the bilateral market matching mechanism of the platforms will still stimulate the continuous innovation of such manufacturing enterprises and eventually lead them to the path of high-quality development.

Conclusions and Policy Implications

In the final analysis, the high-quality development of the manufacturing sector needs to be realized through the high-quality development of manufacturing enterprises. Based on the real situation of the new era and the theories related to enterprises' competitive advantages and innovation, we defined the high-quality development of manufacturing enterprises and analyzed their dynamic mechanism and realization paths, finding that the high-quality development of manufacturing enterprises is characterized by a platform-based organizational model, innovation-driven growth, high green total-factor productivity, win-win results among stakeholders and stronger flexibility and adaptability. In order to further enhance the effect of innovation on manufacturing enterprises and better promote the high-quality development of manufacturing enterprises, we offer the following suggestions: First, rely on emerging technology to establish a standardized and comprehensive enterprise information disclosure system. Manufacturing enterprises with demand-orientation can only obtain value through effective supply. Therefore, signal transmission and credit incentives and constraints can form consumer demands and force manufacturing enterprises to improve the quality of their output from the supply side. Second, build a business environment suitable for manufacturing enterprises to achieve innovation-driven development. Innovation is the fundamental way to realize the high-quality development of manufacturing enterprises. The business environment, including all external environments such as policy regulation orientation, financial market environment and collaborative service network infrastructure, is an important factor for enterprises to take innovative

actions and obtain innovative results. Experience shows that developed countries also rely, to a certain extent, on financial systems and fiscal subsidy policies to solve the problems of technological research and innovation. President Xi Jinping has also made it clear that a stable, fair, transparent and predictable business environment should be created. Therefore, it is necessary to establish a transparent and efficient government affairs environment, a fair and just market environment and a good financial ecological environment, and to stimulate the enterprises' motivation for innovation, improve the enterprises' enthusiasm for innovation, and actively guide social capital effectively to the field of manufacturing to mitigate the financing constraints on manufacturing enterprises' innovation, thus promoting the development of manufacturing enterprises with high quality. Third, strengthen the building of a contingent of innovative talent. Being innovation-driven is actually being driven by talent, and the competition among enterprises is, after all, the competition for talent. Therefore, the supply of innovative talent can be guaranteed through the formation of a training mechanism conducive to the growth of innovative talent and the positive policies for talent introduction; we should give full play to the intelligence and wisdom of innovative talent by formulating a scientific system for personnel selection and employment.

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