Economic Research on Green Transformation in Digital Field

Huiping Han[*]   **Beida Wang**

China University of Geosciences (Beijing), Beijing, 100083, China

Summary: In the context of the in-depth implementation of the digital China strategy, digital technology has fundamentally changed the organizational structure and operation mode of enterprises. The digital transformation has brought significant changes to individuals, organizations, and all levels and fields of society, providing conditions for leapfrog economic growth. This paper mainly focuses on the new development concept in the digital field, follows the original mission of serving the real economy, conforms to the new trend of accelerating digital development in various industries, strengthens the technology empowerment and innovative service model, strives to build a virtuous circle of digital, technology and industry, and carries out targeted economic research on the green transformation in the digital field.

1. Introduction

Since January 2020, digital transformation has become the expectation and consensus of the world under the epidemic. At the two sessions in March 2022, digital carbon reduction, digital new infrastructure, digital RMB, industrial Internet, and intelligent connected vehicles became hot words again, and how digital carbon reduction technology can empower the industry again attracted the attention of representatives. Representatives from all walks of life have described the beautiful vision of digitalization in their respective fields. Compared with traditional industries, digital technology has its own "green gene" and plays an important role in the "3060" process. Looking around the world, whether it is goal setting or practical action, overseas digital technology has taken the lead on the "3060" road. How China's digital technology enables the transformation of social decarbonization, the opportunities and challenges it faces, and the process of carbon practice have become inevitable propositions.

2. Digital Level

The existence and development of the Internet have provided an effective platform for millions of online transactions and communications every day, and have played an important role in promoting the development of various economies. In order to measure the scale of the Internet economy in various countries, McKinsey Global Research Institute has launched the iGDP indicator. China's iGDP index has reached the level of the world's leading countries.

McKinsey's research shows that Chinese enterprises' IT investment accounts for only 2% of their operating income, significantly lower than the international average of 4%; However, this proportion will increase significantly in the future, indicating that the Internet is growing rapidly. By 2025, the contribution of the Internet to China's GDP growth will reach 7% to 22%. The corresponding supportive policy framework will be put in place soon. All industries will actively introduce new Internet applications and create new markets for digital products and services.

As Chinese enterprises accelerate the introduction of emerging technologies, all operational links, including product development, supply chain management, marketing and customer interaction, are bound to be smoother.

3. Digital Transformation

3.1 Take Customer First as the Key

Enterprises must guide all aspects of operation based on the needs of consumers, rather than assuming Product design and launch. What consumers expect is a seamless, convenient and personalized user experience. Now, enterprises can not only focus on mass production, but also select a wider range of suppliers through the network,

collect customer insights, and launch more complex product portfolios to more accurately meet consumer needs.

3.2 Adjust the Strategy to Prepare for the New Wave of Competition

Competition may emerge from an unexpected corner at any time, because the boundaries of the industry are increasingly blurred. Repeated testing and adjustment of customer experience is critical, but enterprises must quickly determine the digital investment that can create the greatest value. Enterprise leaders must be deeply involved, because the decisions they make may overturn the business model. In the short term, the initial investment required for the transformation will exert pressure on the cost structure of the enterprise, but it will eventually gain long-term benefits.

3.3 Operation Transformation

Enterprises must carefully design information and products in order to be more competitive on the Internet and mobile Internet platforms. Production and operation need stronger flexibility and efficiency to respond flexibly to the market. Integrating big data may be a daunting proposition, but it can help enterprises optimize decision-making, improve resource allocation, and better listen to customers' opinions.

3.4 Train Highly Skilled Personnel and Build Corresponding Organizational Structure

The shortage of highly skilled talents will become more and more serious, especially the generalists who understand strategy, process, data, architecture and governance, as well as the specialists who master big data and advanced analysis. Large companies can target small high-tech companies to achieve rapid digital transformation. Enterprises also need to cultivate their own talent teams, such as continuous training of existing employees, cooperation with peers or educational institutions, or joint establishment of external training programs with the government. Enterprises also need to adjust the traditional functional management organizational structure to better reflect the customer-centric business philosophy.

