

Communication

# Digital Transformation and the New Normal in China: How Can Enterprises Use Digital Technologies to Respond to COVID-19?

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**Abstract:** The COVID-19 pandemic, a worldwide health and humanitarian crisis, has created unique challenges for citizens, governments, and organizations alike. Business leaders ask ‘what is the new normal, post-pandemic?’ while industries become more complex and uncertain. Premises sit empty, employees work remotely, and customers possess less disposable income. However bleak, opportunities do exist. Organizations will, however, need to transform. Technology will need to be used to respond to the pandemic, and organizations must re-structure to better function. This paper examines the role that digital technologies can play in responding to pandemics and outlines four classifications of digital technologies for pandemic response. An as-is/to-be pathway analysis is presented using case studies from Chinese enterprises to provide trajectory guidance for moving forward to the new normal. After analysis from an incorporated technology-centric and business model-based framework perspective, six fundamental enterprise strategies are presented that are derived from literature and empirical observations.

**Keywords:** COVID-19; post-pandemic; new normal; digital technologies; pandemic response; digital transformation strategies



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## 1. Introduction

In December 2019, the Wuhan Municipal Health Commission of Mainland China reported an outbreak of SARS-CoV-2 (COVID-19). Unknown at the time, the novel coronavirus was to become an international public health emergency and the fastest spreading and most difficult to contain disease since the founding of New China. The black swan events of COVID-19 led to a global pandemic being declared in March 2020, creating mass panic, fear, and uncertainty among citizens. Governments, organizations, and the general public experienced sudden changes to normality which have required significant adjustment to overcome the barriers of the pandemic.

The post-pandemic era ushers the inclusion of smart-enabled technologies into our everyday lives, creating remote office working, distance learning, and a cashless society, thereby transforming citizens' lives into an on-demand model with permanent internet connectivity. Technologies that assist in the management of human capital are perhaps the most critical resource on which redeployment and reconfiguration efforts depend. Thus, it is imperative that we create new capabilities to deal with the expected uncertainty in New Normal environments [1]. Governments and society rely on social media platforms (e.g., Twitter, WeChat, QQ, etc.), search engines, and other data-rich services that use smart positioning, instant messaging, and similar functions, to obtain big data to monitor trends in real-time and achieve visualization of activities. The internet plays an increasingly important role in the sharing of information, rumor refuting, and early warning messages.

Artificial Intelligence (AI) has positively assisted in medical diagnosis and healthcare delivery. For example, Huawei launched an AI-assisted medical image analysis service to help assess the progress of COVID-19, while BGI Genomics used cloud computing for gene sequencing and nucleic acid test reagent development. Google employed cloud computing to aid in the innovative development of specific drugs and vaccines, while IBM provided round-the-clock access to clinical laboratory data through IBM® Clinical Development (ICD) to accelerate the development of key drugs in the fight against COVID-19. Similarly, Microsoft established Azure, a cloud-based platform that provides rapid medical resources to healthcare providers. Technologies such as the electronic medical recording system by Unisound, and the smart disinfection robot by Keenon, have effectively minimized the spread and transmission of COVID-19 in Mainland China. Food provision has experienced few challenges with digital services, such as ‘Card Free’ and ‘Why Hunger’, providing free contactless meal ordering and interactive maps for citizens to find free meals during the pandemic. The autonomous contactless takeaway delivery robot, developed by Meituan, has enabled isolating households to order and receive essential household items. Business meetings have transitioned to online environments, while remote office working has been facilitated through online platforms, such as Ping An Group. In education, AI has assisted in classroom assessment and discussions, while companies such as SenseTime have provided real-time monitoring of vital statistics, including body temperature. Table 1 shows the various applications of digital technologies as we transition to a new normal, post-pandemic.

