



The Rise of Corporate Digital Transformation and Government Regulatory Innovation

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Abstract

Purpose – We attempt to provide a background, a review of current development of the digital technologies and their effect on the digital transformation process, and then offer our recommendations for identifying and taking strategic actions to exploit them. More importantly, we also aim to offer important recommendations for policymakers and practitioners how to better advance the innovation system by facilitating the development of digital technologies and take advantage of improvements in digital technologies.

Research design, data, and methodology – This study undertakes an extensive and critical review of the digital transformation literature and identifies several important issues with relevant practical examples of best practices in the transition to digital transformation process.

Results – This paper finds that digital technologies with strong technological backing have brought technological spillovers to the economy while also generating shocks.

Conclusion – To maintain a healthy and developing market order, it is necessary for governments to innovate regulatory models. This study offers several important suggestions for government regulatory innovation that we believe should help to better deploy digital transformation initiatives and enhance the efficiency and effectiveness of government regulation in contributing more to the high-quality and healthy development of the digital economy.

Keywords: Digital transformation, Digital technology, Government regulation, Innovation

JEL Classification Code: G38, L16, M16, Q17.

1. Introduction

The enormous and accelerating growth of digital capabilities has fundamentally opened up a new dimension of global business development. It has given rise to a whole new range of industries, from online entertainment to social networking, as well as the relaunch of many traditional industries, from taxi platforms to accommodation businesses. In the digital economy, the trend towards digital transformation of businesses is not only driven by the search for competitive advantage or to meet customer needs, but is also an important factor for sustainable business operations.

China Mobile International Limited (CMI) used the agile and efficient digital tools provided by AWS (Amazon Web Services) to achieve rapid transformation of its own products and accelerate the deployment of cloud-net convergence globally; People's Education Digital Publishing Co. Ltd. used Testin Cloud Testing to establish a high quality and efficient cloud testing system for the entire product lifecycle; Shanghai Chest Hospital joined hands with Shanghai Digital Certificate Authentication Centre to establish a secure and trustworthy information management system based on mobile CA authentication, etc. The strategic goal of digital transformation of enterprises is becoming increasingly clear. These examples confirm that the rapid development of digital technology has revolutionized business models, with digital industries such as communications and software bearing the brunt of the impact, and hospitality services, healthcare, finance and insurance, transport, education and many more all being dramatically affected. In traditional manufacturing, the digital transformation is not only reflected in the digitization of management processes and the use of intelligent manufacturing technologies such as robots in production, but also in new digitally innovative products that apply digital technology to purely artificial products. Examples such as watches with health records (Xiaomi bracelets), running shoes that record sports performance, driverless cars, smart TVs and many more are too numerous to mention, but what is even more surprising is that these technologies in turn feed user usage information back to the manufacturers, who in turn further contribute to product innovation based on such direct and accurate data. The development of the digital economy is one of China's key grips in building a new development model and has become an important driver of sustained and stable economic growth. Based on the 《Digital China Construction Development Process Report (2019)》 issued by the State Internet Information Office (SIIO): 36.2% of GDP, with a contribution rate of 67.7%, amounting to 35.8 trillion yuan, has maintained rapid growth compared with 2018, and significantly improved quality and efficiency; the new output of the digital economy integration part (industrial digitization) accounts for 80.2% of the digital economy, and the economic structure continues to be optimized and upgraded. The high-quality development trend has further consolidated the status of the main engine of digital economy development (SIIO, 2020).

The double-edged sword of technology has also made social affairs increasingly complex and specialized. With the development of digital technology, enterprises have embraced the opportunities brought by digital transformation while a series of social issues such as price fixing, big data killing, food safety of online food preparation, infringement of users' data property rights and privacy have emerged. These phenomena show how governments can innovate their supervision and management methods to take advantage of the rapid commercialization of digital technology, which is now a matter of great concern and urgent need to be addressed. In this study, we attempt to provide a background, a review of current development of the digital technologies and their effect on the digital transformation process as well as the current practices, and then offer our recommendations for identifying and taking strategic actions to exploit them. More importantly, we also aim to offer important recommendations for policy-makers and reformers how to better advance the innovation system by facilitating the development of digital technologies and take advantage of improvements in digital technologies, and how to effectively deal with the challenges created in the process of digital transformation and taking advantage of improvements in digital technologies.

