

# Review of Research on E-commerce Platform Ecosphere

Anwen Lu, Yinqing Tan\*

School of Economics and Management, Chongqing University of Posts and  
Telecommunications, Chongqing 400065, China

\*1573152065@qq.com

## Abstract

**In the Internet era, the ecological development of enterprise platforms has become the norm. The specific performance is centered around the core platform enterprises, and enters other fields through platform envelopment strategy to carry out ecological development. In order to clarify how the enterprise develops the platform ecologically, this paper reviews the related research of the platform ecosystem and analyzes the related research on the representative e-commerce platform ecosystem. It is found that there are relatively few studies on the formation mechanism of the platform ecosystem and the relationship between the various entities, and further research is needed.**

## Keywords

**Platform; platform ecosystem; e-commerce platform ecosystem.**

## 1. Introduction

With the rapid development of digital technology, the platform economy has risen rapidly. According to the "Global Internet Trends Report 2018" released by Internet Queen Mary Meeker, as of May 29, 2018, the top 20 Internet companies in the world have a market capitalization of up to 5.78 trillion US dollars, compared with 1.429 trillion in 2013. In the US dollar, the total market capitalization is 4.05 times that of 5 years ago, and the top 20 Internet companies with the largest market capitalization have adopted the platform model without exception. China representative platform in the field of enterprises such as search engine baidu, alibaba and instant communications in the field of e-commerce in the field of tencent, they all revolve around the core platform, through the platform envelope strategy into other areas, ecological development, and become the world's top Internet companies, these companies are in the Internet industry started relatively early, influential enterprises, its development model by the from all walks of life. In addition, with the introduction of the "Internet plus" action plan, the integration of Internet platform and traditional industries has been accelerated. On the one hand, Internet platform enterprises get involved in more fields through strategic cooperation means; on the other hand, traditional enterprises gradually adopt the Internet platform model for transformation.

Industry practice shows that, with the rise of the business model of Internet platform, the industrial environment is gradually changing and the industrial boundary tends to be fuzzy. Enterprise competition is no longer the competition between individual enterprises, but gradually turns into the cross-boundary competition and even the competition between the platform ecosphere (Eisenmann & Parker, 2011). For example, the competition between two e-commerce platforms, taobao and jingdong, is the competition between two platforms' ecospheres that gather suppliers, producers and consumers. In order to enhance competitiveness, it has become the goal of enterprises to join or build the platform ecosystem. However, not all platform owners can successfully build the platform ecosystem in the end, and there are many failures in the development process. So, what is the mechanism of the formation

of the platform ecosystem? This problem is of great significance for enterprises to build platform ecosystem. And in business practice, the platform ecology of different industries reflects different characteristics.

Therefore, this paper will first sort out the relevant research on the platform ecosystem. Secondly, a representative e-commerce industry will be selected to review the related research on the e-commerce platform ecosystem.

## 2. Platform Ecosystem Research

### 2.1. Platform and Platform Enterprise

#### 2.1.1. Platform

According to the Oxford Dictionary, the term "platform" first appeared in the 16th century, initially referring to an entity used to hold an event, and later gradually blurred, referring to an idea, design, and concept. The platform research in the field of management started in the 1990s. Wheelwright and Clark (1992) introduced the platform concept to the field of management for the first time. With the development of the industry, the "platform" is constantly given new meaning, and the producers use the "platform". Depicting a new generation of products for a company, Wheelwright and Clark define the "product platform" as a new product that meets the needs of the core consumer groups. The platform is considered to be a product platform that combines core products with complementary peripheral products (Wheelwright & Clark, 1992). Since then, the academic community has gradually deepened the relevant research on the platform, appearing in the field of new product development, technology strategy and industrial economy. From the perspective of platform structure, Meyer and Lehnerd (1997) believe that the platform is composed of a series of subsystems and interfaces, and the platform can effectively develop products (Meyer & Lehnerd, 1997). Stabell & Fjeldstad believes that the platform is an asset that can create value, and that the platform has a paradigm character and is of economic importance (Stabell & Fjeldstad, 2015). With the development of bilateral market theory, Rochet and Tirole (2003) first proposed that the platform (Platform) originated from the bilateral market theory, and considered the platform to be an economic organization with certain network externalities (Rochet & Tirole, 2003). Armstrong (2006) believes that the platform is the medium of interaction between the two market entities with network externalities, and that the platform organization is the representative of the new organization operation mode (Armstrong, 2006). Domestic scholar Xu Jin (2006) thinks that the platform is a realistic or virtual trading space or place. The place can promote transactions between two or more customers. The platform itself does not produce products, but provides a trading place for two or more customers. You can get the value from it and get the value (Jin Xu, 2006). Gawer and Cusumano proposed an industry platform, which is considered to be a "system" composed of many modules that can be individually innovated. It has become ubiquitous. Many companies use platforms to develop complementary products or services to form a business ecosystem. Divided into internal platform and external platform, it also proposes that the multilateral market and network effect are the two characteristics of the industrial platform (Gawer & Cusumano, 2014). Hagiu (2014) considers a platform to be a product, service, or technology that facilitates transactions for two or more users (Hagiu, 2014).