**Table 1.** Major classifications of digital technologies for pandemic responses.

<b>Automatic Systems to Cut off the Transmission Route</b>	<b>Clinical Management</b>	<b>Life Assistance</b>	<b>Big Data Monitoring for Epidemic Trends</b>
<ul style="list-style-type: none"> <li>• Quarantine and self-isolation solutions</li> <li>• Prevention and control robots</li> <li>• Smart voice recognition and input</li> <li>• Smart disinfection robots</li> </ul>	<ul style="list-style-type: none"> <li>• Medical imaging assisted diagnosis</li> <li>• Group temperature measurement</li> <li>• Early detection and diagnosis of infections</li> <li>• Screening for infections</li> <li>• Clinical trial data collection</li> </ul>	<ul style="list-style-type: none"> <li>• Remote education</li> <li>• Medical supplies</li> <li>• Prevention transportation and logistics</li> <li>• Contactless delivery and takeaway</li> <li>• Remote office working</li> </ul>	<ul style="list-style-type: none"> <li>• Real-time epidemic reporting</li> <li>• Group temperature measurement</li> <li>• Early detection and diagnosis of infections</li> <li>• Screening infections</li> <li>• Clinical trial data collection</li> </ul>

The outbreak of COVID-19 has created fragile cities, but internet-enabled solutions, such as AI, Internet of Things (IoT), and 5G, have quickly responded to and provided opportunities for city development and resilience against the disease. In response to the spread of the pandemic, governments have repeatedly emphasized the supporting role that science and technology can play. The government of Japan, for example, has aimed to strengthen funding for scientific research projects and have prioritized ethical reviews for scientific activities related to COVID-19. In the United States, the White House emphasized the key role of technology companies in the fight against the pandemic. In Russia, the Russian Direct Investment Fund (RDIF) has funded the research and development of a new COVID-19 vaccine. In Germany, the Academy of Sciences emphasized the use of mobile phone data to collect information on infection rates and contacts, which is conducive to isolation measures. In China, the government issued a white paper titled “Fighting COVID-19: China in Action” on 7 June 2020, emphasizing the important role that digital technologies can play in identifying, policing, preventing, and controlling the pandemic.

To improve enterprise understanding about how to effectively respond to the new normal in a post-pandemic reality in China, this communications paper aims to identify the major classifications of digital technologies for pandemic response using a case study analysis from 100 listed companies in China that provide cutting-edge COVID-19 solutions. Then, an as-is/to-be pathway analysis is completed to provide trajectory guidance for en-

terprises to move forward to the new normal using digital technologies. Finally, we present six enterprise strategies that are derived from the literature and empirical observations. This research aims to answer the following questions: what are the major classifications of digital technologies for pandemic response? What is an effective Digital Transformation (DT) pathway for enterprises to adopt to move forward to a new normal using digital technologies? What are the most effective digital transformation strategies for enterprises to adopt when facing the new normal, post-pandemic?

The remaining sections of this paper are organized as follows. In Section 2, related studies on digital transformation post-pandemic are reviewed. We also propose the “Servitization–Digitalization Conceptual Framework (SDC framework)”. Then, the as-is/to-be pathway analysis of key case companies is exposed by the SDC framework. In Section 3, we introduce and discuss six enterprise strategies with coherent thoughts based on Sections 1 and 2. Finally, we provide a conclusion with industry implications in Section 4.

## 2. Digital Transformation Post-Pandemic

As approved COVID-19 vaccines are distributed across the world, citizens will transition to a ‘new normal’ way of living. The term ‘new normal’ is used to describe the new features of the post-crisis world economy [2]. El-Erian [3] refers to the new normal as the situation that developed countries will fall into, long-term, with economic weaknesses and high unemployment rates. Compared with the pessimistic tendency of foreign countries, the concept of the ‘new normal’ in China tends to be the opposite. It suggests that China will move positively and favorably towards a more advanced development stage. President Xi Jinping put forward the concept of a ‘new normal’ in 2014 to summarize the current national economic development situation, which is characterized by speed of change, structure optimization, and power transformation. He proposed that the new normal will bring new opportunities and challenges to China’s development. The term is also closely linked to China’s economic transformation and upgrading as it enters a new development stage. This concept analyzes the necessity of China’s economic transformation and points out the direction and driving force of economic change. Under the new normal, China’s national economy has entered a new medium to high growth platform: the pursuit of quality, efficiency, innovation, and sustainable development, with high quality.