This paper finds that digital technologies with strong technological backing have brought technological spillovers to the economy while also generating shocks. The flow of data is more flexible and difficult to control, and this storage feature of personal information may bring about conflicts in the application of law; The powerful network effects and near-zero marginal costs of the digital economy make it difficult for entrants to enter, creating a huge impact on the traditional economy. To maintain a healthy and developing market order, it is necessary for governments to innovate regulatory models and unleash human creativity in the digital economy. The study proposes that the government should innovate in three aspects of regulation: grasping trends, sharing governance, and creating an environment, so as to enhance the capacity and efficiency of government regulation, adapt to the new economic models and contribute more to the high-quality and healthy development of the digital economy.

The remaining four parts of the paper are organized as follows, with Part II describing the concept and characteristics of digital transformation and Part III citing cases to illustrate the need for innovative government regulation. Part IV makes policy recommendations. The fifth part concludes and gives the limitations of the article's research and research outlook. The conceptual research model for this study is shown in <Fig. 1>.

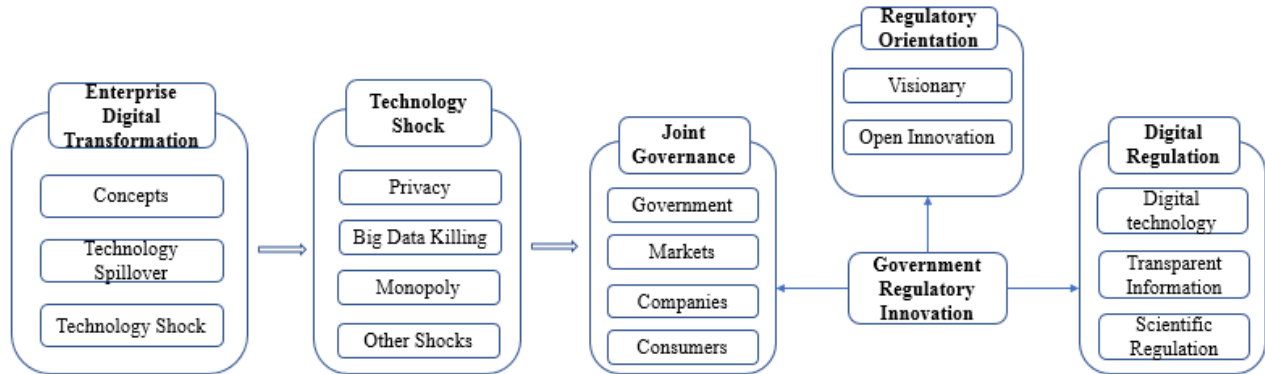


Figure 1: Conceptual Research Model

2. Inside the Digital Transformation

2.1. Digital Technology and Digital Transformation

Digital technologies are the basic technologies that support smart work, smart products, smart supply chains and smart manufacturing, including big data, analytics, cloud computing and Internet of Things technologies (Frank, Dalenogare, & Ayala, 2019). In addition, the prospect of blockchain applications integrated by various technologies such as cryptography, smart contracts and distributed networks also shows a broad application prospect. Digital technologies have given rise to the digital economy and are driving its rapid development. With the efficient processing of large-scale data and information, the digital economy can achieve multiple advantages such as rapid matching of supply and demand sides, optimization of processes, compression of transaction costs, and precise discovery of diverse needs through digital supply chains.

Digital transformation (DT) refers to the process in which significant changes are triggered in an entity's attributes after information technology, computing, communication, and connectivity technologies are combined (Vial, 2019). The new generation of digital technologies is rapidly evolving, and current business models are changing dramatically, with a global data circle of 33 terabytes (ZB) in 2018, which the IDC speculates will grow to 175 terabytes (ZB) in 2025 (Reinsel, Gantz, & Rydning, 2018). Companies elevate digital transformation to a core corporate objective in order to run data governance and analytics through digital operations, for example, innovation of business models, access to digital resources, optimization of internal and external corporate processes and design of digital strategies (Verhoef, Broekhuizen, Bart, Bhattacharya, Dong, Fabian, & Haenlein, 2021). Digital transformation has received attention in different research areas, such as marketing, which focuses on the effects of social media; strategy, which focuses on business model innovation; and information systems, which focuses on technology adoption, technological development and multidisciplinary convergence discussions (Marques & Ferreira, 2020). Digitalization is revolutionizing the business world and the rise of digital companies in recent years is strong evidence of this shift (cf. valuation of companies).

