

# Research on Business Model Innovation Driven by Scientific and Technological Innovation\*

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**Abstract**—The innovation of business model driven by science and technology has become one of the key drivers to promote the leap-forward growth of economy. Through literature review, this paper analyzes the theory of scientific and technological innovation to drive the business model innovation logic, summarizes the Internet age, the age of the Internet, and before the typical business model intelligent era, in order to grasp the future direction of the business model innovation for the enterprise, make the management decision to provide corresponding theoretical reference.

**Keywords**—*scientific and technological innovation; business model innovation; platform mode; sharing economy; entrepreneurship*

## I. INTRODUCTION

Innovation-driven development strategy has become the core of China's development strategy. Theoretical research and practice prove that the innovation of business model is a change that has both the hypothesis and the thinking set of the industry [1]. In recent years, the innovation of business model has emerged, and the result of scientific and technological innovation and its transformation and application have played an indispensable role in it. Therefore, to clarify the theoretical logic of technological innovation to drive the innovation of business model and to predict the trend of business model innovation, it has the reference value and guiding significance for enterprises to advance the business model in advance.

## II. THE THEORETICAL LOGIC OF TECHNOLOGICAL INNOVATION DRIVES THE INNOVATION OF BUSINESS MODEL

### A. Theoretical Review of the Innovative Driving Business Model of Science and Technology

Compared with the general and mature technology innovation theory, the research on business model innovation is still in the process of perfection. Most scholars analyze the

business model from the perspective of origin and process. McGrath believes that business model innovation is driven by external drivers [2]. From a dynamic perspective, this view defines the business model innovation as a result of "trial - trial and error - adjustment", which is a passive stress change process. Martins et al. thinks that business model innovation is driven by enterprises, and believes that the business model innovation begins with the cognition of the enterprise executive team [3]. From the perspectives of innovation process and Lecocq, etc. that business model innovation process is caused by internal factors of enterprise target, operation mode and profit mode [4], system evolution and the fundamental change. The research of Bucherer etc. showed that the so-called business model innovation is the enterprise change the key core elements for a specific purpose and business logic to achieve sustained profitability, is to design the process of operating model and profit model [5]. In conclusion, it is widely believed that business model innovation requires the participation and cooperation of enterprise internal and external value network members. Innovation is driven by internal factors such as enterprise management cognition, core competence, decision-making and other internal factors such as technological innovation, dynamic situation and market opportunity. It is a systematic change in the implementation of business model elements within the enterprise.

In the research on the innovation of science and technology innovation-driven business model innovation, the research literature on the technological innovation that drives the business model is rich. Wu xiaobo et al. (2013) scholars believe that there is a relationship between technological innovation and business model innovation. In addition, some scholars compare the business model innovation and the innovation of technology innovation process and innovation as a result, think both innovations based on the resources and capacity, to make scientific decision in order to get the final customer value and economic benefits. The innovation of enterprise technology innovation and business model has the consistency of process form and goal consistency. But there is an essential difference between Science and technology

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innovation and technological innovation. Science and technology innovation including knowledge innovation, technology innovation and management innovation from three aspects, scientific and technological level in different periods, different stages of development, the connotation and extension of science and technology innovation might be different, but the innovation system of the three elements of architecture is constant.

### *B. Scientific and Technological Innovation Drives Business Model Innovation in Logic Analysis*

Science and technological innovation is different from technological innovation. The innovation of science and technology is mainly reflected in the innovation at the industrial and national level, while the technological innovation mainly involves the enterprise level. The transformation of scientific and technological innovation can not only bring about the customer value and economic benefits of technological innovation, but also create social welfare including scientific discovery and spiritual value. Therefore, compared with technological innovation, the internal logic of innovation driving business model is more complex and richer.

The research results of innovation-driven theory show that science and technological innovation brings technological innovation, knowledge innovation and management innovation, which greatly changes the external environment of enterprise operation. First, technical innovation as the optimization of industrial structure and economic growth mode transformation possible, resulting in earnings growth, and the emergence of more technology to improve the quality of workers, and using a series of positive, promote the enterprise's internal resource allocation optimization and ability level. Management innovation requires companies to break the original boundary, looking for a new source of innovation, forcing the enterprise structure and the way they operate more open and inclusive, and determines whether the enterprise can carry on the business model innovation effective. Second, management innovation and technology innovation can improve the efficiency of enterprise's internal operations and marketing, which changes the enterprise value creation logic, value delivery and access; create enterprise value creation and innovation of the profit model. At the same time, the organization form of enterprises under the impetus of the scientific and technological innovation platform and intelligent, achievements drops and other matching supply and demand model platform supply diversification of enterprise value and profit model innovation.