The platform has the following characteristics: 1 The complementary feature of demand means that the demand of both sides of the platform exists at the same time. Once one party's demand disappears, the other party's demand disappears; 2 network effect characteristics, Evans (2003) believes that compared with the traditional market, bilateral The biggest difference in the market is its cross-network externalities [10]. The specific performance is that the user's utility has a close positive relationship with the number of users on the other side (Armstrong, 2006).

Scholars classify platforms based on different perspectives. Evans (2003) considers the characteristics of the bilateral market and divides the platform into market-oriented, demand-coordinated and user-oriented (Evans, 2003). According to the degree of competition, Armstrong divides the platform into monopolistic platforms, single-homed perfect competition platforms and competitive bottlenecks (Armstrong, 2006). Xu Jin (2006) divides the platform into open platform, closed platform and monopoly platform according to openness. According to the nature of connection, the platform is divided into vertical platform, horizontal platform and audience platform (Jin Xu, 2006). Chen Yinglong believes that it should be divided into five categories: trading platform, information platform, payment platform, software platform and social platform (Yinglong Chen, 2014). In addition, scholars are divided into traditional commercial platforms, e-commerce platforms, instant messaging platforms, and financial payment platforms according to the industry to which the platform belongs.

### 2.1.2. Platform Enterprise

In recent years, the development of Internet technology has promoted the rise of platform-based enterprises, and at the same time promoted the transformation of some traditional enterprises to platform-based enterprises. Platform-based enterprises have emerged in various industries, such as Alibaba in the field of e-commerce and Tencent in the field of instant messaging. Therefore, it attracted many scholars to pay attention to platform-based enterprises. Ciborra (1996) proposed the concept of "platform organization", which he believes is an organizational form that can build flexible resources, practices and structural combinations to cope with emerging business opportunities and challenges (Ciborra, 1996). The in-depth study of bilateral market theory by scholars such as Rochet and Tirole (2003) has laid a solid foundation for the theoretical research of platform-based enterprises (Rochet & Tirole, 2003). Armstrong (2006) takes into account the theory of bilateral markets and takes the lead in proposing the concept of platform enterprises. That is, platform-based enterprises refer to the use of cross-network externalities to attract buyers and sellers to the platform and promote transactions between the two parties, but do not directly provide goods or services. Mainly from the trading medium, reducing the transaction costs of both sides (Armstrong, 2006). As a platform provider and platform operator in the platform ecosystem, platform-based enterprises are mainly responsible for formulating platform trading rules, maintaining platform trading order, attracting complementary product providers to participate in the platform, and becoming the builder and leader of the platform ecosystem. Complete transactions and interactions on the platform (Cennamo & Santalo, 2013). Platform-based enterprises will reconstruct a new round of order or system within the service industry, within the manufacturing industry, and between industries by changing the pattern of division of labor and cooperation within and outside the industry (Yishuang Wu, 2014). In addition, Cennamo and Santalo (2013) believe that platform providers and operators in the platform ecosystem are platform-based enterprises, and are the builders and leaders of the platform ecosystem, and urge platform companies to complete transactions and interactions (Cennamo & Santalo, 2013). Lei Li et al. (2016) believe that platform-based enterprises refer to organizations that connect two or more specific groups to meet the needs of users and stimulate network effects through a series of measures. The network effect is the development of platform-based enterprises. The key can be divided into the same side network effect and the cross-edge network effect (Lei Li, 2016). Yijin Zhang (2016) believes that platform-based enterprises are platform providers. They develop unified standards, open sub-ports for parties to connect with, and provide products and services to meet different market needs of bilateral and multilateral markets, thereby promoting bilateral User transactions form a platform business ecosystem, and continue to develop new business functional areas and expand the scale to achieve long-term development (Yijin Zhang & Jinsong Zhang, 2016). Based on the above research, this paper considers that platform-based enterprises are platform providers, are the trading medium of

two or more groups, and are responsible for meeting the needs of the participants and promoting the transactions between the two parties.