However, the outbreak of COVID-19 has had a profound impact on global economic development and our lifestyles, creating a new normal for businesses and citizens [4]. Marcus [5] believes that there is a significant difference between the existing normal and the new normal, post-pandemic. The fight against the epidemic should make citizens return to normal life instead of to a “dehumanizing” new normal [5]. This new normal is unlikely to be a static equilibrium, because the pandemic shock has triggered another unexpected dynamic [6–8]. Social development and industrial development in both the manufacturing and service sectors, before COVID-19, could no longer effectively deal with structural inequalities (e.g., racial discrimination, unstable employment) brought about by COVID-19, and the spread of the epidemic should be effectively dealt with under the new normal [4,9,10]. Subsequently, COVID-19 has injected new meaning into the concept of the ‘new normal’ which has driven rapid growth in online demand, boosted prosperity of the digital economy, and irreversibly transformed citizens lives. The ‘online and remote life model’ has become a new normal, whether it be the progress of society, the development of enterprises or the way of life which is fast moving in the direction of digital development. With advanced science and technology as the ‘booster’, China’s economy is evolving towards a more advanced state, with a more detailed division of labor. The lifestyle of citizens will change dramatically. The use of digital technologies, such as AI, 5G, and IoT, will transition society from a ‘human-contact and offline economy’ to a ‘stay-at-home and non-contact economy’. The use of cloud computing for working, learning, and pleasure, will become the new normal. Cloud-based services will facilitate home workouts (e.g., Peloton), home entertainment (e.g., Netflix), and home shopping (e.g., Amazon), thereby

creating new lifestyles for citizens. Human mobility will also be constrained, creating new 'cloud' models, such as cloud offices, cloud parties, cloud classrooms, cloud games, and cloud dates, etc. Personal lives will transition from offline to online environments, while professional working lives will quickly transform our working habits across industries. To support normal organizational operations, many employees have transitioned to online and hybrid working, advancing the field of remote office working. DingTalk, Tencent Meeting, and other remote office and video conferencing platforms have flourished to help organizations resume work and remain productive.

The consumption patterns of citizens have shifted from offline to online, with the e-commerce industry showing tremendous growth. The provision of live broadcasts is thriving, especially for live sports events and theatre productions. Brick-and-mortar stores are transforming their online operations, building virtual shopping malls, and changing rooms with the help of 5G and Virtual Reality (VR) technology. Since the closure of schools around the world, educational models have switched from offline to online modes of delivery with 'distance education' being adopted rapidly. By using online platforms, such as DingTalk Cloud Classroom, iFLYTEK, and other AI-assisted teaching services, the effects of online teaching have been greatly improved and the interaction between teachers and students has become better. The continued development of online education models may subvert the traditional education model, further promoting the sharing of high-quality educational resources and leading to greater educational inclusivity.

The pandemic has also exposed shortcomings, such as creating a digital divide for the elderly. Communities have adopted cloud management models, combined with smart cities, to intelligently analyze water, electricity, and property data to provide necessary medical assistance for the elderly, thus launching the inclusive era of smart homecare. Digital technologies play an important role in restarting the lives of citizens and improving their quality of life, post-pandemic. New digital technologies have been integrated into policy making, our social lives, and healthcare provision [4–6]. The preceding examples show that although the pandemic and lockdown restrictions have limited our offline lifestyles, the development of new digital technologies has helped us achieve an upgrade in our personal and professional lives after the pandemic. It has also accelerated digital transformation across industrial sectors with the rapid adoption of digital technologies, making way for the digital economy to create new business models, leadership styles, organizational thinking processes, and new strategies [4,7,8].