2.2. Characteristics of Digital Transformation

Naughton (2016) hold the view that: "Three fundamental characteristics of digital transformation affect the geographical organization of business: reprogram ability, infrastructural elementality and intangibility" and "these characteristics mean that digitalization is a general-purpose technology (GPT), like steam engines, electricity, and automobiles."

It's more about creating value for the enterprise than about digitalization. The cost of producing and disseminating digital innovations is gradually decreasing or even disappearing, and scaling digital innovations is also becoming less expensive because cloud technology allows companies to obtain computing power at low cost without significant upfront investments; in addition to cost savings, it also enhances the customer experience process. The Healthcare industry is one of the main sectors of digital transformation. The constant change of new technologies has further improved its management and technology, making it possible for healthcare professionals to provide all health services

more professionally and precisely (Marques & Ferreira, 2020). The impact of digitization goes far beyond business and economics, thus changing the nature of human social activity (Yoo, 2010).

2.3. Digital Transformation Trends

With the rapid development of digital technology, digital change is receiving greater attention in all areas and companies are creating unexpected opportunities through digital transformation. Companies wanting to achieve significant business improvements must do so through successful digital transformation or they will face threats from their competitors (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2014). Digital technology acts as a bridge enabling companies to gather vast amounts of information from different sources and build strong network relationships (Berman, 2012), and digital transformation has also changed the supply chain model of companies, making internal and external operations management more streamlined and flexible and reducing costs (Crittenden, Crittenden, & Crittenden, 2019); digital features such as QR codes and system locators have also emerged (Ström, Vendel, & Bredican, 2014). The topic of digital transformation is equally popular among academics in the fields of information systems, management, strategy, and innovation, and many domestic and international scholars have encouraged companies to use digital technologies to enhance their digital capabilities and seize digital transformation opportunities to enhance their competitive advantage through research in recent years.

3. Corporate Digital Transformation and the Need for Innovative Government Regulation

3.1. Technology Shocks in the Digital Economy

First, after the mid-1990s, creative destruction became more important in IT-intensive industries. The term "Big Data" encapsulates technological developments not only in the field of data storage but also in the field of data processing. Big data offers the opportunity not only to process large amounts of data from social networks, images and other information and communication technologies, but also to use and add value to this data (McAfee & Brynjolfsson, 2012). There are also risks associated with the use of big data, in particular the potential for infringement of personal information right. Compared to traditional information services, the flow of data is more flexible and difficult to control, and this storage feature of personal information may bring about conflicts in the application of law, which may have adverse legal consequences for the security of personal information. In the smart economy, infringement of user data property rights and privacy rights is not only manifested by enterprises illegally collecting user data without consent or taking advantage of information asymmetry to obtain user data at low prices, but also by the improper use of legally collected user data. The most direct area of application for smart companies after acquiring user data, besides developing new products, and providing personalized services, is marketing, the so-called "big data killing" - the price discrimination against users based on their historical consumption records and other relevant data, such as online taxi services and online shopping. With the abundance of data resources and the advancement of intelligent algorithms, some companies have become capable of estimating consumers' reservation prices, and the previously theoretical first-level price discrimination has gradually become feasible in reality. Some intelligent companies are maximizing the consumer surplus through this means (Xu, Zhang, & Cao, 2020).

Second, there is also evidence that digital innovation has further increased market concentration, i.e., that digitalization has created creative disruption. At the same time market concentration has emerged. Thus, both environments coexist, e.g., automakers begin to recognize that they are facing a new business model when Uber implemented the car-sharing alternative to car ownership model. In addition, incumbents benefit from economies of scale and scope by taking advantage of network effects, platform advantages, leading-edge technologies and, in particular, large market players. Companies have taken advantage of digital resources such as these to enhance innovation and generate breakthroughs. As an example, companies like Alibaba and Jingdong taking advantage of better tools such as big data. In the early stages of their entry into the market, online taxis had a huge impact on cruisers, leading to a massive loss of their customers, a sharp decline in the number of drivers, a significant reduction in daily mileage and operating hours, and even the embarrassing situation of a "tidal wave of dropouts" (Wu & She, 2016). Not only the transportation industry, but also other industries such as hotels and accommodation, restaurants and entertainment have been exposed to similar conflicts.

