

# Digital innovation ecosystem and innovation of SMEs: A case study of Anker

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**Abstract.** Digital technology has changed the original product form, the way of new product production process, business model and organizational form, and even overturned the basic assumptions of many innovation theories. Embedding digital innovation ecosystem makes it possible for small and medium-sized manufacturing enterprises to create value from the production side in the industrial era to the demand side in the digital economy era. Through a typical vertical case analysis, this paper reveals the internal mechanism and process of digital innovation ecosystem empowers the innovation of small and medium-sized manufacturing enterprises. The research results show that the embedding of digital innovation ecosystem has a significant positive impact on the innovation performance of small and medium-sized manufacturing enterprises, and value co-creation plays an intermediary role between digital innovation ecosystem and the innovation performance of small and medium-sized manufacturing enterprises. This paper puts forward the innovation theoretical framework of small and medium-sized manufacturing enterprises from the perspective of digital innovation ecosystem.

## 1 Introduction

During the 14th Five Year Plan period, China puts forward more urgent requirements for accelerating scientific and technological innovation. SMEs play an important role in improving the ability of scientific and technological innovation, supporting sustainable economic development, and expanding social employment. They are also an important force in cultivating new drivers of development and high-quality development of the national economy. In the era of digital economy, digital technology has changed the original product form, the mode of new product production process, business model and organizational form, and even overturned the basic assumptions of many innovation theories [1-2] and the innovation basis of traditional industries [3]. Embedding the digital

innovation ecosystem makes it possible for SMEs to create value from the production side in the industrial era to the demand side in the digital economy era [4]. It is an important measure to promote high-quality development to study how to effectively improve the innovation ability of scientific and technological SMEs in the era of digital economy, solve the problem of insufficient innovation ability objectively, and give better play to their due role in national economic development.

## 2 Relevant literature review

### 2.1 Digital innovation ecosystem

The concept of ecosystem was first put forward by British ecologist Tansley in 1935. Moore took the lead in

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introducing ecosystem theory into business in 1993[5]. The research pointed out that enterprises should not be regarded as members of a single industry, but a part of a cross industry business ecosystem. Business ecosystem consists of individuals, organizations, governments, business rules, customers, competitors, media and other components. The US competitiveness Commission first put forward the concept of "innovation ecosystem" in 2004, it refers to the unified whole formed between various innovation institutions (enterprises, universities, research institutions) and innovation service institutions (government, finance institution, law firm, agency) interacting in a certain region and various elements of the innovation environment.

The innovation ecosystem emphasizes the collaborative symbiotic relationship between innovation subjects, which enables participants to realize resource synergy and value creation around a core subject, and continuously launch new products, new technologies or new solutions [6-7]. Innovation subjects can be suppliers, complementarities, consumers, etc. these subjects in the innovation ecosystem affect and restrict each other, forming a purposeful, value sharing and dynamic network, and conducting common value creation and joint research, so as to jointly achieve a new state. With the rise of digital economy, digital, as a new element, is comprehensively influencing and participating in innovation interaction, promoting the expansion and improvement of traditional innovation development theory, and triggering the discussion on the construction of digital innovation ecosystem. Zhang Chao et al. divided the digital innovation ecosystem into two forms: innovation oriented digital ecosystem and digital enabled innovation ecosystem [8].

## 2.2 Value co-creation

Prahalad & Ramaswamy put forward value co-creation, which refers to an individual centered method in which enterprises and consumers create value together [9]. Subsequently, the value co-creation subject extends from the dual relationship between consumers and enterprises to suppliers, channel providers, platform enterprises and other subjects [10-12], The link of value

co-creation extends from the initial marketing field to R & D innovation [13].

Value co-creation is divided into four dimensions, namely dart model, namely dialogue, access, risk reduction and transparency [14]. Dialogue is the communication mechanism between the subjects of digital innovation. Access is the channel of resource flow. Risk reduction emphasizes the risk sharing mechanism in value creation behaviour. Transparency reflects the information symmetry in value co-creation behaviour, and reduces transaction costs by improving the transparency of innovation cooperation.