Platform-based enterprises can be classified into two categories: one is a platform for traditional enterprise platform transformation, and the other is a platform-based enterprise based on the development of bilateral market theory. This article focuses on the latter. In the past, research on platform-based enterprises mostly focused on product development platforms. In recent years, research on bilateral market platforms has gradually deepened, and scholars have gradually paid attention to the development process of platform-based enterprises. Isckia and Lescop (2015) divide the development process of platform-based enterprises into start-up period, growth period and update period, and describe in detail the tasks of the platform at each stage. The initial stage mainly attracts users, and the growth period is responsible for increasing value proposition and strengthening users. Sticky, the update period mainly enhances user loyalty and strengthens the competitive chip (Isckia & Lescop, 2015). Zhang Yijin and Zhang Jinsong analyzed the evolution path of the Taobao platform and came up with six key factors for the development strategy of the platform-based enterprise: value core and bilateral market, pricing strategy and user scale, tipping point and network effect, open or Closed model and key profit points, market demand and user belonging, enveloping strategy and sustainable development of the ecosystem (Yijin Zhang & Jinsong Zhang, 2016). Liangjie Zhu, Jiaxun He and other scholars explored the platform formation and evolution mechanism based on the dynamic capability perspective, and divided the platform formation evolution path into three stages: product value creation stage driven by rapid iteration capability and platform system driven by platform integration capability. The stage and the value creation stage driven by the ecosystem construction capacity (Liangjie Zhu & Jiaxun He, 2018).

Platform-based companies have also highlighted some of their characteristics during their development. Lei Li (2016) believes that platform-based enterprises have the following characteristics: platform enterprises are not unique to the network environment; platform enterprises connect two or more groups; platform enterprises cannot profit from unilateral enterprises, and must stimulate network effects; platform enterprises should Retain cooperation with soft power such as brand and word of mouth (Lei Li, 2016). Peihong Xie (2017) believes that openness, integration, interaction, co-creation, sharing and spillover value are the biggest characteristics of platform-based enterprises. At the same time, it points out that not only must we focus on interaction between enterprises, but also seize opportunities to interact with consumers (Peihong Xie, 2017).

## 2.2. Platform Ecosystem

In 1993, Moore combined the natural ecosystem to present the concept of "commercial ecosystem" for the first time (Moore, 1996). In 1996, the book "Leadership and Strategy in the Age of Competitive Business Ecosystem" defines the business ecosystem as an economic union based on the interaction between organizations and individuals. Its members are mainly consumers and producers. Competitors, suppliers and other interest communities are combined (Moore, 1996). It can be seen from the existing research that the research on the concept of commercial ecosystem mainly proceeds from the following four aspects: ecological perspective, complex system perspective, platform perspective and innovation perspective. As a commercial ecosystem, the platform ecosystem comes from the natural ecosystem. In the natural ecosystem, no growth of any organism can leave other organisms. The interdependence of each organism is network-dependent, that is, the survival and growth of each organism. The value contribution of each other will eventually achieve multi-party win-win (Qian Wang, 2014). With the development of platform-based enterprises, the platform ecosystem has gradually attracted the attention of scholars. It can be seen from the existing literature that the existing

research on the platform ecosystem focuses on the connotation and evolution of the platform ecosystem, which can be classified into the following categories: the connotation study of the platform ecosystem; the development and evolution of the platform ecosystem; Circle strategy selection and ecological advantage research.