Digital transformation is a process that combines digital technologies with existing operating models to create value, respond to market demands, and grow profits [4,8,9]. The four basic elements of DT are their target entity, the scope and focus of the digital transformation, the way in which the technologies are delivered and adopted, and the expected changes that the new digital technologies will provide [10,11]. An organization with a high degree of digital transformation maturity means that it can upgrade and transform across different contexts, such as operational processes, value propositions, and customer experiences and culture, while remaining sensitive to market demands and consumer needs [10,12,13]. Digital transformation business models refer to the ability to use digital technologies to provide users with personalized experiences and services that break the constraints of time and space, while also providing value to the enterprise and its stakeholders. The DT model aligns to the various elements of organizational functions, including customers, revenue, value-added, stakeholders, and finance [11–13].

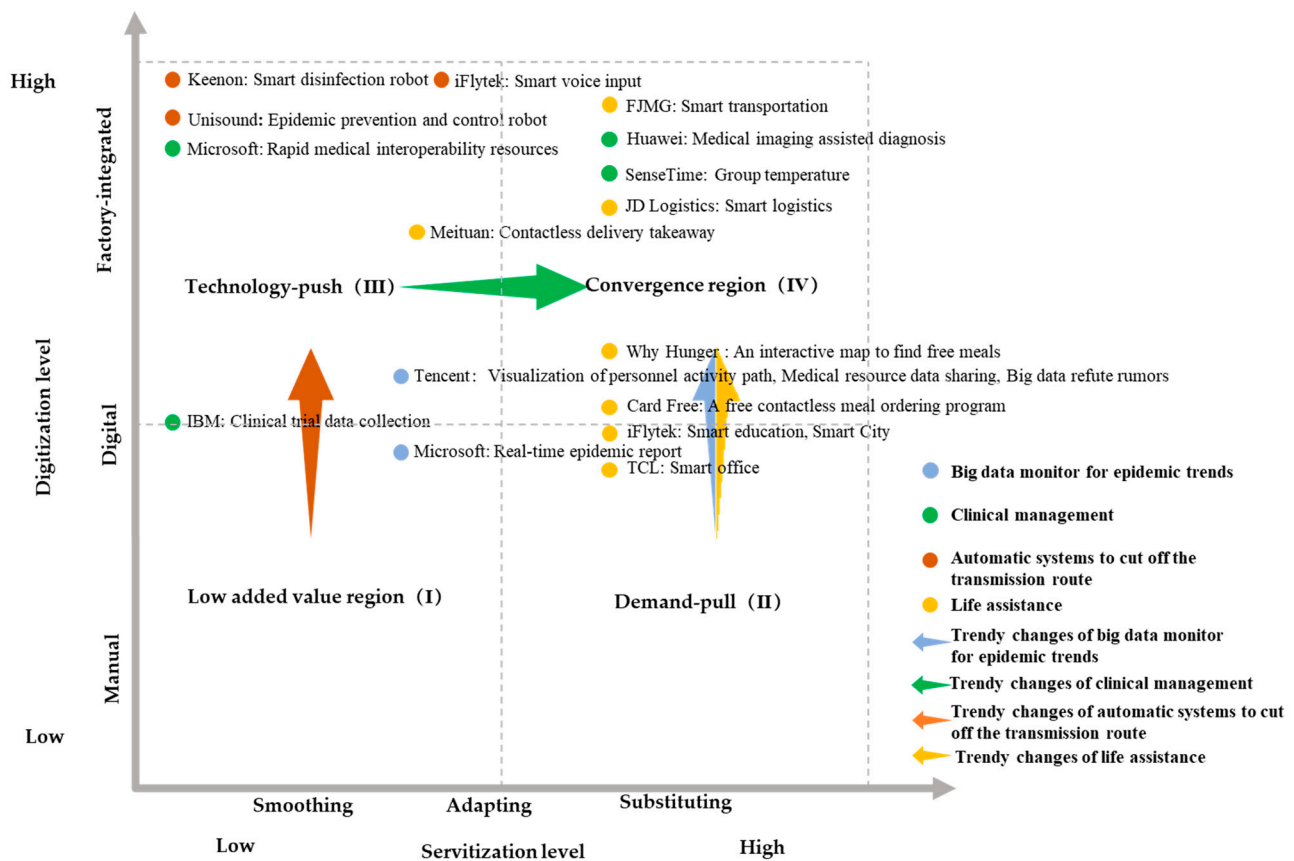
New DT business models include two trends: Servitization and Industry 4.0. COVID-19 has not only created difficulties for marketplace survival, but also forced enterprises to find alternative strategic paths to market. Although the pandemic has posed serious challenges to industry sectors, innovation, and digital transformation, new business models have helped some enterprises accelerate their shift to digital technologies and survive the turbulent marketplace [14,15]. In the post-pandemic era, organizations must gather digital transformation insights and learn new ways for generating effective value for themselves and consumers. This approach can lead to survival and growth [12–15].

