

Research on Governance Mode of Digital Platform Ecosystem from the Perspective of Ecological Niche: Based on Double Case Analysis

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Abstract: In order to comply with the requirements of the times, in view of the problem that the strength of the main enterprises of the digital platform ecosystem is too different, which leads to too large differences in resources. From the perspective of the niche, firstly, this paper integrates the three governance modes of "hierarchical governance", "cross-level governance" and "panoramic comprehensive rational analysis framework", and puts forward the "panoramic joint governance mode from the perspective of niche". Secondly, the two cases of Haier COSMOPlat Ecology and Huawei Smart Car Ecosphere are selected, and the exploratory case analysis and comparative study methods are used to carry out corresponding analyses on the two cases to verify the feasibility of the new governance mode. The study found that the essence of this governance mode is to create more connection points by introducing a resource-sharing platform based on the new generation of information technology, breaking the fault-type hierarchical governance, focusing on solving problems at all levels, and attracting more regulatory bodies to conduct joint governance. Through these, we can expand the niche width of the digital platform ecosystem, then reduce the barriers to resource sharing among the subjects of the digital platform ecosystem. By applying this mode, different forms of digital platform ecosystems can achieve efficient operation.

Keywords: Digital Platform Ecosystem; Niche; Governance Mode; Platform Enterprise.

1. Introduction

The current era is in the era of the digital economy, which endows the traditional manufacturing business ecosystem with the characteristics of platformization and digitalization, so that enterprises can draw high-quality resources needed for their development from the outside world, promote enterprises to improve their strength, and then improve the overall operating performance of the digital platform ecosystem. With regard to the development of the digital economy, China has issued relevant policies to support it, such as the development goals of the 14th Five-Year Plan for the Development of Digital Economy, by 2025, China can basically form a coordinated and unified digital economy governance framework and rule system, a cross-sectoral and cross-regional collaborative supervision mechanism, and a digital economy governance pattern featuring government-led, diversified participation and legal protection. On the basis of the formation of the basic governance pattern, we will consolidate the leading position of dominant industries, drive the development of weak areas in key areas, and improve the ability to supply strategic resources, based on these, we can help the development of China's real economy and build the manufacturing power and digital China proposed in the report of the Twentieth National Congress. Under a series of policies, Haier Group and Huawei, the leading enterprises in the manufacturing industry, have been continuously improving their industrial Internet platforms, but there are still problems such as imperfect governance and management systems. Other industries also build their own purely profitable business modes through platform sharing. These behaviors reflect the insufficient supervision of the digital platform ecosystem, which may lead to more and more dissimilated behaviors of platform system participants and oriented resource trends. The above are the problems of excessively

different resources caused by the enterprise's strength in practice, which will affect the operational performance of the digital platform ecosystem. Therefore, the effective governance of the digital platform ecosystem is a common concern of the business community and the academic community.

In the context of the dynamic, networked characteristics, uncertain environment and digitalization of today's platform ecosystem (Zhong et al,2021), the negative research on value creation in the platform ecosystem is very limited, especially the lack of discussion on its impact mechanism and governance measures, (Mou et al,2021) in practice, the digital system operates independently, and interacts with traditional physical or physical systems, resulting in a class of increasingly critical governance needs, These governance needs need to be solved urgently, (Young et al,2020) therefore, it is urgent to explore the way of Internet platform governance from a multidimensional perspective, and explore the construction of a platform collaborative governance system with the participation of all stakeholders, (Liang,2021) we should further improve the legal regulations related to the digital economy, strengthen the governance of the digital platform, optimize the administrative management mode of the digital economy, and accelerate the construction of the digital economy governance system. (Qiao,2021) The platform is becoming more and more dominant, and the governance strategy of platform sponsors should also change from mainly supporting a wider range of complementary groups to more selective end users. (Rietveld et al,2020) The governance mode should also change accordingly. Therefore, it is necessary to study how the participation of the development platform evolves, as well as different access and control conditions. (O'Mahony and Karp,2020) In addition, the blockchain industry is becoming more and more popular. Some scholars have evaluated the trade-off between

centralization and decentralization, and believe that semi-decentralization is a higher-performance governance structure. (Chen et al,2020) In response to the above problems, some scholars have built a tentative governance mode for the digital transformation of the industrial innovation ecosystem, (Yang et al,2020) some scholars have built an innovation ecosystem governance mechanism based on digital platform construction, digital technology application, and digital resource collaboration from three aspects: relationship mechanism, incentive mechanism, and control mechanism (Wei and Zhao,2021), and some scholars have also found the main antecedent variables that affect the internal governance of the platform ecosystem (Dai and Liu,2022), Five key aspects that need to be closely considered in the design of platform governance are identified: meta-organization or ecosystem design, coordination mechanism, value co-creation mechanism, value distribution mechanism, and structural principles, (Mukhopadhyay and Bouwman,2019) all of these help to expand the application scope and analysis object of exploratory governance theory.