3.5 More Willing to Accept Partners and External Cooperation

In the Internet era, the main activities in the industrial chain are not necessarily confined to the company. For example, some industries such as mobile internet equipment have been subdivided, and a broader ecosystem covering software and hardware developers, application developers, content providers and value-added product manufacturers has been formed.

4. Opportunities and Challenges Faced by Green Transformation

4.1 Opportunity

4.1.1 Enhance the Empowerment of Technology to Other Industries

Science and technology enterprises can take advantage of their own technological advantages to realize the overall deep emission reduction of the industry by promoting the innovation of digital technology. For example, thermal power plants can use AI technology to enable smart transformation. The historical data of thermal power plants are sorted out by artificial intelligence, the operation rules are summarized, more scientific and efficient strategies are obtained, the real-time status of each instrument is monitored, and the operation scheme for dynamic optimization and adjustment is given, so as to save human and material resources, improve energy utilization, and reduce carbon emissions.

4.1.2 Considerable Economic Benefits

Under the constraints of the "3060" goal, science and technology enterprises will accelerate the search for green upgrading solutions to achieve energy conservation and emission reduction in data centers, and will force the formation of sustainable operation models. For example, virtualize the servers in the data center. Users can start servers dynamically, and each server can make the operating system mistake the virtual machine as the actual hardware. Through this approach, you can run multiple virtual machines at the same time, give full play to the computing potential of physical servers, and quickly respond to the changing needs of the data center. At present, many companies have reduced their costs by 5%-15% through this technology, and many universities have realized virtual machines, such as China University of Geosciences (Beijing).

4.1.3 Improve Social Reputation.

By achieving the "3060" goal, scientific and technological enterprises can obtain the intangible asset of social benefits. For example, carry out environmental protection science education related to "3060" through university teachers and students' groups, launch popular public welfare environmental protection activities such as health travel punch card, and launch an environmental protection topic with its own hot search aura. High-tech enterprises, especially Internet enterprises, can give play to their existing traffic and channel advantages, strengthen exposure of their own brands, and promote a new healthy social ecology of everyone's participation and responsibility by virtue of their strong social and network influence.

4.2 Challenge

4.2.1 The Proportion of Energy Consumption of Science and Technology Enterprises Increased

The rapid development of digital economy, 5G, Internet of Things and artificial intelligence has led to a blowout growth of data flow. In large data centers, tens of thousands of servers continuously calculate, transmit and store massive data day and night, and continue to consume a lot of energy. According to statistics, the power consumption of global science and technology enterprises in 2015 was about 2370 TWh, accounting for 11% of the total power consumption of all industries. This figure has been rising continuously. By 2030, the power consumption of global science and technology enterprises is expected to reach 800 billion TWh, accounting for 20% of the total power consumption of all industries. In the face of increasing energy consumption, the task of emission reduction is more arduous.

4.2.2 The Emissions of Technology Empowerment Exceed Their Own Emissions

The upstream and downstream enterprises that produce supporting products for science and technology enterprises all have high carbon emissions, and the problem of carbon emissions is far beyond the science and technology enterprises themselves.

5. Decarbonization Strategy

5.1 Key Engine for Decarbonization

Digital technology must combine its own reality, set scientific decarbonization goals, formulate practical plans, specify specific time and node to complete specific emission reduction tasks, and how to combine the industry's ecological characteristics with the country's overall green and low-carbon planning to reflect the strength and inclusiveness of industry emission reduction, and use its own advantages to drive all industries to participate in emission reduction actions.