Digital transformation is similarly a process that requires novel methods, enhanced processes, and theoretical innovation. The roadmap for DT includes five steps: digital reality, digital ambition, digital potential, digital fit, and digital implementation [13,14]. Many enterprises experience six critical stages during DT, including: business as usual, test and learn, systemize and strategize, adapt or die, transformed and transforming, and innovate or die [13,14]. COVID-19 has led to changes in citizens' consumption habits with organizations needing to create new methods to accelerate their DT. Some enterprises have quickly adopted digital transformation, while others have not yet defined their formal transformation strategy. From a clinical management perspective, many enterprises are transitioning from the 'transformed and transforming' stage to the 'innovate or die' stage. At this stage, for example in the healthcare field, the main application of AI has been to assist doctors in clinical diagnosis; however, in future, AI will play a major role in the screening and diagnosis of major disorders, while pharmaceutical research and development will also see AI disrupt the global pharmaceutical industry [16,17].

To reduce the transmission of the coronavirus disease, much effort has been put into smart disinfection robots that have attracted attention from companies employing digital transformation strategies. With technological developments in deep learning, movement control and big data, the functions and application scenarios of robots will be further improved. In addition, to aid disinfection of work environments, operations will be carried out in high-radiation and high-temperature places, and in farmland and orchards. Enterprises that use big data monitoring to study pandemic trends are in the mature stage of DT. They examine the needs of customers and employees by listening to societal demands to develop and continually innovate [16]. For example, companies are using real-time data to visualize employee and citizen activity paths to meet the requirements of transparent pandemic data sharing. Due to continued innovation and digital transformation, these companies are in the highly mature stage of the maturity spectrum. In terms of life assistance, technology companies in the mature stage of DT are expanding into the development of smart education and remote office working, while others in the early stages of digital transformation have started to 'systemize and strategize'. In other words, these enterprises have begun to pay attention to customer interactions and the optimization of internal processes. For example, retail organizations have shown significant digital potential during the outbreak. Accordingly, many traditional retail sectors have begun to employ supply chain management and consumer behavior prediction tools based on big data in order to reduce costs and improve the operational efficiency of their supply chains, marketing initiatives, and inventory management.

From the spread of the pandemic to the prevention and control of the disease, and then to normalization, pandemic prevention technologies play a decisive role in all stages of its development. An important aspect of DT is the use of DT-enabling technologies, including AI, 5G, IoT, and big data, to meet the needs of different industries [14,18,19]. New technologies are often used to solve the problems of demand-pull factors, such as value-added customers, or technology-push factors, such as improvements in manufacturing or engineering processes [14,20,21]. As enterprises fight to survive the COVID-19 pandemic, technology is seen to play an important role in all aspects of medical care and our personal lives. In the previous sections, we have summarized relevant concepts and provided examples of pandemic prevention technology companies and then combined the development stage of digital transformation with their business models to form the conceptual framework, titled "The Servitization–Digitalization Conceptual Framework (SDC framework)", shown in Figure 1.





