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Research on the Connotation and Business Model of Internet of Things under the Background of Globalization

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Abstract: With the advent of the fourth industrial revolution, the new generation of information technology industry represented by the internet of things (IoT) has continually nurtured new business models and economic growth points and created one after another IoT mythology, which greatly promoted the global socioeconomic development and transformation. IoT has increasingly become the new engine of the current global economic development. To this end, this paper starts with the concept and connotation of the IoT, discusses the development and application of the global IoT and the types and characteristics of the IoT business model, and proposes the measures and countermeasures of the business model of the IoT in the context of globalization.

Keywords: *internet of things; business model; economic growth point*

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0 Introduction

The internet of things (IoT) is another wave of informationization in the world after the computer, internet and mobile communication networks. In recent years, the IoT industry has developed geometrically in a global scale and transformed it into real productivity at an unprecedented rate. According to the latest statistics, "by 2018, the global market for car networking will reach 40 billion euros, with an average annual compound growth rate of 25%; in 2018, the global smart manufacturing and smart factory related market will reach 250 billion US dollars; the shipment of wearable devices increased from 19.6 million, in 2014, to 126 million, in 2019; it is estimated that by 2020, the number of connected devices worldwide will reach 26 billion, and the size of the IoT market will reach 1.9 trillion US dollars"[1]. This is both an opportunity and a challenge for companies in different industries. Hence, how can we benefit from the fierce market competition and win the ultimate success? To this end, this paper starts with the concept of the IoT and conducts an in-depth analysis of the connotation and business model of the IoT in the context of globalization, with a view to propose corresponding countermeasures and suggestions. If there are any inconsistencies, please present criticism and valuable opinion.

1 The interpretation and development of the concept of the IoT

The IoT is an important part of the new generation of information technology. It is neither a cloud nor a thing. What is more realistic is to make the IoT truly a business model and truly make money. It is generally believed that its concept was first proposed by Gillen and Lall of the Massachusetts Institute of Technology in 1999[2]. At that time, it was in consideration of factors such as radio frequency identification, infrared sensor, and IoT. In the form of computer internet, the devices were connected together according to the agreement, forming a physical network that realizes real-time sharing of global item information, referred to as IoT. On November 17, 2005, at the World Summit on the Information Society in Tunis, the International Telecommunication Union released the "Global Internet Report 2005: IoT"[3]. Although the report extended the

concept of the term "IoT" proposed by Gillen and Lall, the report also extended the connectivity of objects to a new dimension in the information society and information network.

Wherefore, the author believes that the so-called IoT, in a nutshell, refers to the network of communication between people and things, things and things, and can make things that are not life can "live" and pass far infrared rays. The transfer technology is transmitted to a designated place or person, which, in turn, can be controlled and directed. Broadly speaking, the current application of information technology can be included in the scope of the IoT. However, application innovation is the core of the development of the IoT. The innovation centered on user experience is the soul for the development of the IoT.

Due to this, the formation of the IoT industry has become "multiple blossoms" overnight, involving manufacturing, medical, energy and public utilities, transportation and logistics, agricultural technology, smart cities, retail, financial services, smart homes, and other fields have become the wonders of "thousands of trees and pear blossoms," and some even think that it is "the next trillion-level communication business"[4] and "the new wave of the fourth generation of sub-industry revolution in the world." Some people even made bold predictions about this, and they believe that the scale of the global IoT market will grow sharply in the next few years. According to relevant data, the global IoT market reached US$70 billion in 2007 and exceeded US$140 billion in 2015. The global IoT market has reached US$450 billion in 2017. It is estimated that the market will reach RMB2.8 billion by 2020.

Obviously, facing such a huge and tempting market, undoubtedly it will be a rare medicine for the western developed countries facing the global economic downturn, and they will carry out the strategic layout in an attempt to be able to take a new round of informationization industry. In the revolution, the market opportunity of the global IoT can be captured.

The US government gives great importance to the strategic position of the IoT, and in January 2009, the National Intelligence Council's "2025 Key Technologies for Potential Impacts on US Interests" report specifically identified the IoT as one of the six key technologies. The "Smart Earth" strategy centered on IoT applications to ensure the US's position in international information control.