To sum up, current researches on the governance issues of the digital platform ecosystem mainly focus on the direction, method, mechanism, mode construction, and various factors affecting governance of the platform ecosystem. Although the era has endowed the platform ecosystem with the characteristics of "digitalization" and "niche", few scholars have studied the governance of the digital platform ecosystem from relevant perspectives. Due to the large difference in the strength of the main enterprises of the digital platform ecosystem, resulting in the large difference in resources between enterprises, this problem has seriously affected the operation performance of the digital platform ecosystem. We need to sort out the internal causes of the problem from these two perspectives, integrate the internal and external environment of the digital platform ecosystem, and improve the existing governance mode of the digital platform ecosystem. Compared with the existing research, the innovation of this paper lies in two aspects: firstly, from the perspective of "digitalization", it enriches the existing research on platform governance, ecosystem evolution, and platform network; Secondly, from the perspective of "niche", it provides new research ideas for the governance of digital platform ecosystem.

2. The Governance Mode of the Digital Platform Ecosystem from the Perspective of Niche

2.1. Embodiment of Enterprise Niche in the Digital Platform Ecosystem

Niche comes from ecology, and the niche of a species refers to its function and status in the community in terms of an ecosystem. In ecology, the greater the niche difference is, the more obvious the complementary effect of the ecosystem is, and the weaker the selection effect is. Species can gradually approach a balanced state through competition (Godoy et al,2020). With the fourth industrial revolution, the digital economy has a disruptive innovation impact on traditional business systems. The digital economy endows it with the characteristics of digitalization and platformization. In the industrial Internet platform, enterprises use the new generation of information technologies such as big data, blockchain, cloud computing to share resources, exchange

information, and jointly carry out digital technology innovation, and achieve mutual benefit and symbiosis(Shmeleva, N.,2021).In this context, the strength gap between enterprises is increasing, and the concept of niche is also applied to the business community. The corresponding concept corresponds to each element of the business ecosystem. Each enterprise has its own niche, and enterprises with similar niche form the corresponding enterprise community (Wu, Y., Zhu, X.,2021). Each enterprise has its niche, and enterprises with similar niches form a corresponding enterprise community. The niche situation theory points out that biological units have two attributes "state" and "potential", the former refers to the state of the enterprise, which has reached the current operating state after various stages of development; The latter corresponding niche concept, refers to the enterprise's ability to influence their survival environment, this property also shows that the enterprise future development ability and commercial status(Shi and Tian, 2018), for the digital platform ecosystem, the greater the difference between the system subjects, the smaller the niche overlap, and the greater the heterogeneity of resources. Absorbing high-quality resources through resource sharing can promote the improvement of the innovation ability of each subject.

2.2. Digital Platform Ecosystem Governance Mechanism

The digital platform can be used inside and outside the enterprise according to the situation, while the digital platform ecosystem focuses on external connection, which reflects the characteristics of interdependence among various subjects. Some scholars point out the complementary effect and resource-sharing mechanism of the digital platform ecosystem from the economic and structural aspects, and they consider that the platform owner in the digital platform ecosystem implements the governance mechanism to promote the digital platform value creation mechanism between the platform owner and the participants(Hein et al,2020). Today, the digital platform of ecosystem management, is still in the primary stage of the platform ecological system, the phase, the platform management object is an external platform participant, governance is for the incentive and control, to stimulate all kinds of network effects, the governance strategy mainly includes two categories, price and non-price strategies (Yang and Ning,2021). Although different governance mechanisms will lead to different evolutionary results, the governance and coordination of the system will change with the change in the system environment (Zutshi and Grilo,2019), and the classification of the digital platform ecosystem also varies to some extent, but the core of the system is centered on transactions(Xiao and Li,2019), and the governance of the digital platform ecosystem can also be centered on all kinds of transactions. At present, "ecological governance" combined with niche is gradually becoming a new concept and new choice of platform for corporate social responsibility governance. As a governance paradigm that is highly compatible with the platform business ecosystem(Lv et al,2019), ecological governance provides a new idea for digital platform ecosystem governance.

2.3. Digital Platform Ecosystem Governance Mode from the Perspective of Niche

2.3.1. Hierarchical Governance Mode and Cross-Level Governance Mode

With the widespread of idea of "sharing", the focus of traditional corporate governance has shifted from simple internal governance to comprehensive internal and external governance. With the development of the enterprise supply chain, the focus of enterprise governance has shifted to the whole supply chain. In the era of the digital economy, new ecosystem concepts integrating the supply chain, such as digital ecosystem, digital innovation ecosystem, and digital platform ecosystem, have emerged. From the perspective of niche, the smallest element of such an ecosystem is each enterprise, and each enterprise is different in terms of human, material, and financial strength, and the niche width of an enterprise in a supply chain involved in the whole life cycle of a single product is not large, but from the perspective of the ecosystem, the niche width of each supply chain is quite large. In the ecosystem of mutually beneficial symbiosis, the member enterprises are interrelated and interdependent, and there is a relationship of "prosperity for all and loss for all", any lack of responsibility or alienation behavior may lead to the rupture of the supply chain at light and the collapse of the entire system at worst. Therefore, in this case, the starting point of corporate governance should not stay in the single industry supply chain but should be promoted to the ecosystem perspective of multi-industry supply chain, taking into account each type of enterprise with a large strength gap.