Third, in practice, blockchain risks and problems abound. The concept of blockchain is built on the basis of cryptography and is an underlying protocol that effectively solves the trust problem and realizes the free transfer of value, significantly reduces social transaction and communication costs, greatly enhances economic efficiency, makes

the digital era safer and more reliable, and has a very large scope for development in the areas of digital currency, digital depository and digital anti-counterfeiting. However, such projects are currently uneven, and the market is unstable, as the lack of regulation makes it easy for unscrupulous elements to manipulate the market to gain all kinds of illegal benefits.

Moreover, the powerful network effects and near-zero marginal costs of the digital economy make it difficult for entrants to enter, creating a huge impact on the traditional economy, which may be squeezed out of the market before the transformation is complete and the digital economy gains market dominance or even monopoly status. Technological change has expanded the market for industry and information services and, as a result of digital non-competition, revenues are increasingly concentrated at the top, with the losers often eliminated from the market and unable to survive-the so-called "winner takes all" (Rosen, 1981). As the digital transformation progresses further and the digital economy is booming, more and more economists are beginning to realize that the trickle-down effect, whereby the technological dividend inevitably spreads to all aspects of social development and benefits all social groups, does not hold true and that the economic transformation resulting from technological progress does not naturally benefit all segments of society and all groups. Instead, it may further worsen income distribution and accentuate welfare imbalances (Cai, 2017).

3.2. Government Regulatory Innovation

We find that digital technologies with strong technological backing have brought technological spillovers to the economy while also generating shocks. The flow of data is more flexible and difficult to control, and this storage feature of personal information may bring about conflicts in the application of law; The powerful network effects and near-zero marginal costs of the digital economy make it difficult for entrants to enter, creating a huge impact on the traditional economy. Coupled with the anonymity, virtual nature and replicability brought about by digital technology, economic value and security risks co-exist, which also poses difficulties for government regulation and challenges the traditional government regulation model. There is an urgent need for effective innovation in government regulation models in the context of digitalization. To maintain a healthy and developing market order, it is necessary for governments to innovate regulatory models and unleash human creativity in the digital economy. So as to enhance the capacity and efficiency of government regulation, adapt to the new economic models and contribute more to the high-quality and healthy development of the digital economy.

4. Policy Implications

Innovation in government regulation is extremely important in the administrative governance structure and greatly affects the social and market economic order. It is important to explore marginal innovation in regulation from a global perspective and to organically unify the three connotations of reasonable, efficient and democratic to achieve innovation in existing functional behaviors and continuous improvement of the regulatory system. In order to prevent market failures, regulators intervene in unfair market transactions of micro-economies by means of laws, regulations and orders, in order to improve the regulatory environment. Under the wave of digital economy, the country is vigorously promoting digital transformation. The government should not only support and encourage digital innovation, but also effectively regulate the negative effects brought about by the process of digital transformation of enterprises, so as to form a healthy and orderly competitive environment to promote the harmonious development of the market and safeguard public interests.

The market innovations brought about by digital technologies such as Big Data, AI and IoT have impacted traditional industries, but the new economic energy they stimulate has created higher social value at the same time, and the overall benefits outweigh the disadvantages. Therefore, it is imperative for government regulation to be innovative, not only to avoid covering up the problems, but also not to be indifferent, not to be overly aggressive and not to choke, i.e., the scope of regulation and intervention should be moderate, and the level of government regulation and governance should be improved while maintaining market dynamics and production innovation, so that government regulation and market operation can mutually promote each other. Therefore, this paper puts forward the following countermeasures and suggestions. To maintain a healthy and developing market order, it is necessary for governments to innovate regulatory models and unleash human creativity in the digital economy. We propose that the government should innovate in three aspects of regulation: grasping trends, sharing governance, and creating an environment, so as to enhance the capacity and efficiency of government regulation, adapt to the new economic models and contribute more to the high-quality and healthy development of the digital economy.

4.1. Understanding the Trend and Appropriately Dealing with the Relationship between Innovation and Regulative Policies

Due to the rapid advancement of technology, the legal and institutional process is always slower than innovative business practices. The government should be far-sighted, understand and study the development trend of digital technology in the digital transformation, set the right attitude towards the perception of technology, accurately classify and precisely manage according to the characteristics of economic sectors, and improve the capacity of digital government regulation.

