

# Innovation and CSR on Chinese SOEs: Adapting to COVID-19

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**Keywords:** Innovation, CSR, COVID-19, Corporate Competitiveness.

**Abstract:** In 2020, COVID-19 spread all over the world, seriously threatening human life and health and severely impacting economic development. Chinese pharmaceutical state-owned enterprise (SOE) Da An Gene quickly developed new products and helped meet huge demands for protective supplies. Its “R&D innovation and corporate social responsibility (CSR)” interactive mechanism formed in the course of long-term innovation and capital accumulation enabled it to seize opportunities brought by the epidemic. This study explores the path of how innovative SOEs created value through interaction of R&D innovation and CSR with case study against the background of COVID-19, and whether reform of state-owned capital regulatory system to inject market vitality into SOEs can effectively transform the interaction mechanism of R&D innovation and CSR into sustainable core corporate competitiveness.

## 1 INTRODUCTION

According to Organization for Economic Co-operation and Development (OECD) in 2020, the wide spread of COVID-19 is considered one of the biggest public health security incidents in the contemporary era. In addition to public health, it has produced catastrophic impacts on the economy. Due to their weak financial capabilities, micro and small enterprises have halted production or closed down on a large scale (Bartik A et al., 2020). Enterprises need to find a survival mechanism in crises (Champion D, 1999). In the context of sudden disasters such as COVID-19, companies with the ability to innovate and launch innovative products can more quickly adapt to rapidly changing external environment (Amore M D, 2015). However, they need to undergo a long technological R&D cycle and consume a lot of human and financial resources, so most of them give priority to reducing costs (Bushee B J, 1998). On the other hand, studies have shown that companies that continue to focus on product innovation can accumulate R&D skills and innovation resources, who are more likely to survive crises than those adopting a cost-cutting strategy (Amore M D, 2015). Therefore, companies need to lay stress on accumulating innovation capital and cultivating innovative talents in the boom times, so as to quickly

adapt to changes when major crises come and withstand the impacts of huge external shocks. On the other hand, COVID-19 has highlighted the importance of CSR. CSR can not only reduce companies' production and labor cost (Berman S L et al., 1999), affect the recruitment, retention and motivation of employees (Aguilera R V et al., 2007), but also improve customer satisfaction and corporate reputation, thereby affect customers' loyalty and purchase intention (Lee S et al., 2020). During economic crises, companies actively fulfill their social responsibilities for the purpose of gaining the trust of stakeholders and the public (Popkova E et al., 2021), which helps them effectively coordinate the relationship with stakeholders and thus survive difficulties (He H et al., 2020).

Under socialist market economy system, China's state sectors are the most important force for funding and conducting innovative research, who provide SOEs with stable talents, capital, knowledge, and technical resources so that they can continue to work on R&D and effectively commercialize patents and R&D results (Cao X et al., 2020). SOEs enjoy more resources from government departments than private enterprises, but should assume more CSR, especially during difficult times such as economic crises or natural accidents (Zhu Q et al., 2016). However, there are some problems in their development, such

as imperfect supervision mechanism, which lead to their limited development and insufficient vitality. In respond, the state proposed to continue to deepen the reform of the state-owned assets management system, and impose more supervision on specialized state-owned capital investment and operating companies, so as to release the management power of SOEs, stimulate their vitality, realize the maintenance and appreciation of state-owned assets, and ensure their role as main players in the market.

Da An Gene Co., Ltd. of Sun Yat-sen University (hereinafter referred to as “Da An Gene”) is a state-owned listed pharmaceutical company that draws support from Sun Yat-sen University in terms of scientific research. Since its establishment in 1991, it has been focusing on R&D innovation. The company has rich innovation resources and practical experience, and adheres to fulfilling social responsibilities based on product innovation. At the outbreak of COVID-19 in early 2020, it quickly seized market opportunities with its competitive advantages in R&D innovation and CSR, and became one of the first pharmaceutical companies to develop and produce COVID-19 detection kits. In September of the same year, its largest shareholder transferred its equity to State-owned Assets Supervision and Administration Commission of the State Council, and the company began to receive assistance from Guangzhou Finance Holdings for capital operations, which put the company into more active market competitions. Therefore, Da An Gene is a typical case for studying the role of interaction between R&D innovation and CSR in improving enterprises’ core competitiveness, helping them resist the impacts of COVID-19, increasing the value of state-owned assets, and exploring potential development opportunities brought by the reform of regulatory model after transferring state-owned assets and the path of corporate value creation after introducing supervision of state-owned assets.

Although existing research points out the importance of R&D innovation and CSR to the development of enterprises, and that in most cases, the fulfillment of CSR can promote R&D innovation, there are few literatures on the mechanism of the interaction and mutual promotion of R&D innovation and CSR. This study focuses on the interaction between “R&D innovation and CSR” among SOEs, and adopts single case study with Da An Gene as a typical case to discuss the path and mechanism for innovative SOEs to create value through the interaction between R&D innovation and CSR, and explores whether competitive advantages of the interaction mechanism can maintain and contribute to

the growth of corporate value in the market environment of changed state-owned capital operation and supervision model. Specifically, it concludes “enterprises can accumulate R&D skills and innovation resources if they continue to focus on R&D and innovation”, that “enterprises can earn social trust by fulfilling social responsibilities”, that “R&D innovation and CSR interact and complement with each other”, and that “reform of the state-owned capital management system guarantees the long-term and stable operation of interaction mechanism between R&D innovation and CSR” based on case study. By single case analysis, this study explores the mutual promotion of R&D innovation and CSR in innovative SOEs against the background of COVID-19, enriches related theories, builds the path of creating corporate value through an interaction mechanism between R&D innovation and CSR, and discusses whether Da An Gene’s interaction mechanism can translate into its continuous core competitiveness, which provides reference for the development of other SOEs that implement a new model of supervising state-owned assets.