However, due to the difference in enterprise strength, responsibility scope, social status, and other factors, a series of governance issues such as the governance mode, governance subjects, and governance methods of ecosystem governance will also be different. Some scholars have proposed a combination of hierarchical governance and cross-level governance. The former divides the ecosystem into three levels, and the governance subjects and governance methods at each level are determined according to the characteristics of the level, and the latter seeks different roles of the same element at different levels and uses this as a connection point for cross-level governance (Lv et al,2019), the governance mode is shown in Figure 1.

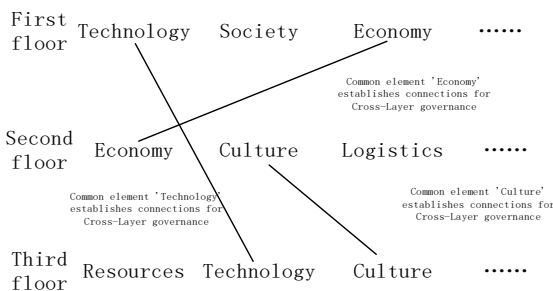


Figure 1. Traditional governance mode

The above traditional governance mode may have a large gap and isolation in the implementation process, and the enterprises will be vertically stratified. These will cause that there are too few connection points between the layers, and the problem of information islands is becoming more and more serious. Finally, the strength of the enterprise group is becoming more and more disparity, which may lead to the phenomenon of commercial monopoly; The horizontal stratification of enterprises, people, and organizations, will

cause the lack of mutual supervision between layers, and then may lead to different behaviors at different levels and low supervision efficiency. Therefore, a new mode integrating hierarchical governance and cross-level governance is urgently needed to avoid these phenomena.

2.3.2. Panoramic Comprehensive Rational Analysis Framework

The governance mode should have the characteristics of multi-agent comprehensive governance(Zhao and Xu,2021; Lee and Gereffi,2021). Some scholars put forward a panoramic comprehensive rational analysis framework, which starts with the environment and derives different governance subjects required by each environment. These environments include the external environment and internal environment. The external environment includes all aspects of the enterprise's living environment, such as the technical, political, economic, social, and historical environment. The government is responsible for system formulation and supervision, and the public organizations and the public for value dissemination and supervision coexist for the digital platform ecosystem. Such public organizations belong to the political, social, and historical environment, play a foundational role, can identify the fundamental problems of national economic and social development, and examine the digital platform ecosystem from the perspective of the fundamental purpose; The internal environment refers to the technology, information, and other environments, the ownership of core technologies, the internal information circulation degree of the enterprise, the maturity of the enterprise for internal and external information processing technology, etc. these environments are directly related to the core competitiveness of the enterprise and are the key reason for the larger niche. Such environments involve a large number of platform stakeholders, such as professional technology R&D teams, third-party information processing centers, etc(Liang,2021).

2.3.3. Joint Governance Mode from the Perspective of Panoramic Niche

In view of the problem of excessive resource diversity caused by the enterprise's strength, combining the above rational analysis framework, hierarchical governance, and cross-level governance, this paper proposes a panoramic joint governance mode from the perspective of niche. The specific mode is as follows:

According to the hierarchical governance thought of Hongjun Xiao and Ping Li(Xiao and Li,2019), from the perspective of ecology, the participating enterprises of the platform are divided into first-layer, second-layer, and third-layer cooperative enterprises according to their strength. The first-layer cooperative enterprises have strong strength and meet all the indicators of platform participation, and are strong participants of the platform. Compared with the first-layer cooperative enterprises, the second-layer cooperative enterprises are slightly weaker and meet the rigid index of platform participation, while the non-rigid index is slightly lacking. They are relatively stable participants of the platform. Compared with first-layer and second-layer cooperative enterprises, third-layer cooperative enterprises have the weakest strength and can only meet the rigid index of platform participation. If the index is slightly changed, it will face the risk of being eliminated. The enterprises' hierarchy is shown in Figure 2.