### **2.2.1. Research on the Connotation and Characteristics of Platform Ecosystem**

The current academic circles have certain differences in the definition of the platform ecosystem. For example, scholar Wang Qian (2014) based on the common value perspective, researched the Internet enterprise platform ecosystem and its financial ecosystem, and believed that the platform ecosystem of Internet enterprises is to make the platform ecosystem in the core business by constructing a multilateral group cooperation and win-win mechanism. The driver, each derivative of the business module through the organic synergy formed by the system (Qian Wang, 2014). Based on the theory of large organizations, Zheng Zhan et al. (2015) proposed that the platform ecosystem refers to the value network self-organized by leaders and stakeholders who hold specific core competencies, which surrounds the cooperation between platforms and the formation of ecosystem mechanisms. It has developed into an organic system that realizes resource sharing, complements each other and continuously enhances core competitiveness and creates value (Zhan Zheng, 2015). Yijin Zhang (2016) believes that the platform ecosystem refers to the products (services) of the platform enterprises as the core, and many enterprises participate in it to meet the needs of all consumers, form a complementary and complementary network relationship, and jointly grow an profitable ecosystem (Yijin Zhang, 2016). Peihong Xie and Changdong Chen (2017) and other scholars reviewed the components and competition strategies of the platform-based enterprise ecosystem, and proposed that the platform ecosystem means that the platform enterprises provide trading places by connecting two or more groups with complementary needs. The mechanism further satisfies the needs of all groups and benefits from the mutually beneficial and mutually beneficial ecosystem; and believes that the essence of the platform ecosystem strategy is to build an ecosystem for the interaction of members of the multilateral market and stimulate the network effect to create a A continuing ecosystem (Peihong Xie & Changdong Chen, 2017).

It can be seen from the above definition that the platform ecosystem has the following characteristics: (1) Dynamic, the platform ecosystem is not static, but gradually changes with the changes of the environment; (2) Openness, the platform ecosystem is an open The system, its boundaries are difficult to define; (3) complexity, the platform ecosystem is a complex system, the system members are complex and diverse, and each member adapts to each other to ensure the healthy development of the ecosystem.

### **2.2.2. Research on the Development and Evolution of Platform Ecosystem**

With regard to the development and evolution process of the platform ecosystem, scholars mainly focus on two different perspectives of collaborative evolution and network evolution. Based on the perspective of collaborative evolution, Tiwana et al. (2010) proposed a platform ecosystem evolution model by studying the platform ecosystem architecture (Tiwana, 2010). Jingkun Bai (2017) based on the process perspective and self-organization perspective, taking Taobao as an example, through the analysis of the platform enterprise function, the relationship between SMEs in the platform enterprise network and the self-organization status of the platform enterprise network, the self-organization of the platform enterprise network is explored. Formation mechanism (Jingkun Bai, 2017). Inoue et al. (2017) pointed out that in the new market environment, it is pointed out that multiple platform ecosystems work together to achieve complementary functions and resource sharing can promote the sustainable development of the platform ecosystem (Inoue, 2017). Zhengpei Wang (2017), through the research on the development path of 11 crowdfunding platform cases, proposed three different

types of crowdfunding platform ecosystem construction ideas, and also found the fundamental dynamic mechanism of the evolution and development of crowdfunding ecosystems (Zhengpei Wang, 2017). Jianping Wang (2018) reveals the construction mechanism and behavioral process of the platform ecosystem from the perspective of industry 4.0. The study believes that the construction of the platform ecosystem must undergo bilateral market positioning, stimulate network effects, determine profit models and formulate Platform ecological rules and other links, and explore the relationship between the construction of the platform ecosystem and organizational change (Jianping Wang, 2018).

Starting from the network evolution of the platform ecosystem, Li Lei (2016) adopted the idea of “based on macroscopic analysis and microscopic” to construct the life cycle curve of the platform ecosystem, and divided the curve into the initial stage, the vacuum period, the outbreak period, the maturity period, In the six stages of uncertainty period and secondary explosion period, the theoretical framework of platform enterprise operation strategy is constructed by identifying the characteristics of each stage (Lei Li, 2016). Liangmou Gao proposed the platform ecosystem evolution process of “product platform-platform enterprise-platform ecosystem” by reviewing related literatures, and elaborated the mechanism of each stage (Liangmou Gao, 2018). Hairui Shi (2018) used system dynamics to explore the evolution of platform ecosystem. It is believed that network effect, platform quality and platform competition are the key variables of platform system evolution. The causal loop diagram is also built around these variables to identify possible evolution. The problems that arise, and finally the corresponding models are proposed to propose relevant policy recommendations (Hairui Shi, 2018).