Europe is not far behind in the development of the IoT. To promote the development of the IoT industry in the EU, in June 2009, the European Commission submitted the "European IoT 14-Point Action Plan" to the European Parliament, the Council, the European Economic and Social Committee, and the Regional Committee. The development process can lead the world to ensure its leading role in the development of the IoT industry. As the European Union's Information Society and Media Division's "Future Internet 2020: A Vision of an Industry Expert Group" report released in May 2009, the EU's future IoT industry development said: "In Europe, we are very proud and very adhere to the IoT, and we call on decision makers, manufacturers, industrialists, technologists, entrepreneurs, inventors and researchers around the world to develop a concrete plan for the creation of an EU-style IoT economy to meet the EU Public needs and ambitions." Europe must take action now and must act together to lead the new internet era."

Japan and South Korea also proposed plans and ideas for U-Japan and U-Korea, respectively. "U" comes from the Latin word "Ubiquitous" which means omnipresent. For example, in 2004, the Ministry of Internal Affairs and Communications of Japan's information and communication industry proposed the U-Japan strategy. In July 2009, the IT Strategy Division of Japan proposed the I-Japan Strategy 2015 with the goal of achieving a national-centric digital peace of mind and a vibrant society. In the I-Japan strategy, the application of the IoT in transportation, medical, education, and environmental monitoring has been strengthened.

In 2006, South Korea proposed a 10-year U-Korea strategy. In the U-IT839 program, eight businesses that need to be promoted are identified. The IoT is the focus of implementation of ubiquitous services such as home networks, car communication platforms, and location-based services. In October 2009, the Korea Communications Commission issued the "Basic Plan for Infrastructure Construction of IP-Based Sensor Networks," which identified the IoT as a new growth driver, and determined the construction of the IoT infrastructure, the development of IoT services, and the development of IoT technologies. We will create 12 detailed topics in 4 major areas such as the IoT diffusion environment.

Since the Chinese government Premier Wen Jiabao proposed "perceive China" in August 2009, the IoT has also been officially written into the "Government

Work Report," and its level of attention is even more unmatched by the United States, the European Union, and other countries. According to statistics, China, currently, has >30,000 IoT and related enterprises, of which SMEs account for >85%. The innovation vitality is outstanding, and it has a great driving force for industrial development. It has initially formed in the areas surrounding the Bohai Sea, the Yangtze River Delta, and the Pan-Pearl River Delta. There are several national-level IoT industry development demonstration bases and multiple IoT industrial bases in the spatial pattern of the four major regions as well as in the country's central and western regions.

On June 15, 2017, the Ministry of Industry and Information Technology of the People's Republic of China officially issued the "Notice on comprehensively promoting the development of mobile IoT," which calls for accelerating the strategic deployment of the IoT. By the end of 2017, the IoT has been realized. Covering major cities such as municipalities and capital cities, the number of base stations will reach 400,000. By 2020, the IoT in China will be implemented nationwide, achieving deep coverage for application scenarios such as home indoors, transportation road networks, and underground pipes, with number of base stations reaching as many as 1.5 million. At the same time, the Ministry of Industry and Information Technology requested to promote the application of the IoT in the segmentation field, and gradually form a scale application system. In 2020, the total number of connections of the IoT in China is expected to exceed 600 million.

It is precisely due to the long industrial chain of the IoT, the cost and scale involved, the network and the terminal and other interdependent factors, the number of participants is huge, and it is difficult to form a unified step in the short term; China Mobile has already made it clear to accelerate the construction of the IoT to provide corresponding terminal subsidies and promote the rapid increase in the scale of connections. It is expected that in the near future, China's IoT will take a new step. Aristotle once said, "Give me a fulcrum, I can pick up the earth." Now with the development of IoT technology, this rhetoric will be "Give me an IoT, I can perceive the earth," throughout the world.

2 The business model of the IoT and its problems

At present, the wave of globalization has swept the world, and market competition has become increasingly fierce. Business models are playing an progressively important role in the corporate competition. The development of the IoT industry has accelerated the pace of development of niche organizations in financial services, technology, and agricultural equipment. At present, the biggest challenge in realizing the IoT is not technology, but the transformation and innovation of business models. Hence, what exactly is the business model?

The so-called business model is "a conceptual tool that contains a set of elements and their relationships to interpret the business logic of a particular entity." It explains what value a company can provide to its customers and how the company's internal organizational structure, partner network and relationship capital maintain a dominant position in the value provided and generate sustainable profitability. In fact, the business model can not only adjust the structure of the value creation process but also the economic logic delivered to the customer at the right cost, and it is a link between technology development and economic value creation. As an emerging industry, the IoT needs to accelerate the pace of its technology research and development and product design. It is also necessary to accelerate the process of industrial socialization to form large-scale commercial applications in the market as soon as possible.