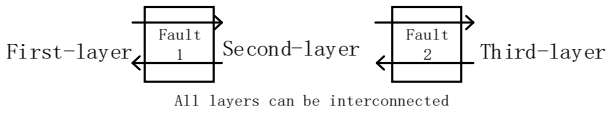


Figure 2. Enterprise Layered Diagram in Joint Governance Mode

The digital platform is introduced into the governance mode, and each layer condenses its characteristics, then

presents the characteristics and solutions of each layer in this platform, then uses digital technology to conduct an in-depth analysis of the characteristics of each layer, excavates the problems that may exist in each layer, and increases the connection points, to alleviate the fault phenomenon. The panoramic joint governance mode from the perspective of niche is shown in Figure 3.

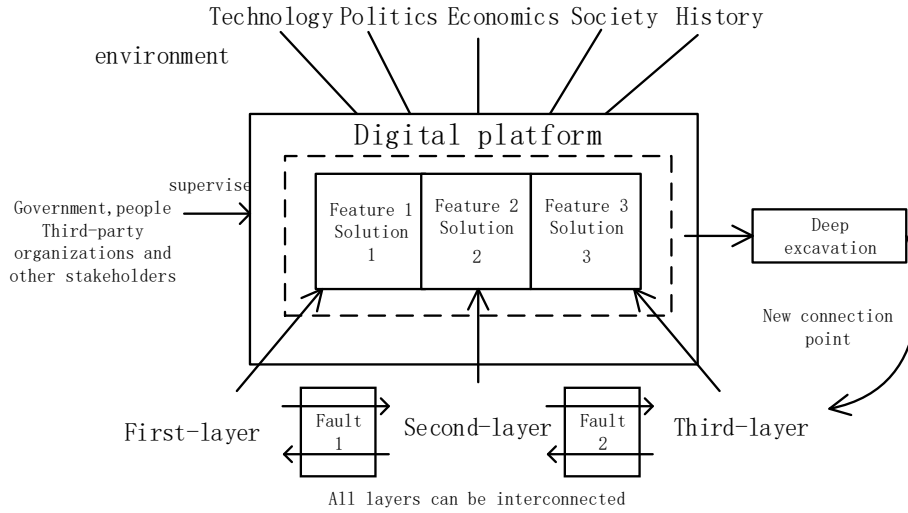


Figure 3. Joint governance mode in the perspective of panoramic niche

The introduction of the platform also gives new meaning to the traditional corporate entity governance. Enterprises should not only conduct their own internal and external entity governance but also participate in platform governance. Through the platform, they can learn the governance experience of other high-quality enterprises, thus improve their strength. The new mode after the introduction of the rational analysis framework includes three aspects: the platform's governance, the participant's supervision of the platform's governance, and the supervision of the third-party organization and other stakeholders on the platform. This mode can continuously follow up the development status and trend of the enterprise, thus improve its "status" in the ecosystem; At the same time, this mode is a more transparent governance mode with more connection points than cross-level governance, this feature is conducive to the flow of resources between enterprises and cross-field flow, then it can improve the enterprise status of enterprises in the industry. It can also improve the enterprise status of enterprises in related industries across fields, that is, improve the "potential" of enterprises in the ecosystem. Through the improvement of the two attributes, the niche width of the enterprise will be expanded.

3. Analysis and Comparison of Two Cases

3.1. Research Methods

In this paper, the COSMOPlat Ecology of Haier Group and Huawei Smart Car ecosystem are selected as the research objects, the governance modes of the two digital platform ecosystems are sorted out, and the new governance mode proposed here is applied to the two digital platform ecosystems, to verify the feasibility of the new mode. This paper also adopts the double-case exploratory research method and the comparative analysis method. The double-

case exploratory research method can effectively verify and supplement the same phenomenon and mode, and the comparative analysis method can make the new governance mode be applied to two ecosystem cases. The two methods help us to conduct an in-depth exploration of the governance mode of the two digital platform ecosystems, and propose a more universal new governance mode, so as to provide new solutions to the problems encountered in the process of digital transformation and upgrading of the traditional manufacturing industry through the resource-sharing platform based on the new generation of information technology.

3.2. Case Analysis

3.2.1. Case Study of Haier Group COSMOPlat Ecology

(1) Overview of Haier Group

At the beginning of 2016, Haier Group launched COSMOPlat, the first industrial Internet platform with independent intellectual property rights in The Chinese industry, aiming to drive manufacturing enterprises with different capabilities to jointly carry out digital transformation together by providing customized services. The platform connected its upstream suppliers, downstream users, and relevant external resource enterprises in the supply chain. It has gathered more than 300 million users and more than 3.8 million global ecological resources, with a scale of more than 200 billion. And now, considering the ecological economy, Haier is making every effort to establish a new industrial ecology centered on users. At the same time, Haier has formulated manufacturing standards in the textile, equipment, construction, transportation, chemical, and other industries, realizing its cross-industry and cross-field expansion and service (Li,2019).