## 2.3 Innovation of manufacturing SMEs

As for the innovation driving force, since Schumpeter first put forward the innovation theory, Dosi proposed two innovation driving forms: technology driven and market driven on the basis of previous studies [15]. Verganti put forward the concept of design driven innovation to further supplement this theory, so as to establish three driving forces of enterprise innovation. Design innovation is the information transmitted by products and the novelty of design language is far greater than the novelty of its technical achievements. Design innovation is of great significance for the transformation and upgrading of SMEs because of its characteristics of short technology R & D cycle, quick effect, low investment and low risk [16].

Through the research on the innovation mode of SMEs, more and more scholars pay attention to non-R & D innovation [17]. Non-R & D innovation refers to the general name of various types of innovation in an enterprise other than R & D innovation mainly comes from the existing knowledge reserve of the enterprise or outside the enterprise, and is not realized through systematic R & D activities within the enterprise.

The existing literature pays attention to the empowering effects of different types of digital platforms and their ecosystems on the innovation, transformation and upgrading of complementary (external enterprises), but there are still gaps. In terms of research objects, the theoretical framework of digital innovation ecosystem research is mainly aimed at platform enterprises (or ecosystem leaders, focus

enterprises and incumbent enterprises), and lacks attention to complementarities, especially SMEs. Their research content focuses on the construction, operation mechanism and governance of digital innovation ecology, and there is a lack of in-depth discussion on how to empower the innovation of SMEs; In terms of research methods, theoretical framework construction and case analysis are mainly used, and empirical research is still relatively scarce.

### **3 Basis research design and case analysis**

#### **3.1 Research questions and research methods**

In order to analyze the internal mechanism and process of digital innovation ecology enabling the innovation of SMEs, this study selects the case study method. Digital innovation ecology is in the exploratory stage, and the use of case study method can help to answer the "how" issue.

#### **3.2 Case selection**

This paper selects Anker (SZ: 300866) as a typical case study. Since its establishment in 2011, Anke has focused on 3C accessories. With the help of Amazon cross-border e-commerce platform, Amazon Web Services, Amazon Alexa, Anke has obtained 1478 pieces of intellectual property rights, more than 80 million users, and its business covers 100 + countries around the world. 98.48% of its revenue comes from overseas. For four consecutive years, it has been ranked in the top 11 of BANDZ China's global brand list, becoming a model for Chinese manufacturing enterprise to rely on cross-border e-commerce to sell products to the world. In 2020, Anker was listed on the market with a market value of up to 80 billion yuan, and won the title of Hurun China's top 500 private enterprises in the same year.

#### **3.3 Data collection and analysis**

This paper collects data through interviews, official websites, documents, on-site observation and

second-hand materials, which come from media reports, research reports and so on. The growth process of Anker is divided into three stages.

##### **3.3.1 Phase I (2011-2013)**

At this stage, Anker mainly relies on digital platform operators to realize value co-creation. In 2012, Anker chose Amazon as the main channel. The product R & D positioning mainly referred to Amazon's scoring system and competitive product data, and took the 3C Product accessories such as charging plug that are relatively low price but can also obtain high score as a breakthrough. The specific method is to collect the review of each product for data statistics and analysis to reflect the user's experience and potential demand for the product. For example, many consumers are troubled by the problem that the lightning cables of the mobile phone is easy to break after being used for a time. Anker innovated and tried hundreds of materials, and finally found a fiber on the bulletproof vest, which is much more durable and functional than other data lines on the market. In 2013, Anker's sales exceeded US \$100 million and has become a major seller of Amazon.

##### **3.3.2 Phase II (2013-2016)**

At this stage, Anker relies on the platform to realize value creation with consumers. Anker carries out product design and optimizes each link according to the user's pain points. Anker has a complete set of processes to ensure that the product manager can extract the areas where the product needs to be improved from the analysis and summary of VOC (voice of customer). In 2014, Anker created the first portable power source with a total sales volume of more than 1 million, which is a portable power source in the shape of lipstick.

##### **3.3.3 Phase III (2016-2021)**

At this stage, Anker realizes value creation with digital platforms, consumers and digital technology supplier. When Anker becomes the leading brand in the industry, it decided to make some new products that can lead the industry. Anker continues to cooperate with digital

technology supplier such as Amazon Web Services and Amazon Alexa, and focuses on the development of intelligent innovative products such as smart home devices, security camera and car voice assistant. Through Amazon Web Services in artificial intelligence, machine learning, speech recognition and other fields, Anker quickly realizes the innovation and iteration of intelligent hardware products. For example, Anker uses Amazon Robomaker, Alexa for business services to accelerate the functional development and iteration of products such as sweeping robots. The evidence for each stage is shown in table 1.