### III. ANALYSIS OF TYPICAL BUSINESS MODEL DRIVEN BY TECHNOLOGY INNOVATION

With the development of science and technology, the role of various stakeholders in the value chain has gradually changed. Industrialized era carrier of enterprise business model transfer customer value proposition is a linear, one-way flow of value chain, along with the science and technology innovation, the traditional linear and unidirectional value chain to the value of dynamic, interactive network and the evolution of business ecosystem.

#### *A. Business Model of Information Age*

##### *1) The business model driven by technological innovation in the pre-internet era*

*a) Industrial chain perspective:* Information technology promotes the rapid development of traditional enterprises and information enterprises, and promotes the continuous extension of the traditional industrial chain and the closer links between upstream and downstream enterprises. Due to the frequent sharing of database information and interaction between industries, it has also strengthened mutual cooperation and formed inter-industry strategic alliance. In this stage, enterprise competition evolves into supply chain competition. Therefore, the value transfer and value creation of most enterprise business models in this period cannot be separated from the collaboration of upstream and downstream industry chain.

##### *b) Strategic perspective*

- Mass customization mode

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- Physical platform mode

Because of technological innovation, electronic digital technology has achieved the use of digitization to capture sound, and the enterprise has designed the technology physical carrier for the interaction and exchange of the two parties. The carrier is the prototype of the platform mode, which connects the supplier with the buyer through the hardware platform, and the value proposition extends from one way to the two-way. The typical representative is apple's iPod.

- Likey mode (precision product mode)

The application of standardization and service robots and the popularization of RFID technology provide technical guarantee for the change of enterprise value creation process. Companies aim at niche markets where products are small, refined and diverse. The combination of small and multi-category products makes for diverse and low-cost value propositions.

*2) The business model driven by technological innovation in the Internet age:* Since the 1980s, with the maturity of Internet related technologies, such as communication technology and IT system, the penetration and integration of manufacturing, finance, logistics and other industries have been full. The penetration and embedding of Internet information technology into industries, agriculture and service

industries have led to the blurring of industrial boundaries, deepening the integration of services and manufacturing industries. In this stage, the consumption concept has taken a qualitative leap and experiential consumption and personalized consumption has gradually become main stream, and the value creation process pays more attention to co-working with upstream and downstream enterprises to create customer value. The profit model emphasizes the customer's whole scene profit digging. At this stage, a series of new business models emerged.

*a) Free mode:* Free pattern as representative business model, in this stage mainly refers to rely on the accumulation of free customer resources, at the same time there are other customer segment willing to pay, offer free customer segmentation group financial support; By establishing the user's trust relationship, it can reduce the cost of re-contacting the customer and realize additional value-added profit. It is divided into: first, bilateral, multilateral free, third-party payment (advertising and other), online traffic liquidity logic. Second, basic services are free and premium services. Third, the fishing mode relies on free accumulation of customer resources to cultivate customer habits, and then attract customers to repeat the purchase of follow-up products.

*b) Platform mode:* Platform mode is the most important innovation of this stage of business model. The model by network effects and entity platform connecting different communities, transfer the value chain benefit related parties and even the final consumers to actively participate in, to innovation value proposition, value creation and realization. The typical platform model is the multilateral resource integration platform. Specific include: first, supply and demand matching platform mode. For example, the supply and demand matching platform created by didi travel. Second, the supply side shortage resource classification matching mode. Through the establishment of grading platform, the supply side scarce resources should be cut. Third, multilateral sharing creates a platform model. In a new generation of information technology, driven by innovative undertaking public (including enterprises and individuals) according to the requirement from innovation platform, using the platform provides powerful tool for sharing research and development and production, turn their own ideas and thoughts into physical products and solutions. Fourth, the demand side sharing platform model. Using the new Internet technology to develop a Shared platform, we can provide a Shared platform and carrier for the demand side by the maturity and popularization of the scanning code and online payment technology.

*c) Internet + industrial chain integration mode:* Internet + industry chain integration model is the new stage of the innovation of business model in the Internet era. The model uses a new generation of information technology and Internet technology, enterprises through the adjustment and optimization of the industrial chain link the relationship between the relevant enterprises, and make them work together, improve the operation efficiency of the whole industry chain, extending the original value proposition. The characteristics of this model are: through forward integration and backward integration, the traditional industrial chain upstream and downstream.