In addition to its own energy consumption, the overall emissions of the value chain of the digital technology industry are large, far exceeding those of consumption, finance and other industries. However, the digital technology industry can give full play to its technical and financial advantages, provide other enterprises with relevant products and solutions (such as carbon emission monitoring tools, etc.) or invest in start-ups related to energy conservation and emission reduction (such as hydrogen energy, hydrogen fuel, etc.), enable and drive thousands of industries to achieve low-carbon transformation, and can effectively use the advantages of flow resources, Carry

out relevant concept publicity and behavior guidance for users (such as initiating environmental protection issues, healthy travel clocking, etc.), and promote the formation of a healthy ecosystem in which everyone is involved and responsible.

5.2 Principles for Setting Zero Carbon Targets

Digital technology enterprises must set clear goals from the perspective of the actual situation of the enterprise, the overall strategy and the top consensus.

The establishment of long-term vision needs to be based on comprehensive analysis and judgment of the enterprise's emission reduction potential and capacity. On the one hand, the overall emission reduction space of enterprises can be estimated on the basis of carbon accounting; On the other hand, through the evaluation of the enterprise's technical and financial strength, we can judge our own carbon emission reduction strength. Because carbon neutrality is a long-term and systematic project, after the establishment of long-term vision, enterprises need to break down and clarify phased tasks, steadily and gradually, and constantly lead to the final goal.

As one of the key strategic measures of the enterprise, carbon neutrality should be aligned with the enterprise vision and overall strategy to avoid conflicts. At the same time, as an important part of CSR, carbon neutralization should be integrated to straighten out the relationship between them. It is a long-term and complex undertaking for enterprises to achieve carbon neutrality. Core executives need to reach full agreement on the long-term goal, implementation path and implementation plan of carbon neutrality, and provide strong support for the realization of the goal.

5.3 Work from Three Dimensions

Science and technology enterprises can combine their own technology and capital advantages to achieve low-carbon transformation from three dimensions: improving energy efficiency, reducing energy demand, optimizing energy structure, reducing overall emissions, carbon recovery and capture, and eliminating historical emissions.

Enterprises can use the advantages of hardware and software technologies, such as efficient system integration, efficient refrigeration, efficient water treatment and other hardware technologies and artificial intelligence algorithms for lighting, temperature regulation and other software technologies to reduce the overall energy demand for their business development and daily operation. For example, by developing and using energy-efficient refrigeration systems, Google has significantly reduced

the energy consumption of data centers (only half of the industry's average energy consumption).

Internet and high-tech enterprises can flexibly use self-building, trading, investment and other means to increase the proportion of enterprises' use of carbon-free and low-carbon energy. Self-built: directly generate and use low-carbon energy by deploying solar photovoltaic devices in data centers and office parks, and building hydropower equipment. For example, Amazon has built 68 solar roofs in the world; Microsoft is exploring hydro-electric power generation in the park, and its data center backup hydrogen fuel has also been tested and used successfully, with the goal of getting rid of diesel backup fuel. Transaction: Carry out power transactions, including signing power purchase and sale contracts and green certificates with wind farms and solar energy manufacturers. For example, Google has signed direct power purchase contracts with wind farms and solar energy manufacturers in Europe, America and Asia to consolidate its renewable energy sources in the next 10-20 years. Investment: Invest in holding or building wind and solar power plants. Take Apple for example, 83% of the electricity used globally in 2019 came from clean electricity provided by self-built projects.

Internet and high-tech enterprises can eliminate carbon dioxide emissions by participating in or investing in carbon capture projects or purchasing forestry carbon sinks. For example, Microsoft issued an invitation to carbon elimination proposal in 2020, and has purchased solutions that can eliminate 1.3 million tons of carbon emissions from 15 suppliers of 26 projects around the world.

5.4 External Empowerment

Energy, industry, transportation, construction and electricity are the main sources of carbon dioxide emissions. As the birthplace of technology and innovation, digital technology enterprises have the ability to empower B-end ecological partners through technology output, resource output and concept output, and help and guide all walks of life to achieve the long-term goal of energy transformation and green and low-carbon by virtue of their strong technological innovation ability and social impact ability.