### **2.2.3. Research on Strategic Management and Ecological Advantage of Platform Ecosphere**

Scholars have little research on strategic management of platform ecosystem. Songting Pan (2017) considers the realization mechanism of enterprise ecosystem strategy and the source of ecological advantage. He believes that the formation of enterprise ecological advantage should be based on consumption scene rather than product. The scenario also suggests that the implementation of the ecosystem strategy requires attention to avoid risks (Songting Pan, 2017). Pengjie Xu (2017) used Han Duyi as a case to explore the evolution direction of the competition paradigm of enterprises from the acquisition of competitive advantage to the acquisition of ecological advantages in the Internet era. The research conclusions indicate that the evolution needs to be carried out from the strategic, organizational and operational levels (Pengjie Xu, 2017). Jing Zhang (2018) takes Jingdong as an example, and combines the platform enterprise life cycle theory to extract the path model of ecological advantage formation. It believes that the formation paths of different stages are different, enriching the theory of enterprise advantage (Jing Zhang, 2018).

**Table 1.** Summary of perspectives of platform ecosystem research

<b>Perspective</b>	<b>Main content</b>	<b>Research methods and theory</b>	<b>Representative scholar</b>
Connotation feature	Connotation feature, Component	Ecosystem theory	Wang Qian (2014) Xie Peihong (2017)
Development and evolution	Evolutionary stage characterization, Evolutionary motivation analysis	System Dynamics, Case analysis method, Ecosystem theory, Life cycle theory, Self-organization theory	Lanlan Hu (2009), Lei Li (2016), Inoue (2017), Zhengpei Wang (2017), Hairui Shi (2018)
Strategic management and ecological advantages	Business model selection, Construction of ecological superiority	Case analysis method, Life cycle theory, Classical competition theory, Resource-based theory	Yuhui Hou (2015), Songting Pan (2017), Yi Zhang (2018)

### 3. E-commerce Platform Ecosystem Research

In recent years, China's e-commerce has achieved vigorous development. In terms of market size, according to China E-Commerce Report 2017, China's e-commerce transaction volume in 2017 reached 29.1 trillion yuan, and the transaction volume was 2.8 times in 2013. In terms of industrial innovation, with big data, cloud computing and The rapid development of digital technologies such as artificial intelligence has continually spawned new formats. Around the e-commerce platform, there have been support services such as payment and logistics, and derivative services such as marketing and consulting. It can be seen that the current stage of e-commerce is not only a network transaction, but also reflects a platform and ecological characteristics (Guangqian Li, 2018).

With the ecological development of e-commerce platform enterprises, domestic scholars gradually introduce commercial ecosystem into e-commerce research. The e-commerce platform ecosystem is similar to the natural ecosystem, including producers, consumers, decomposers and the ecological environment. Lanlan Hu (2009) divides the evolution of e-commerce ecosystem into four stages: development, expansion, coordination and evolution.

According to the positioning, the “species” in the e-commerce ecosystem are divided into four categories: leading population, key population, supporting population and parasitic population. Finally, the theory is also combined with the Alibaba case to prove the theory (Lanlan Hu, 2009). In addition, Zhen Li (2016) extracted five measurement dimensions of the Internet business platform ecosystem based on the literature review, and incorporated the Internet business platform ecosystem construction and the business platform virtual value chain into the customer selection conceptual model. , conducting an empirical study to verify the hypothesis. The research conclusions show that the Internet business platform ecosystem can directly affect the perceived value of customers on the business platform (Zhen Li, 2016) . Huiling Xiao, Li et al. (2017) based on the theory of commercial ecosystem, analyzed the composition and evolution stage of the e-commerce platform enterprise ecosystem, and proposed the corresponding strategic choices (Huiling Xiao, 2017). Tiezhen Wang (2018) analyzed the influencing factors and internal growth mechanism of e-commerce platform enterprise ecosystem growth from the evolution of ecosystem (Tiezhen Wang, 2018).

### **3.1. E-commerce Platform Ecosystem Conceptual Model**

This paper will simulate the natural ecosystem to sort out the components of the e-commerce platform ecosystem. Between various groups, between the population and the environment, relying on logistics, capital flow and information flow are interrelated.