Keep abreast of trends and properly managing the relationship between innovation and regulation. Governments should keep up with the times and improve fundamental laws and regulations, from safeguarding institutional norms to continuous innovation in government regulation, in order to mitigate the negative effects of digital transformation for businesses and not to hinder or limit innovation. Improve intellectual property protection laws that facilitate access to knowledge, establish standards and rules for accessing, owning, and using data (e.g., strict privacy rights and a system of innovation management regulations based on minimizing risks, threats and challenges), and improve competition policy (e.g., anti-trust "race to the bottom" policies that do not simply protect and support the relatively backward traditional economy. It is to better protect the interests of consumers and maximize social welfare, and to provide a necessary market environment for the digital transformation and upgrading of traditional economies (Xu, Zhang, & Cao, 2020). They also help the traditional economy to transform digitally, create a moderate transformation environment for it and properly handle the relationship between innovation and regulation. China is beginning to respond positively to the phenomenon of unreasonable hegemony, for example by further clarifying specific terms for elements such as platforms, data and algorithms, and measures to address ethical issues in technology such as differential pricing are being further improved. It is necessary for the government to actively maintain digital trust, build innovative guarantee systems and promote healthy data sharing.

The government should also improve support for innovation and entrepreneurship (including training, basic ICT inputs, and bridging the digital divide) for the benefit of SMEs. As we all know, SMEs are the mainstay of China's economic development and play a vital role in the enhancement of economic activity and employment stability. However, enterprises lack competitive advantages and the pressure of transformation has increased dramatically. In response to the lack of resources and insufficient investment funds of SMEs, the government should encourage enterprises to gradually improve their digital management capabilities and do a good job of infrastructure construction by paying attention to the infrastructure of enterprise software and hardware platforms, for example, the "Kingdee Management Easy Cloud", which has strong product capabilities for manufacturing, supply chain and finance, focuses on the new retail industry and uses digital middleware to break through the dilemma of retail enterprise transformation; the government should popularize the knowledge of digital transformation, step up efforts to nurture talents, and guide enterprises to adopt different transformation strategies according to their own characteristics to avoid blind transformation; help SMEs share resources and drive networked collaboration from the outside in, for another example, Haier is constantly bringing itself closer to outside organizations or individuals through its all-employee creator mechanism, sharing resources and achieving self-driven innovation based on user needs. At this moment, the government has kept up with the times and properly handled the relationship between innovation and regulatory policies.

4.2 Building Joint Governance, and Collaborative and Open Governance System

Due to the penetrating role of digital industries, it is difficult for a single government department to effectively respond to the many challenges brought about by new models and new business patterns. The effectiveness of public affairs management does not only rely on the government, but should also interact positively with society, enterprises and citizens to influence each other, and combine this triadic structural capacity in the dynamic process of government function reform, thus achieving the organic interaction and systematic promotion of the three (Xue & Li, 2014). For example, the orderly management of platforms such as Didi Dache manage through its own various regulations; Uber's use of information collected from economic activities to cooperate with government authorities. The government's analysis of this traffic big data implements more effective and accurate urban traffic solutions (Zhang, 2016), improving traffic conditions in real time, not only relieving urban road congestion, but also undoubtedly contributing to shared governance and bringing substantial inspirational significance to the establishment of a collaborative and open governance system. In markets where digital innovation is very important, market forces are not inevitable and therefore policy can play an important role in allowing market competition.

Admittedly, the flow of information in the digital age is not unidirectional, but has a two-way, even multi-way, nature. Transparency of public information by government agencies, then, can have an unexpectedly positive impact on the market. As in the aforementioned series of cases of lack of ethics, such as the bottomless use of users' private information by companies, real-time government regulation is particularly important. Firstly, from the standardization of access standards to the supervision of the operational process, sound laws and regulations should be established to strengthen law enforcement, with regulators joining forces with platform providers to adopt Internet + big data to protect consumers and their privacy; secondly, both platforms and merchants should set up digital integrity evaluation systems and reward and punishment mechanisms to encourage consumer monitoring and reporting, and implement precise management.

4.3 Creating a Digital-Oriented Government Regulatory System

It is also necessary for the government to apply information technology to effective innovation in regulatory policies, government information transparency and further improvement of digital basic public service platforms. Thus, it will become possible to open up multi-level innovation information silos between departments, to activate the dormant state of cut-off data, to optimize and integrate digital resources owned by government departments at all levels, to provide precise oversight and guidance, and to create a secure environment that supports the development of the digital economy.