During the operation of COSMOPlat, assembly production is implemented, and various products are divided into different technical modules. These different modules are subcontracted to various upstream suppliers. Among them,

the product feature technology module, which needs the peripheral components that keep pace with the times, cannot be supplied in real-time only by its strength. Therefore, it needs to be fully open to third-party complementary parties, that is, it needs the joint participation of the whole supply chain including suppliers and users. Therefore, Haier's governance mode is modular. By establishing an open global procurement platform, the company updates procurement information in real-time, carries out comprehensive information management on the third-party complementary parties, and provides technical and information support to the platform participants. At the same time, it strengthens its innovation ability and efficiency in research and development design, which attracts more complementary parties to participate in the platform, this also reflects the balance between closure and openness in platform governance (Li,2019).

(2)Application of panoramic joint governance mode in Haier Group from the perspective of panoramic niche

From the perspective of economy, politics, and history, Haier Group is the world's top brand of white goods. 19 products have been rated as China's most famous brands and the most valuable brands in China. It plays a pivotal role in China's manufacturing industry and even in the world's manufacturing industry. As for China, Haier Group, as the leading enterprise in China's manufacturing industry, its development level reflects the development level of China's new generation of manufacturing industry to a certain extent. Therefore, the governance mode of Haier Group is not only limited to the internal and external environment of the enterprise, but also needs the joint governance of the government, the country, and even the world industry, and also needs to accept the joint supervision of relevant industries and personnel. Therefore, the governance of COSMOPlat needs the participation of the government, the public, third-party organizations, and other stakeholders, such as the local governments and the public where the Haier branch is located, the quality supervision bureau that monitors

the product quality, and the environmental management bureau that monitors environmental pollution.

Since Haier Group needs to carry out a comprehensive opening to the third-party complementary parties, in order to maintain the status of the core enterprise of Haier Group, the security of its core technology and internal information is particularly important from the perspective of the internal environment. In the era of rapidly changing digital economy, the leakage of the two may bring irreversible losses to Haier Group. COSMOPlat Ecology is divided into four layers: resource layer, platform layer, application layer, and mode layer. The resource layer will include a series of enterprises that provide resources for Haier, such as software and hardware enterprises, third-party enterprises that provide services, etc. The platform layer is mostly the application communication companies that provide platform components, and the application layer includes service solution providers. The mode layer involves a wide range, and the government and all walks of life can be involved. There are many participants at each level, and the strength of each participant will also be uneven. Although Haier Group now implements modular governance, the governance mode is to divide enterprises according to technical attributes, which is difficult to grasp. Therefore, according to the governance mode in the perspective of the panoramic niche, enterprises at each level should be divided according to the strength standards established by Haier. Each part should be divided in more detail and the boundary should be clearer according to the corresponding standards. Each part should sign the corresponding agreement with the platform owner. Haier can focus on the four levels of issues on the digital platform for unified management. This helps Haier Group and platform participants to supervise each other, and also helps governments, people, third-party organizations, and other stakeholders outside the platform to supervise and guide the entire digital platform ecosystem. The specific governance mode is shown in Figure 4.

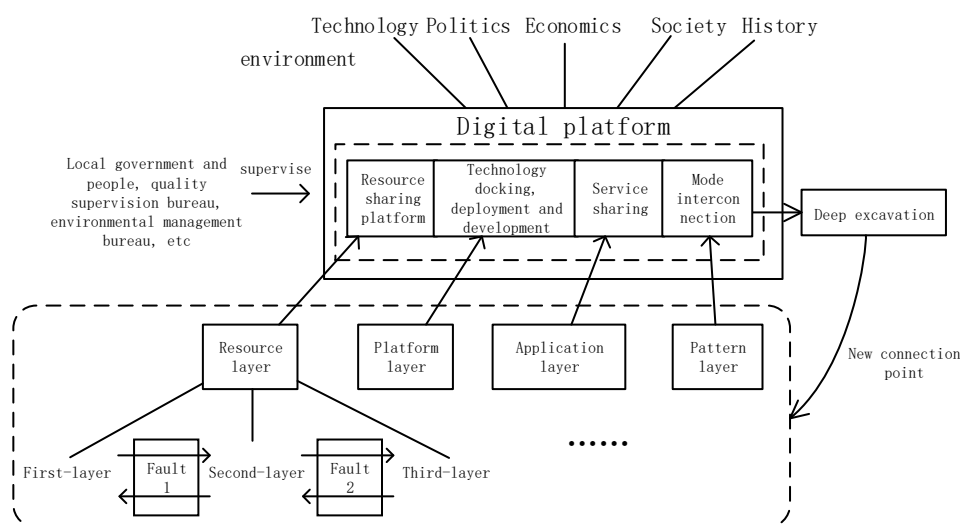


Figure 4. Haier COSMOPlat Ecology ecosystem governance mode

The four levels of Haier COSMOPlat Ecology are equivalent to dividing the entire supply network according to enterprise attributes. There are upstream and downstream relationships between enterprises. After applying this governance mode, the resource layer can realize the sharing of various resources through the resource sharing platform,