**Figure 1.** The as-is/to-be pathway analysis of case study companies using anti-pandemic technology under the servitization-digitalization conceptual framework (Adapted with permission from ref. [18]).

The conceptual framework, shown in Figure 1, connects Servitization and DT-enabling technologies under Industry 4.0 and analyzes the enterprise digital transformation process from two perspectives: customer value-added and production process value-added. The framework illustrates the complexity at different stages of enterprise digital transformation based on three service levels: smoothing, adapting, and substituting, and three digitization levels: low, medium, and high level. The above concepts and examples of digital technologies for pandemic responses are summarized and mapped into a four-dimension conceptual framework, adapted from Frank et al. [18]. The framework represents the developing stages of DT and evolution in digital transformation business models. The levels of digital transformation are relative with technology development levels, which is shown on the vertical axis, from Dimension I to dimension III. Servitization, as a business model, is classified into smoothing services, adapting services, and substituting services, from Dimension I to Dimension II, on the horizontal axis. This enables the intersectional four dimensions, including: low added value region (I), demand-pull (II), technology-push (III), and convergence region (IV). We analyzed the case study companies based on the four classifications and identified the major trajectory as a type of trend shifting guidance that is occurring based on the above four types of digital technologies.

Firstly, the red color indicates “Automatic systems to cut off the transmission route”. This is a type of techno-centric and pandemic-based digital transformation. Keenon, Unisound, iFlytek are taken as examples to analyze their digital transformation model. Carrying out pandemic prevention and control robots, intelligent disinfection robots, and other machine tools that block the transmission of the disease are constantly being shifted from Dimension I (low level region) to Dimension III (technology-push) due to fast developments in emerging digital technologies.

Secondly, the yellow color indicates “Life assistance”. This is a type of new normal, post-pandemic life requirements digital transformation. FJMG, JD Logistics, Why Hunger, Card Free, Meituan, and iFytekLife and TCL are taken as examples to analyze their digital model transformation. These assistance organizations are continually innovating through digital transformation transitions, to capture consumer demand changes to shift from Dimension II (demand-pull) to Dimension IV (convergence region).

Thirdly, the green color indicates “Clinical management”, which is a type of medical and healthcare-centric digital transformation. Medical diagnosis organizations, facing the urgency of the spread of the pandemic, are shifting from Dimension III (technology-push) to Dimension IV (convergence-region). Microsoft, IBM, Huawei, SenseTime are used as examples of this type.

Fourthly, the blue color indicates “Big data monitor for epidemic trends” which is a type of market screening digital transformation. Companies that focus on monitoring pandemic trends using big data mainly rely on their novel applications which continuously improve the accuracy and broad contexts of applying user data. These technologies can provide governments and society with rapid real-time reports of pandemic data for improving scenarios, shifting from Dimension II (demand-pull) to Dimension IV (convergence region). Tencent and Microsoft are taken as two key examples.

### 3. Recommendations and Strategies

During the COVID-19 pandemic, technology has been seen to play an essential supporting role in urban construction and the development of the digital economy [21,22]. As a governance tool, governments should pay greater attention to the appropriateness of digital governance. Issues exist between governments and citizens, voluntary versus compulsory, knowledge and concealment [23], service and control, transparency and closure [24], fairness and discrimination, and protection and utilization [25] during the pandemic. For example, health codes were implemented during the pandemic to ensure citizens’ travel safety which ultimately aggravated problems and hidden dangers of data anxiety, privacy security, and information crime. To rebuild the economy post-pandemic and improve the efficiency of urban governance, governments can take the following actions. First, governments, social organizations, other types of enterprises, and citizens should work more closely together to establish a diversified urban governance system to convert crises into opportunities and achieve victory in the battle against pandemic prevention and control [22,26,27]. Second, countries should accelerate the construction of digital governments, developing digital economies and improving the level of urban governance continually. Further, the formation of strong consumption environments is inseparable from legal norms and ethical constraints. Government ministries and agencies should fully consider the social needs of citizens and improve their laws and normative ethics. Finally, they should welcome the potential of smart city development and a resilience management mechanism should be established to build digital nations [23,27,28]. The pandemic is temporary, while sustainable development is permanent. The ability to find value in the tide of the digital economy and achieve successful digital transformation is a critical factor for organizations’ future development. For this reason, in facing such a major crisis, enterprises should implement the following six DT transformation strategies.