(1) Leading populations. The e-commerce platform enterprises in the e-commerce platform ecosystem are leading populations. It is the dominant species in the ecological circle and occupies a controlling position in the entire ecological circle. It mainly provides communication channels for members of the ecological circle and plays an important role in integrating resources and coordinating relationships.

(2) Key populations. It mainly refers to the trading entities in the e-commerce platform ecosystem, such as producers, suppliers, retailers and consumers. Its main function is to maintain population diversity and system stability.

(3) Supporting populations. Mainly refers to logistics platforms, financial institutions, telecommunications service providers, etc. They are redundant and do not directly depend on the core platform, but rely on the core platform to earn more than the benefits of their own development.

(4) Parasitic populations. Parasitic populations depend on the e-commerce platform ecosystem.

### **3.2. Analysis of the Interaction Relationship of the E-Commerce Platform Ecosystem**

Compared with the population of the natural ecosystem, the participating populations in the e-commerce platform ecosystem have niche overlap problems, and the interaction relationship of the e-commerce platform ecosystem is also different. Therefore, based on the classification of the e-commerce platform ecosystem type, Analysis of the interaction between various groups is of great significance to the healthy development of the e-commerce platform ecosystem.

#### **3.2.1. Intra-population Interaction**

The interaction within the population is the interaction between individuals and individuals within the population, including two types: competition and cooperation. Within the population, individuals compete for competition for the same kind of resources. For example, suppliers in the key population of the e-commerce platform ecosystem will compete for the attention of the same kind of users. At the same time, there are cooperative relationships among individuals within the population. For example, among the key populations, enterprises in the upstream and downstream of the ecological chain will cooperate with each other in order to reduce costs and improve efficiency, and then seek to maximize profits.



### 3.2.2. Inter-population Interaction

The interaction between populations is the interaction between populations and populations in the ecosystem, with emphasis on symbiotic relationships. The symbiotic relationship is mainly divided into mutual benefit symbiosis, partial symbiosis and parasitic symbiosis. Among them, mutual benefit and symbiosis can be divided into symmetric mutual benefit symbiosis and asymmetric mutual benefit symbiosis. There are resource complementary features among various groups in the platform ecosystem. Therefore, the interaction between populations is mainly reflected in mutual benefit and symbiosis. According to the income distribution ratio, the mutually beneficial symbiosis between populations can be divided into two types: symmetric mutual benefit symbiosis and asymmetric mutual benefit symbiosis. The populations that exhibit symmetric and mutually beneficial symbiotic relationships promote each other and develop together. For example, the supporting populations in the e-commerce platform ecosystem can provide support services for logistics and finance for key populations, and support populations can also obtain high returns from this service process. The two are reflected in the symmetry and mutual benefit symbiotic relationship.

As the dominant species, the core platform enterprise of the leading population in the e-commerce platform ecosystem is to create value and share value. The specific embodiment is as follows: Firstly, considering the heterogeneity of resources, the trusted platform enterprise will integrate all resources and effectively combine resources through the resource sharing mechanism to create value, realize value appreciation, and further realize economies of scale and network effects. Then, the core platform enterprises will also achieve coordinated development of all parties by formulating a reasonable interest distribution mechanism.

## 4. Conclusion and Prospects

Through reviewing relevant literatures at home and abroad, the concept of "platform ecosystem" has been widely quoted in recent years. The research on platform ecosystem at home and abroad has also grown rapidly. At present, some research results have been achieved, and relevant research results are both platforms. The effective implementation of the ecosystem provides a valuable reference and lays a good foundation for relevant theoretical research. However, in the face of the current construction and sustainable development of China's platform ecosystem, the current research is still in the exploratory stage, its research breadth and depth is not enough, lack of support from core theory, the research content needs to be broken, and the following shortcomings exist:

(1) Analysis of existing literatures found that domestic and foreign scholars' existing research results on the platform ecosystem are relatively fragmented, most of which focus on the connotation and characteristics of the platform ecosystem; and the current composition, competition and formation mechanism of the platform ecosystem. The study has not yet formed a unified understanding. The predecessors' research can only be used as a reference, and can not directly guide the practice as a theory. Therefore, the relevant theories about the platform ecosystem are still scarce, and a relatively complete theoretical system has not yet been formed. It is urgent to explore the formation of the platform ecosystem from the theoretical level. mechanism.