and increase the information transparency in the supply network, so as to facilitate the supervision and management of the resource sharing process, the platform layer effectively connects, deploys and develops the technologies needed for production, thus promoting the improvement of the technological level of the entire digital platform ecosystem,

the application layer and the pattern layer mainly enable enterprises at different levels to explore suitable applications and patterns to the maximum extent through the interconnection of applications and patterns, so as to promote the improvement of enterprise competitiveness. In the entire digital platform ecosystem, no matter which level of the enterprise, it can intuitively and clearly understand the product production, material distribution, etc. This can reduce the barriers to resource access and information exchange, and break the status quo of "information islands" among all levels, so as to broaden the breadth of enterprise niche. In the four levels, the further level division according to the strength of enterprises and the restriction of participation standards can enable the participating enterprises to actively carry out self-innovation and drive the weak enterprises to continuously absorb high-quality resources. These can improve their competitiveness and narrow the gap between the strength of enterprises, to improve the "potential" of the enterprise niche.

3.2.2. Huawei Smart Car Ecosystem Case Study

(1) Huawei Overview

With the advancement of the digital economy era, Huawei adheres to the development strategy of "platform+ecology" and is committed to building a collaborative ecosystem. However, the realization of ecological collaboration faces a series of challenges, such as whether to continue to meet the shallow cooperation based on commercial interests or deepen the cooperation through strategic collaboration. Whether to continue to match capital, technology, and other resources based on the purpose of completing a single project, or to establish a mutual trust and mutual benefit resource-sharing mechanism based on the idea of making the industrial cake bigger. In 2019, Huawei pointed out the importance of "AI" in the realization of ecological synergy. In the future, all aspects of our life will be intelligent and digital. Huawei hopes to develop new ecological cooperation relationships by adding AI technology to the platform, to achieve more efficient ecological synergy with ecological partners. Therefore, its strategy has evolved from "platform+ecology" to "platform+AI+ecology" (Zhu et al, 2022).

In the era of the digital economy, computing, and software have become the core of smart cars, and the development needs the joint efforts of the industrial chain. Based on this, the industry needs ecological enterprises the most. Following the strategy of "platform+AI+ecology", Huawei pointed out

in December 2021 that the company will build a smart car ecosystem around the three platforms of iDVP, MDC, and HarmonyOS smart cockpit, provide three digital bases and development tools for ecosystem partners, and provide the platform foundation and resource base for Huawei and partners to jointly develop, to make the development of partners more convenient and efficient, and bring the ultimate experience to consumers.

(2) Application of panoramic joint governance mode in Huawei's smart car ecosystem from the perspective of panoramic niche

From the perspective of Huawei's smart car ecosystem structure, since the ecosystem is formed by the integration of three platforms, the governance of the ecosystem can be divided into two layers. Firstly, according to the three platforms, the ecosystem is divided into three layers: "iDVP ecosystem", "MDC ecosystem" and "HarmonyOS smart cockpit ecosystem"; Secondly, the above three levels will continue to be stratified according to the strength of participating enterprises. Since "iDVP Ecology" and "MDC Ecology" are both platforms providing development tools for partners, a resource-sharing platform with "iDVP Ecology" and "MDC Ecology" based on the Hongmeng system can be developed. For the governance of the entire ecosystem, because the three types of platforms involve different professional technologies, there may be differences in resource sharing. At this time, although there may be few connections between the various levels, the characteristic problems of each level can still be concentrated in the above resource-sharing platform, and the collected problems can be analyzed to find potential common problems and propose corresponding solutions. At the same time, all levels can also exchange experiences on common problems, so as to gather the strengths of all families and jointly contribute to solving problems. At the same time, the manufacturing industry can also learn the knowledge of relevant industries across industries through the resource-sharing platform, laying a foundation for the development of the cross-professional and cross-industry industrial Internet platform in the future. These common problems and solutions become the connecting points between all levels, which is conducive to mining the deep value of resources, enabling resources to flow across systems, thus reducing the resource differences between all levels and widening the niche width of the ecosystem. The specific governance mode is shown in Figure 5.