*3) The business model driven by scientific and technological innovation:* As the data mining technology, the emergence of intelligent software, intelligent interactive technology, and the traditional industry value creation pattern is broken, under the traditional mode of production, enterprises are producers, and users are consumers, clear boundaries. With the popularization and application of sharing platform technology, customers are more involved in the production activities of enterprises from simple consumers. Using intelligent terminal and interactive technology, Internet technology, sharing platform technology and system integration system, share information and achieve high participation of all subjects. The typical business model of this stage includes: first, intelligent Shared co-create platform mode, such as Skill share launch is a similar self-service education sharing platform. Second, personalized network push based on big data. Amazon has launched a new feature called "My Mix", which is designed to recommend products that may be popular based on the consumer's personal needs. Third, the smart retail industry, including small community retail business and retail industry.

*a) Industrial chain perspective:* Information technology promotes the rapid development of traditional enterprises and information enterprises, and promotes the continuous extension of the traditional industrial chain and the closer links between upstream and downstream enterprises. Due to the frequent sharing of database information and interaction between industries, it has also strengthened mutual cooperation and formed inter-industry strategic alliance. In this stage, enterprise competition evolves into supply chain competition. Therefore, the value transfer and value creation of most enterprise business models in this period cannot be separated from the collaboration of upstream and downstream industry chain in "Table I".

TABLE I. FEATURES AND TYPICAL BUSINESS MODELS OF TECHNOLOGICAL INNOVATION

The phase of the development of science and technology	The information era		Pre-intelligent age
	Computer age (1950s)	Internet age (2015)	
time	Computer age (1950s)	Internet age (2015)	At the beginning of the 21st century
Science and technology innovation	The advent of electronic computers Information technology (it)	Internet related technologies such as IT system integration and communication technology mature	Robot, artificial intelligence, automation production line, Internet of things, big data, cloud computing mature

The phase of the development of science and technology	The information era		Pre-intelligent age
Production mode	Digital computer control automation, automation line, refined production	To give full play to the optimized integration of the Internet in production factor allocation; It is transformed from mass homogenization to on-demand manufacturing, flexibility, and agile manufacturing	Socialized production, intelligent manufacturing, from the factory to the production and sales of production logistics and services, high flexibility, personalized customized products.
Characteristics of the consumer demand	Convenient consumption, the quality, function requirements and attention of different kinds of perceptual consumption, experiential consumption, green consumption and consumer demand for private users from pure consumers more and more involved in the enterprise production activities to produce disappear	Emotional consumption, experience consumption, green consumption, consumer demand personal	The user from the simple consumer more and more participates in the enterprise production activity, becomes the producer
Value proposition	Meet quality, function to differentiation and personalized demand transformation; Enterprise boundary clarity	Emphasizing the supply of diversified value and providing comprehensive solutions; Corporate boundaries blur	Customers participate in design, production and customer design and production. Industrial boundary ambiguity
Value creation	Relying on their own resource endowment and autonomous operation organization, lack of value network expansion, no resource coordination	Based on the development trend of the industry, the efficient operation form and organization form surrounding the key resources should be focused on the cooperation of upstream and downstream enterprises to create customer value	Using intelligent terminal and interactive technology, Internet technology, sharing platform technology and system integration system, sharing information, efficient collaboration, and co-creating value with customers
A typical commercial model	Mass customization and modular production mode; Physical platform mode; The legislative mode	Free mode; Platform mode; Internet + industry chain integration model	Intelligent sharing co-create platform mode; Industrial chain o2o model; Smart retail formats; Personalized network push based on big data.
Representative enterprise	Toyota, MOTOROLA, SONY, Microsoft, IBM; Hanall clothing, gree, haier, wushang, carvings	Jingdong, WeChat, 360, 58, uber, mobai and other Shared cycling trips, didi sharing trips	Skillshare education sharing platform; Shangpin housing (smart home); Amazon "My Mix"; Unmanned shelves and smart community supermarkets

#### IV. CONCLUSION

Knowledge innovation, technological innovation and technology-oriented management innovation brought by science and technology innovation lay the technical foundation for the innovation of enterprise business model. The policy environment, external competitive pressure and entrepreneurial innovation spirit within enterprises play a key role in the innovation of technological innovation. Business model from single line value delivery mode to industrial chain collaboration platform, then to share and intelligent co-create mode, evolve continuously.

The dynamics of market and the objective law of scientific and technological progress lead to the endless innovation of business model. With the further development of a new generation of information technology, integrated innovation (holistic innovation) will become mainstream, strategic perspective of a comprehensive innovation and collaborative innovation, will drive the future business model may be the Internet + across industry ecological mode and intelligent as the core of artificial intelligence applied business models as the direction of evolution.

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