#### 3.1. Strategy 1: Capture the Opportunity Signals of the Crisis

As noted in Sections 2 and 3, diverse and possibly new digital technologies, new business models, pathway guidance in the new normal circumstance, and enterprises can enjoy a new digital transformation opportunity driven by the risk under the uncertainty of COVID-19. Enterprises should, therefore, strengthen their awareness of future uncertainties, proactively studying opportunity signals during the situation. Further, they must create bold business models and digital transformation strategies and prudently push the plan forward. As a result, enterprises can turn pandemics into opportunities.

### 3.2. Strategy 2: Believe in the Risks Seen by Leaders

The global shock of the pandemic has triggered another unexpected dynamic. We have analyzed four major classifications of digital technologies for pandemic responses in this paper, as illustrated in Table 1. If enterprises are still not ready to face competitiveness in the new normal, they will face some survival risks caused by competitors that are using some effective digital technologies for pandemic responses. Enterprises should, therefore, always have a visionary leader or leadership team with the ability to identify risks, such as pandemics, natural disasters, and policy changes. This will allow for quick decision making. By creating corresponding management measures, while dealing with risks, enterprises can promote the improvement of corporate capabilities and collaboration.

### 3.3. Strategy 3: Integrate New Technologies and Design New Business Models

The COVID-19 outbreak has changed the values and behaviors of citizens and employees, while consumption habits have altered. Enterprises should continue to track the changing trends of the pandemic, adjusting their strategies to the expectations and demands of stakeholders, such as customers, employees, shareholders, and partners. They should assess their situation and formulate innovative strategic measures that are conducive to their own digital transformation and upgrade plan. At the same time, for the integration of digital transformation technologies and corporate processes, as well as the development and design of new values and new business models, it is necessary to cultivate diversified technological service designs and management capabilities and create diversified strategies using new technologies to assist supply chains and business models. The as-is/to-be pathway analysis of key case companies, as illustrated in the SDC Framework, acts as guidance for integrating new technologies and designing new business models.

### 3.4. Strategy 4: Strengthen Organization Robustness While Using Digital Technologies for Pandemic Responses

Despite the opportunities and positive effects of adopting new business models based on new information technologies for pandemic responses, enterprises must proactively prevent and eliminate the potential risks or negative effects of them. For example, new information technologies can cause disruption, while markets must accept the technology. Adaptability to new strategies may also raise challenges in facing abnormal internal process disruptions, external variance disturbances, and strategy-making in the new shaping structure. Table 1 provides a clear classification for enterprises to identify new possible solutions. After inspiring new solutions, enterprises can strengthen organization robustness while using digital technologies for pandemic responses.

### 3.5. Strategy 5: Establish a Multi-Dimensional Digitalized Financial Management Configuration

Finance is an essential dimension of digital transformation and should be focused on by building new digital mechanisms to rationalize costs, strengthen risk control, and innovate financial management models to satisfy the requirements of digital transformation. Through effective digitalized financial management configuration, business processes can be optimized and redesigned. This will enable unreasonable operational costs to be revealed, risk management thinking to be strengthened, and internal control systems to be improved. Moreover, risk-management mechanisms can cover a wide spectrum from front-end to mid-end to back-end of business processes, and a long-term effective financial risk initial-warning management mechanism could be established. Eventually, the new intelligent service system with multi-dimensional digitalized financial management configuration can transform corporate finance from 'accounting for the past' to 'managing for the future', effectively supporting corporate strategic decisions for the new normal.