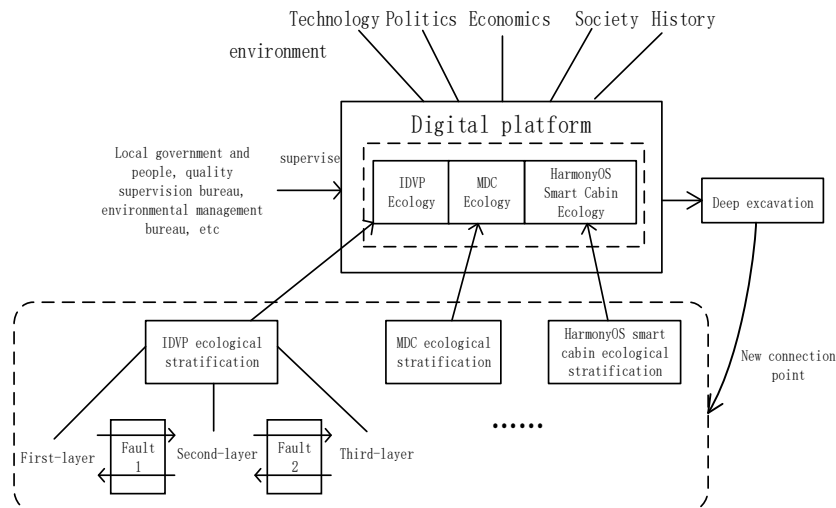


Figure 5. Huawei's smart car ecosystem governance mode

Unlike Haier COSMOPlat Ecology, the three levels of Huawei's smart car ecosystem belong to parallel levels, and there is no relationship between upstream and downstream. They are three types of technical systems for automobile production. From a traditional perspective, the connection point of the three levels lies in the connection between technologies. The joint governance mode shares information such as connection interfaces and technical characteristics to each level through the resource-sharing platform, promoting information transparency and breaking the "information island". The further division of the three levels according to the strength of enterprises can also enable the participating enterprises to actively carry out self-innovation and drive the weak enterprises to continuously absorb high-quality resources, thus improving their competitiveness and narrowing the gap between the strength of enterprises. On this basis, the joint governance mode also needs to find deep and hidden common features and problems in addition to technical convergence through big data analysis technology, and provide corresponding solutions to better avoid the occurrence of risks.

3.2.3. Comparative Analysis of Two Cases

(1) Similarity analysis

First of all, the panoramic joint governance mode from the perspective of niche is applicable not only to the governance of the digital platform ecosystem with a large span of niche, but also to the governance of the digital platform ecosystem in a single field with a relatively concentrated radiation range. Haier COSMOplat Ecology belongs to the former, and Huawei smart car ecosystem belongs to the latter. Both of the two ecosystems rely on digital platforms to carry out their own ecological construction, and both of them are larger in scale and more prone to ecological niche problems. Therefore, the joint governance mode is suitable for application. Secondly, in the process of application, both of them have a large scale and a certain system architecture within the ecosystem. Therefore, when applying the joint governance mode, it is necessary to carry out hierarchical processing from different dimensions. Thirdly, the nature of the two ecosystems is manufacturing ecology, so the types of regulatory bodies are roughly the same, but the regulatory bodies playing the leading role are different. Finally, for cross-layer governance solutions, both of them need to be predicted by digital technology, but in the application process, specific problems should be analyzed.

(2) Difference analysis

Although the joint governance mode can be applied in Haier and Huawei, the application process is different. Haier COSMOPlat Ecology is oriented towards consumers and enterprise customers, involving a large number of industries. Therefore, Haier Ecosystem is mainly realized through the output of products and services of terminal. Therefore, the hierarchy of platform partners can be considered from the service demand categories required by each partner. The focus of regulators and the solution of governance issues should also be centered on the terminal, whose regulatory body is led by both the consumer association and the quality supervision department. For the governance between different layers, the existing problems of each layer can be analyzed and summarized with the support of digital technology, and the common problems of each layer can be identified and solved by modes interconnection and service means sharing of each layer. In contrast, Huawei's smart car

ecosystem focuses on technical support, sharing and joint research and development for enterprise customers. Therefore, its hierarchical standards, problem solving dimensions and regulatory bodies should be set around technology. As for the cross-layer governance solution, different from Haier, Huawei can develop joint solutions with all layers to achieve multi-ecological collaboration and full-link empowerment. The process attributes of application joint governance mode of Haier COSMOPlat Ecology and Huawei smart car ecosystem are compared, and the comparison results are shown in Table 1.

Table 1. Comparison on the application of joint governance modes of two digital platform ecosystems

Attribute name	Haier COSMOPlat Ecology Ecosphere	Huawei Smart Car Ecosystem
Hierarchical classification of standard priorities	Service demand	Technology
Cross-layer governance solution	Mode interconnection, service sharing, technology forecasting, etc	Provide joint solutions, multi-ecological collaboration, full link enabling, technology forecasting, etc
Focus of supervision by regulators	Service implementation process	Technology research and development, sharing process
Niche problem solving dimensions	Terminal product service	Full life cycle technical support
Regulator body	Consumer association, quality supervision department dual leadership	Leader of quality supervision department

To sum up, based on the analysis of the basic situation and governance mode of Haier COSMOPlat Ecology and Huawei's smart car ecosystem, The joint governance mode proposed in this paper is applicable to the digital platform ecosystem of the two enterprises, which verifies the feasibility of the governance mode. In general, the panoramic joint governance mode from the perspective of niche applies to the governance of digital platform ecosystems with large cross-discipline and cross-domain, i.e., large niche span, and also to the governance of single-domain digital platform ecosystems with relatively concentrated coverage. However, in the process of its application, attention should be paid to the formulation of hierarchy criteria, the selection of regulatory bodies, and other issues that need to be analyzed in a specific way.