(2) A large number of practices have shown that SMEs in the platform ecosystem have an indelible impact on the development of the platform ecosystem. However, the existing research perspectives focus on the development of core platform enterprises and pay less attention to other participants. Development, neglecting the relationship among the participating entities in the platform ecosystem, and insufficient research on the relationship between the core platform enterprises and the participating entities is not conducive to the healthy and sustainable development of the platform ecosystem.

(3) Although some literatures have carried out related research on the e-commerce platform ecosystem, many cases are analyzed based on the characteristics of its composition and evolution stage, and the relationship between the various entities in the ecosystem is not analyzed. The existing research is not deep enough. In short, there is still much room for the formation mechanism of the platform ecosystem and the study of the relationship between the various entities in the ecosystem.

This paper summarizes the research on the platform ecosystem, and believes that the future research on the platform ecosystem can focus on the following aspects:

(1) Considering the ecological nature of platforms in different industries has different characteristics. It can analyze the platform ecosystem of specific industries and analyze the formation mechanism and general rules of the ecosystem of various industry platforms.

(2) At present, there is little research on the relationship between the various entities of the platform ecosystem. In the future, the relationship between the various entities in the platform ecosystem of a specific industry can be analyzed. The relevant theories such as ecosystem theory, complex system theory and evolutionary game theory can be fully utilized to analyze the relationship of each subject, and corresponding countermeasures and suggestions are proposed according to the actual situation to promote the healthy development of the platform ecosystem.

## References

- [1] Eisenmann, T., Parker, G., & Van Alstyne, M. (2011). Platform envelopment. *Strategic Management Journal* (John Wiley & Sons, Inc.), 32(12), 1270–1285.
- [2] Wheelwright, S. C., & Clark, K. B. (1992). Creating Project Plans to Focus Product Development. *Harvard Business Review*, 70(2), 70–82.
- [3] Deck, M. (1997). The Power of Product Platforms: Building Value and Cost Leadership (Book). *Journal of Product Innovation Management*, 14 (6), 526–529.
- [4] Stabell, C. B., & Fjeldstad, Ø. D. (1998). Configuring value for competitive advantage: On chains, shops, and networks. *Strategic Management Journal* (John Wiley & Sons, Inc.), 19(5), 413.
- [5] Rochet, J.-C., & Tirole, J. (2003). Platform Competition in Two-Sided Markets. *Journal of the European Economic Association*, 1(4), 990–1029.
- [6] Armstrong, M. (2006). Competition in two-sided markets. *RAND Journal of Economics* (Wiley-Blackwell), 37(3), 668–691.
- [7] Jin Xu, Xiang-jian Zhang. (2006). Survey on Platform Economics. *China Industrial Economy*, (05), 40-47.
- [8] Gawer, A., & Cusumano, M. A. (2014). Industry Platforms and Ecosystem Innovation. *Journal of Product Innovation Management*, 31(3), 417–433.
- [9] Hagi, A., & Jullien, B. (2014). Search diversion and platform competition. *International Journal of Industrial Organization*, 33, 48–60.
- [10] Evans, D. S. (2003). The Antitrust Economics of Multi-Sided Platform Markets. *Yale Journal on Regulation*, 20(2), 325.
- [11] Yinglong Chen. (2014). A study on business model of platform firm in two-sided markets. Wuhan university.
- [12] Ciborra, C. U. (1996). The Platform Organization: Recombining Strategies, Structures, and Surprises. *Organization Science*, 7(2), 103–118.
- [13] Cennamo C, Santalo J. (2013). Platform competition: Strategic trade-offs in platform markets. *Strategic Management Journal*, 34(11), 1331-1350.
- [14] Yishuang Wu. (2014). Study of agglomeration and development led by platform enterprises. *Science Research Management*, 35(07), 20-26.