The SDC Framework (Figure 1) depicts a conceptual framework that connects Servitization and DT-enabling technologies under the paradigm of Industry 4.0. Enterprises can use this framework to analyze their current position and the possible forward path of digi-



tal transformation from customer value-added and production process value-added. By referring to the provided examples, inspiration for conducting their own multi-dimensional digitalized financial management configuration can be gained.

### *3.6. Strategy 6: Rethink and Establish New Network Relationships in the Market*

Enterprises face complex and changeable market conditions, with new consumer behaviors and industrial contexts. They must, therefore, find diversified collaborations to actively assimilate into their innovation networks and create new ecosystems. The pandemic has catalyzed the application of technologies into our everyday lives. Citizens' lifestyles have changed significantly in terms of time and space. Platforms such as Baidu and China Mobile use big data to monitor and analyze the pandemic situation in real time, reporting findings to governments for statistical decision making. Similarly, organizations such as Tencent, Huawei, and Alibaba Cloud have used AI and big data to track and judge capabilities to perform virus genetic testing, drug research and development screening, lung image analysis, and other scientific research activities, which help medical diagnosis and treatment. The use of intelligent systems, such as the infrared temperature sensor detection system developed by Megvii technology, the intelligent voice control system developed by iFlytek, and the question-answering robots in public places, contributes to community governance. Under the new normal, the use of digital technologies not only contains the spread of the pandemic, but also promotes the rise of the digital economy. In times of crises, governments, organizations, and society should follow trends and continuously improve urban governance resilience, while promoting the development of the digital economy, to achieve the sustainable development of economies for all countries. By analyzing existing partners based on the four major classifications of digital technologies for pandemic responses (Table 1), and by re-positioning them based on the SDC Framework (Figure 1), in existing supply chains or enterprises' internal and external networks, organizations can have a new and open perspective to rethink and establish new network relationships in the market. By thinking about the right pathway for digital transformation, enterprises have the opportunity to meet new partners on the way!

## **4. Conclusions**

This paper examines the role that digital technologies can play in responding to pandemics and outlines four major classifications of digital technologies for pandemic response, i.e., (1) automatic systems to cut off the transmission route, (2) clinical management, (3) big data monitoring of epidemic trends, and (4) life assistance. Case analysis is employed from 100 listed companies in China which provide cutting-edge COVID-19 solutions. The features and functions of each classification are illustrated in this paper. Meanwhile, an as-is/to-be pathway analysis of key case companies using anti-pandemic technology under the servitization–digitalization conceptual framework is presented. We take some companies as cases of the four classifications to analyze the changes in business models to understand trajectories for moving forward to the new normal through the use of digital technologies. Then, six digital transformation strategies are presented that enterprises can use in their fight for survival, post-pandemic. Meanwhile, an as-is/to-be pathway analysis is presented to provide trajectory guidance for moving forward to the new normal. The main differences and contributions of this article can be summarized as: (1) the features and functions of each classification are illustrated. These clarify the comprehensive scope considering both the market side and technology side; (2) meanwhile, the “the Servitization–Digitalization Conceptual Framework” was adapted and proposed as a helpful digital transformation rethinking approach. Then, the as-is/to-be pathway analysis was illustrated by analyzing some selected key companies to give clearer trajectory guidance for moving forward to the new normal by using digital technologies; (3) six digital transformation strategies that enterprises can use in their fight for survival post-pandemic are presented.

We then offered six fundamental enterprise strategies derived from the literature and empirical observations, namely: (1) capture the opportunity signals of the crisis, (2) believe in the risks seen by leaders, (3) integrate new technologies and design new business models, (4) strengthen organization robustness while using digital technologies for pandemic responses, (5) establish a multi-dimensional digitalized financial management configuration, and (6) rethink and establish new network relationships in the market. The means of how to apply the four classifications and the SDC framework are also discussed regarding each strategy. It is hoped that this communication provides practical guidance and implications for achieving a more effective response to the new normal in post-pandemic reality and contributing to research about enterprises facing COVID-19.

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