3.3. Research Inspiration

Traditional platform governance often emphasizes that the government and third-party organizations regulate the economic behavior of platform enterprises. However, as emphasized by the panoramic joint governance mode from the perspective of niche, platform governance requires not only the active participation of the government, platform organizations, and third-party organizations, but also the participation of the general public and platform stakeholders in the governance process. Based on establishing the

consensus on the value of platform governance, combining the value division of different platform governance entities, combining the governance capabilities of platform governance entities, and selecting the appropriate governance methods and tools, we can finally form a collaborative governance mechanism for the digital platform ecosystem.

First of all, according to the strategic positioning of the digital platform ecosystem, formulate the ecosystem participation standards, so as to manage the partners participating in the ecosystem in a hierarchical manner, and lay the foundation for the subsequent hierarchical and cross-layer governance; Secondly, according to the structure of the digital platform ecosystem, the hierarchy standards of the whole system are formulated, and the digital platform ecosystem is stratified according to these standards; Then, establish the supervision and governance body of the digital platform ecosystem. At this stage, multiple governance bodies need to form a value consensus. These are the foundation for the cooperation and collaborative governance of the multiple governance entities. On this basis, the value division of the multiple governance entities should be sorted out, and all kinds of governance entities should learn from each other and promote each other, so as to give full play to the respective governance advantages of the governance entities, and finally form the governance synergy.

In the governance process of the entire digital platform ecosystem, the new generation of information technologies such as big data, artificial intelligence, and blockchain should be integrated into all aspects of governance, the infrastructure construction of technology application should be strengthened, the organizational structure and management process of each governance body should be optimized, and the hierarchical governance and cross-level governance should be strictly implemented according to the divided levels. At the same time, we should give full play to the calling role of the government and other national levels, call for the formation of a dynamic and interactive collaborative and co-governance mechanism among the governance entities of the platform, and strengthen information communication between layers, and innovate governance methods and tools according to the timely needs of the platform development and governance, so as to break the fault phenomenon between layers.

4. Conclusion

4.1. Research Conclusion

With the development of the digital economy era, digital platforms are playing an increasingly important role in the process of social and economic development. Haier Group, XCMG, Huawei, and others have built their industrial Internet platforms. However, its ecosystem governance issues also follow, such as niche breadth issues such as excessive resource differences among enterprises. In view of this problem, this paper puts forward a new mode of digital platform ecosystem governance from the perspective of niche, based on the research of existing scholars, taking into account the internal and external environment of the digital platform ecosystem, namely the panoramic joint governance mode from the perspective of niche, and draws the following conclusions:

Firstly, the joint governance mode in the perspective of the panoramic niche integrates the idea of hierarchical governance and classifies the enterprises that participate in

the platform, but the essence is to create more connection points through the resource-sharing platform, so as to solve the problems at all levels in a centralized manner, which is also conducive to improving the management efficiency of the biological system.

Secondly, this mode can coordinate the ecosystem across disciplines and fields, thus improving the "potential" of the ecosystem and laying the foundation for the continuous evolution of the ecosystem, at the same time, it emphasizes the participation of the public, public organizations and third-party organizations to supervise and manage the digital platform ecosystem by expanding the scope of supervision subjects, which correspondingly improves the "state" of the ecosystem, and improves the narrow niche width of the digital platform ecosystem by improving the two attributes of niche.

Thirdly, this mode applies to both the cross-industry digital platform ecosystem and the circular ecosystem centered on core enterprises. It can promote the deep integration of the digital economy and manufacturing economy, and build a manufacturing power and digital China.

4.2. Future Outlook

There are some limitations in the research process of this paper, which leads us to think and look forward to future research.

From the perspective of research methods, the focus of this paper is to propose a new mode of digital platform ecosystem governance, which belongs to the "how" problem. Although the case study is suitable for the study of development law, there is still a lack of verification of the research conclusions. This paper can only verify the conclusions with two cases, namely, Haier Group COSMOplat Ecology and Huawei smart car ecosystem. There is a lack of more rigorous verification. In the future, empirical tests of large samples can be carried out based on the new governance mode in this paper, and the feasibility of the new governance mode can be more detailed and complete through corresponding indicators.

From the perspective of the research scope, the research focus of this paper is on the manufacturing industry and leading enterprises, while the applicability of other industries or small and medium-sized enterprise platforms needs to be further verified. Future research can further conduct cross-industry research or research in small and medium-sized enterprise clusters, to further improve the digital platform ecosystem governance mode.

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