5.4.1 Technology Output

Build a technology platform to enable enterprises to save energy and reduce emissions. For example, Google and Deep Mind optimized the cooling system of the data center through machine learning (which can save 30% energy), and further developed the technology into the Industrial Adaptive Controls platform to help other enterprises to save energy in buildings [1]. For example,

Microsoft has developed the Sustainability Calculator to analyze and calculate the carbon footprint and real-time visualize the carbon emissions, help Azure users understand the carbon emissions generated by their work, and calculate the emission reductions resulting from potential emission reduction measures to encourage the adoption of corresponding emission reduction measures.

5.4.2 Resource Output

Establish a green fund to support the development of emission reduction. For example, Amazon established the "Right Now Climate" in 2019 and invested 100 million dollars in afforestation projects. In 2020, the "Climate Pledge Fund" was established, and it plans to invest $2 billion to support other enterprises to create sustainable products, technologies and services.

5.4.3 Concept Output

Output environmental protection concept and impart their own successful experience. For example, Microsoft uses PowerBI to build an audit management system, update the supplier's code of conduct, and require it to disclose carbon emission data. Apple provides its suppliers with cost-benefit analysis of implementing energy efficiency improvement and face-to-face training for suppliers. Amazon launched the Frustration-Free Packaging Program to encourage manufacturers to use simpler and 100% recyclable product packaging.

Compared with other fields, the digital technology field has the advantages of natural flow and communication. It can continuously cultivate the emission reduction concept and action of C-end users through concept promotion, activity initiatives and platform construction.

(1) Digital technology can push "3060" related concepts, policies, news, etc. through information flow to attract users' continuous attention and secondary publicity in the "3060" field.

(2) Digital technology can guide users to participate in energy conservation and emission reduction by developing tools such as carbon footprint and carbon emission reduction. For example, Microsoft Concur can not only integrate user travel-related information into Microsoft Outlook 365, but also estimate the carbon emissions of flights, and help users compare the carbon costs and financial costs of different travel options, so as to encourage users to travel environmentally.

(3) Digital technology can improve the professional level of users in the "3060" field by making "3060" related interesting courses, games, tools, and guiding relevant thematic discussions. For example, the interactive tool "Your Plan, Your Planet" developed by Google, the

"Green Action Plan" developed by Baidu, and the "Ant Forest" developed by Alibaba can help people understand the impact of food, energy, water and other aspects on the environment, and improve users' correct understanding of energy conservation through game-based experience and teaching (such as the dishwasher uses less energy and water than hand washing dishes).

Like other fields, digital technology also bears social responsibility capital in the process of decarbonization transformation. It can accelerate the construction of infrastructure, product innovation and institutional system, and increase the investment in climate and environment, so as to realize the exploration and practice of climate specific investment and green finance decarbonization path [2] Climate special investment refers to investment in relevant public welfare projects, innovation projects and funds that have an impact on the climate environment. For example, Bill Gates and Jeff Bezos supported carbon capture and clean energy technology research and development through investment. The exploration and practice of decarbonization path of green finance [3] include green credit, green bonds, green stock index, green development fund, green insurance, etc. For example, Temasek Holdings in Singapore has built a green financial business system including four major businesses: green financing, green investment and asset management, cross-border green asset trading and innovative green financial business.

6. Conclusions

As the country with the largest carbon emissions in the world, China has a long way to go to realize the transformation of decarbonization. Whether realizing its own transformation or enabling transformation, digital technology must set reasonable goals, fully consider the actual situation, macro strategy and high-level support, and combine its own technical and financial advantages to control the total amount of energy consumption, adjust the energy structure, and eliminate historical emissions. It must output enabling through technology, resources, and ideas to promote the realization of the overall green transformation goal of society.

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