Therefore, if you want to talk about the development trend and business model of the IoT, you can simply summarize it as ubiquitous, and its ultimate ideal goal is 4A so that people can get information and interaction at any time and place, and the form of the network. Moreover, its evolution will be driven by it. The business model has become more diverse due to the changes in the internet. The business model of the IoT may be disruptive, but it can also be seen from the types of business models of IoT companies that are currently operating today.

Faced with the development of the IoT, domestic and foreign companies have made some attempts in terms of industrial chain cooperation, organizational security, business applications and services, and the following four ways are adopted in the IoT business model: First, channel type, this model is simply to provide network connection services, such as AT and T, Verizon, South Korea SK Telecom, and China Mobile; the second is cooperation type, this model refers to enterprises in some application areas to select system integrator partners, system integrators to develop business and after-sales service, the telecom operator is

responsible for verifying the operation of the business on the network, and on behalf of the system integrator for business promotion and design charging; the third is self-operated, this mode is the way for the enterprise to develop its own business and directly provide it to customers such as SK Telecom, NTT, Telenor, and China Mobile; the fourth is customized, this model is based on customer needs, special M2M business, such as Orange and Vodafone.

From the perspective of business model operation, the current IoT mainly has two business models: Mobile operator-led operation and system integration service provider-led operation. The main modes of mobile operators' leading operations include channel type and self-operated type. The main modes of system integration service providers' leading operations include cooperative type and customized type. In China, all manufacturers in the industry chain are fighting each other. With the concept of the big IoT coming out, the future must be fully interoperable, and it is necessary to expand the horizons, not only the original small pattern but also the expansion of the large background will inevitably summon new business models.

However, despite the current status of the development of the global IoT industry, it has achieved certain results, but it really needs a long way to go to truly meet the advent of the IoT era. One of them is the business model of the IoT. The IoT is divided into three levels: Perception, network, and application. At each level, there will be multiple choices to open up the market. In this way, the business model becomes extremely critical in the future construction of the IoT ecological environment. However, from the perspective of the actual operation of the global IoT business model, there are still many problems that are difficult to solve. These problems are not only technical but also related to the security, agreement, cost, industry chain, terminal, scale, and other issues. The first is that the standards of the IoT lack the development of obstruction technology. Second, it is difficult to form a representative system solution in the core technology. The third is the issue of the agreement. Since the IoT is also a network, it should naturally require a unified protocol foundation. The IoT, like the internet, is based on the TCP/IP protocol, but there are GPRS, TD-SCDMA, sensors, and so on at the access level kind of channel. The fourth is the long and fragmented industry chain. The fifth is that the business model is too fragmented. This makes the development of the entire IoT industry feel disordered and blind, and the sharing of resources by all parties is insufficient, resulting in serious waste of resources and high research costs. The key to the success of the IoT is the application. Without actual application support, the IoT is likely to be replaced by other concepts. Therefore, the business community's understanding of the IoT should return to rationality, calmly respond, and grasp the multi-dimensional understanding of technology, application, market, business model and policy, and proceed from the basic and practical, application-oriented to promote the health of the IoT industry.

3 Conclusions and recommendations

In summary, based on the above analysis, the author believes that it should be analyzed and reflected on the problems existing in the development of the IoT in the context of globalization, and corresponding improvement measures should be taken. As Zhang Yaqin, president of Microsoft Asia Pacific R and D Group, said: "There is information loss in the internet. It can also reduce or even avoid losses through encryption and backup of information. The IoT is dealing with the physical world, whether it is intelligent transportation or smart grid, smart medical care or bridge detection, disaster monitoring, once the problem occurs will involve the loss of life and property." This requires us to build on the business model of the IoT, based on the needs of customers and the interests of all parties concerned. To promote the rapid development of the IoT, it is necessary to establish an organizational model in which all parties in the society participate and cooperate. In addition to the government's administrative promotion, it must also stimulate the enthusiasm and motivation of all parties involved in the society. For the IoT to develop rapidly on a global scale, there is a long and difficult process. Its realization will be multi-party coordination, cooperation and conceptual transformation involving information technology, social concepts, management systems, and application models. The process will be a process of breakthrough by point and step by step. In this process, governments around the world should treat this emerging concept in a prudent and dialectical manner, based on basic technology research, improve relevant laws and regulations, and follow the principle of progressive development. Rationally handling the opportunities and challenges brought about by the concept of the IoT can make us neither at the expense of security nor a good opportunity to lose development. In

short, there is no fixed business model. Different stages of the development of the IoT require different business models to coordinate and adapt. What we really need to do is that we need to deeply understand the changes in the development of the IoT to cope with the constant development of the business level and create a business model that keeps pace with the times.

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