The development of digital technology has improved government governance efficiency and information needs and facilitated public access to and participation in the rule-making process. By taking advantage of advances in digital technology, or the use of information technology in the development and implementation of regulations, it is expected to help simplify and improve regulatory management. Modernizing national governance in the new era requires the use of digital technology tools such as big data, blockchain and other technologies, sharing data through multiple channels, promoting innovation based on scientific big data analysis, jointly seeking efficient countermeasures and making precise management measures diversified, scientific, transparent, precise and collaborative, so as to improve the quality of management of the digital economy and raise the level of regulation under innovative regulation. The achievements of China's regulatory innovation during the period of rapid economic development are quite evident, from the sharing economy of online vehicles to online food trading platforms, from mobile webcasting to third-party payment platforms, from the lack of binding laws and regulations to the continuous establishment and improvement of relevant laws and regulations, transparency of information disclosure and diversification of regulation, all of which are inseparable from the continuous innovation of government regulation. These innovations better maintain the healthy and orderly operation of the market, support both the innovative activities of enterprises and ensure the steady improvement of the social economy.

In recent years, the development space of China's digital industry has grown rapidly in a relatively free environment. The rapid development of the digital industry and its continuous penetration and integration into the real economy have infused new energy for the transformation and upgrading of the industrial structure and economic development, but the uncertainties, risks, contradictions, and problems it brings are also increasing day by day. The post-epidemic era has accelerated the digital transformation of enterprises and the rapid development of the digital economy. Balancing the challenges and opportunities presented by digital technologies is indeed a very difficult but important task. In an ever-expanding digital economy, innovations in government regulation are extremely important in the administrative governance structure and have a huge impact on the social and market economic order. Innovative government regulation is an important issue that cannot be avoided in the digital era and deserves further specific study.

5. Conclusion and Outlook

5.1. Conclusions and Insights

The positive effects of the digital transformation are highlighted in the first part of the article, with Part II describing the concept and characteristics of digital transformation and the resulting negative effects are detailed in the third part of the article. The market innovations brought about by digital technologies such as Big Data, AI and IoT have impacted traditional industries, but the new economic energy they stimulate has created higher social value at the same time, and the overall benefits outweigh the disadvantages. Therefore, it is imperative for government regulation to be innovative, not only to avoid covering up the problems, but also not to be indifferent, not to be overly aggressive and

not to choke, i.e., the scope of regulation and intervention should be moderate, and the level of government regulation and governance should be improved while maintaining market dynamics and production innovation, so that government regulation and market operation can mutually promote each other.

Overall, we argue that the scope and level of government intervention should be moderately maintained. At the same time, the government needs to take assistance measures, such as the government's assistance for the digital transformation of SMEs and traditional enterprises, the regulation of the illegal operation of monopolies, and the effective promotion of the digital capabilities of employees in enterprises are all effective measures to tackle unemployment.

5.2 Limitations and Outlook

This paper elaborates on the corresponding contradictory issues that arise in the process of digital transformation and presents some preliminary views on government regulatory innovation, among which there are shortcomings and limitations. Specific issues will need further separate empirical discussion later, such as government regulation of mobile webcasting platforms, government regulation of third-party payment platforms, and regulation of fintech. We hope to follow up with a targeted study on this. In addition, scholars such as Rachel Botsman have raised the issue of the ethics of technology. As the collaboration and trust brought about by digital technology is a reality that each of us cannot avoid, and in the process has changed the way we live, work and consume, and I think this is an issue that needs to be discussed in a new and focused way by the government in the future.

This paper is really not an empirical paper, so it does not draw conclusions through iterative experimentation and argumentation. Instead, it seeks commonalities by reviewing the literature to summarize the particular examples arising from the transition, and makes reasonable suggestions for government regulatory innovation. The paper concludes by suggesting that the government should innovate in three areas of regulation: grasping trends, sharing governance and creating an environment, to improve government regulatory capacity and efficiency and adapt to the new economic model. Such non-empirical research, which does not seem to have a standard definition, belongs to a discursive exploration of existing research and ongoing phenomena, which, although not logically rigorous and insufficiently supported by theory, can be combined with empirical research in the future to jointly analyze the problem and receive theoretical support through a theoretical framework, which is again highly actionable. Such as government regulation of mobile webcasting platforms, government regulation of third-party payment platforms, and regulation of fintech.

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