**Table 1.** Value co-creation based on Digital Innovation Platform

Phase	Evidence
Phase I	"An important source of innovation and iteration of Anke's innovative products is the review and user feedback on Amazon, which is almost a free but very real and effective way."
Phase II	"Every product innovation and iteration is the full excavation and delivery of consumer needs" "What we saw at that time was that many women only took a small bag when they went out, and they needed a small mobile power supply. We created the first popular model through the shape of lipstick and bright colors." "Brands in the traditional sense iterate on a yearly basis, but why can't we iterate faster when we hear user feedback on a daily basis?"
Phase III	"Over the years, relying on Amazon cloud technology and Amazon's rich global resources, Anker has continuously innovated, broken through itself, and successfully created a leading smart product brand in the global market."

## 4 Conclusion

With the help of Amazon cross-border e-commerce platform, Amazon cloud AWS, Amazon Alexa, Anker has realized from non-R & D innovation to R & D innovation, and has accumulated 1478 pieces of intellectual property rights. Digitization can increase the

new combination of production factors or produce new production functions. With the in-depth integration of traditional entities and digital technology, the product boundary will no longer be clear. SMEs change the original product architecture by combining physical components and digital components to form digital product innovation. Therefore, this paper puts forward the following proposition:

*Proposition 1: Digital Innovation Ecosystem embedding has a positive impact on the innovation performance of SMEs.*

Anker realizes innovation through value creation with digital platforms, consumers and digital technology suppliers. A large number of SMEs are OEM or ODM, and the information obtained from the market is limited. The dialogue helps enterprises understand the value proposition of customers as the basis for enterprise R & D or iterative product decision-making. In 2020, the combination of SMEs with innovative resources, such as the ability to improve the performance of SMEs; in 2021, there are insufficient ways to rely on their own technological and manufacturing resources; in 2021, the combination of SMEs with innovative resources. SMEs have weak anti risk ability. value co-creation can improve their keen perception of external market changes, and then adjust in time to reduce innovation risk. The improvement of transparency helps to protect the innovation cooperation in the innovation ecosystem, reduce opportunistic behavior and indirectly improve the innovation performance of enterprises. Therefore, this paper puts forward the following proposition:

*Proposition 2A: Dialogue has a significant positive impact on the innovation performance of SMEs.*

*Proposition 2B: Acquisition has a significant positive impact on the innovation performance of SMEs.*

*Proposition 2c: Risk reduction has a significant positive impact on the innovation performance of SMEs.*

*Proposition 2D: Transparency has a significant positive impact on the innovation performance of SMEs.*

The digital enabled innovation ecosystem promotes value co-creation mainly through the following mechanisms. First, the digital infrastructure and digital platform of the digital innovation ecosystem reduce the cost of communication between innovation subjects,

improve the efficiency of communication, and strengthen the role of user participants in the ecosystem. Users can fully participate in the value creation process. Second, the heterogeneous subject of digital innovation ecosystem has become the source of innovation resources. Third, the digital innovation ecosystem has reduced risks. Fourth, the of digital innovation ecosystem strengthens the coordination mechanism of innovation ecosystem and improves the transparency of value co-creation. Therefore, this paper puts forward the following proposition:

*Proposition 3: Value co-creation plays an intermediary role between digital innovation ecosystem and innovation performance of SMEs.*

Based on innovation paradigm 3.0, some studies have proposed the importance of digital innovation ecosystem for complementarities, but the mechanism of digital innovation ecosystem enabling the innovation of SMEs needs to be explored. The possible theoretical contribution of this study is to introduce value co-creation among innovation subjects, which provides a new idea for the study of effective empowerment of digital innovation ecosystem.

This paper adopts the single case study method, which is helpful to dissect the typical process and mechanism of innovation of SMEs in the digital innovation ecosystem, provide ideas for SMEs to carry out digital innovation and improve their innovation ability, and provide policy suggestions for the high-quality development of manufacturing industry. Quantitative methods can be used for quantitative analysis and verification in future research.

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