- [15] Lei Li, Xiande Zhao, Zhaoquan Jian. (2016). Operation Strategy of Platform Enterprises in Network Environments. *Journal of Management Sciences in China*,19(03), 15-33.
- [16] Yijin Zhang, Jinsong Zhang. (2016). A Study on the Development Strategy of Platform Enterprises Based on Internet: A Case of Taobao Platform. *East China Economic Management*, 30(06), 54-61.
- [17] Isckia T, Lescop D. (2015). Strategizing in platform-based ecosystems : leveraging core processes for continuous innovation. *Communications & Strategies*, 1.
- [18] Liangjie Zhu, Jiaxun He, Haiyang Huang. (2018). The Evolution Mechanism of Internet Platform Formation: A Case Study Based on Han Du Yi She. *Journal of Management Case Studies*,11(02), 163-180.
- [19] Peihong Xie, Changdong Chen, Fan Zhou. (2017). Research on the Frontier of Platform Enterprise Ecosystem Strategy. *Journal of Shanghai University of International Business and Economics*, 24 (05), 54-65.
- [20] Moore J F. (1993). Predators and Prey: A New Ecology of Competition. *Harvard Business Review*, 71(3),75-86.
- [21] Moore J. (1996). The Death of Competition. *Fortune*, 133(7), 142-144.
- [22] Qian Wang. (2014). Research on the Internet Business Platform Eco-sphere and Its Financial Ecology: Based on the Perspective of Common Value. *Financial Markets*, (11), 76-86.
- [23] Zheng Zhan, Xusong Xu, Guobin Zhu, et al. (2015). The overview of Big Organization. *Chinese Journal of Management*, 12(04), 522-529.
- [24] Tiwana A, Konsynski B, Bush A A. (2010). Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics. *Information Systems Research*, 21(4), 675-687.
- [25] Jingkun Bai, Jian Wang, Wei Zhang. (2017). Research on Self-Organization Mechanism of Platform Enterprise Network: A Case Study of Taobao.com. *China Soft Science*, (05), 171-180.
- [26] Inoue Y, Tsujimoto M. (2017). New market development of platform ecosystems: A case study of the Nintendo Wii. *Technological Forecasting & Social Change*.
- [27] Zhengpei Wang, Guoxin Li. (2017). Building Crowdfunding Ecosystem: A Multi-case Study. *Management Review*, 29(05), 256-272.
- [28] Jianping Wang. (2018). Industry 4.0 Strategy Driven Enterprise Platform Ecosystem Construction and Organizational Change. *Science & Technology Progress and Policy*, 35(16), 91-96.
- [29] Liangmou Gao, Yijin Zhang. (2018). The Evolution and Enlightenment of Platform Theory. *Forum on Science and Technology in China*, (01), 123-131.
- [30] Hairui Shi, Guoqiang Sun, Baojian Zhang. (2018). System Archetypes of the Evolution of Platform Ecosystem and Policies' Explanation. *Forum on Science and Technology in China*, (07), 113-123.
- [31] Songting Pan, Dapeng Yang. (2017). Corporate Ecosystem Strategy Decision and Eco-advantage Building. *Science & Technology Progress and Policy*, 34(21), 80-87.
- [32] Pengjie Xu. (2017). The Change Competitive Paradigm in Internet Era: From Competitive Advantage to Ecological Advantage: A Case Study Based on Handu Group. *Human Resources Development of China*, (05), 104-109.
- [33] Yi Zhang, Renhuai Liu, Haiquan Chen. (2018). Eco-Advantage Formation Path of Platform Firm in Business Ecosystem: Evidence from JD. com, Inc.. *Research on Economics and Management*, 39(09), 114-124.
- [34] Guangqian Li, Tao Tao. (2018). E-commerce Platform Ecology and Platform Governance Policy. *Management World*, 34(06), 104-109.
- [35] LanLan Hu, Xianghua Lu, Lihua Huang. (2009). A Essay on E-business Ecosystem and Its Evolutionary Path. *Economic Management Journal*, 31(06), 110-116.
- [36] Zhen Li, Xinxin Wang. (2016). Influence of the Construction of Internet Business Platform Ecosystem on Customer Choice Modes. *Journal of Shanghai University of Finance and Economics*, 18 (04), 67-82.

- [37] Huiling Xiao, Wei Li, Wenkang Du, Yuhang Lu. (2017). Research on E-commerce Platform Enterprise Ecosystem and Its Strategic Evolution: Based on Enterprise Case Study. *Shopping Modernization*, (07), 50-52.
- [38] Tiezhen Wang, Tijun Zhang. Influencing Factors and Intrinsic Growth Mechanism of E-commerce Platform Enterprise Ecosystem Growth. *Journal of Commercial Economics*, (02), 64-67.