## 2 LITERATURE REVIEW

The literature review is as follows.

### 2.1 Influencing Factors and Mode of Innovation

R&D innovation is an important driving force for social and economic development, as well as an important factor for the sustainable development of enterprises. In the past two decades, more scholars at home and abroad began to study its role in enterprises. In related literature, influencing factors on it are divided into external factors and internal factors. External factors mainly include national policy (Gu Y and Zhang L, 2017), competitive environment (Lunn J, 1986), etc., while internal factors mainly include enterprise scale (Chen C T et al., 2004), equity incentive (Chang X et al., 2015), employee compensation and benefits (Li J et al., 2020), and managerial personality (Shen H et al., 2020), which either promote or inhibit enterprise R&D innovation. However, the most important determinant in corporate R&D is capital. Companies raise capital mainly through equity financing (Huang Y et al., 2014) and debt financing (Anderson et al., 1999). In China, government subsidy is also an

important source for companies to promote R&D innovation (Czarnitzki D and Licht G, 2006).

Main modes of R&D innovation are internal R&D, external R&D and collaborative innovation (Arvanitis S, 2012). Enterprises would adopt different modes in R&D innovation. Relevant studies have shown that main determinants in the choice of innovation modes are corporate size and dedicated system (Hull C E and Covin J G, 2009). From the perspective of enterprise scale, small companies are more likely to choose internal R&D or external R&D alone, while large ones tend to choose both internal R&D and external R&D (Fritsch M et al., 2001 and Veugelers R et al., 1999). After controlling the variable of scale effect, when dedicated system is strong, companies tend to conduct independent external R&D; when internal information is more important for R&D, they tend to conduct both internal and external R&D (Veugelers R et al., 1999). When companies develop to a certain extent, collaborative innovation can also improve their innovation performance (Wang C and Hu Q, 2020). Each innovation mode can promote the development of enterprises to a certain extent, but enterprises should appropriately balance R&D activities under multiple modes (Denicolai S et al., 2016).

## 2.2 Relationship Between Innovation and CSR

After analyzing 817 papers related to “research and innovation” in the past 20 years (as shown in Figure 1.) with CiteSpace, we see that topics related to corporate R&D and innovation and the fulfillment of CSR have increasingly aroused the attention of scholars in the last two years (Luo X and Du S, 2015). CSR mainly includes economic responsibility, environmental responsibility and social responsibility (Yu W and Zheng Y, 2020), but no consensus has been reached on the relationship between innovation and the three kinds of CSR. Although some studies point out companies will squeeze innovation resources and inhibit innovation when fulfilling CSR (Mithani M A, 2017), that additional costs required for performing CSR such as charity donations are prone to cause agency conflicts (Bethel J E et al., 1993), and that companies need to bear certain tax risks in this regard (Davis A K et al., 2015), but most studies reveal the fulfillment of CSR exerts positive effects on R&D innovation.

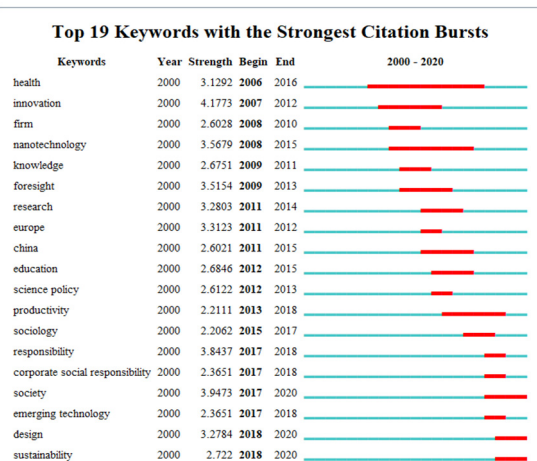


Figure 1. Keywords for innovation with strongest citation bursts.

Bereskin believe that by setting up incentives for employees and fulfilling economic responsibilities related to employees, companies can improve employee stability and innovation efficiency, and inject vitality into R&D innovation (Bereskin F L et al., 2016 and Liu B et al., 2020). Investing in stakeholders such as shareholders and creditors contributes to the sustainability of corporate profits and financial support for continuous innovation (Choi J and Wang H, 2009). Miles and Covin point out that environmental awareness enables enterprises to carry out product innovation, solve social problems, and improve business performance through cost savings and market benefits (Dionisio M et al., 2020). Voluntary charity activities and other social activities can help enterprises not only solve social problems and gain reputation, but also obtain more external information to accumulate capital for future innovation (Holmes S and Smart P, 2009). In short, companies that continue to perform CSR can win social recognition, form a good industrial responsibility atmosphere, and improve innovation performance (Bereskin F L et al., 2016 and Ko K-C et al., 2020).

Existing research points out R&D innovation and CSR are important to the development of enterprises, and that most activities for fulfilling CSR can promote corporate R&D innovation, but there is no study on whether the transfer of corporate holdings of SOEs under the background of state-owned capital reform can inject vitality into enterprise development, and the mechanism of interaction and mutual promotion of R&D innovation and CSR. This article explores the role of R&D innovation activities and CSR fulfillment in the development of SOEs against

COVID-19 and China’s deepened SOE system reform.

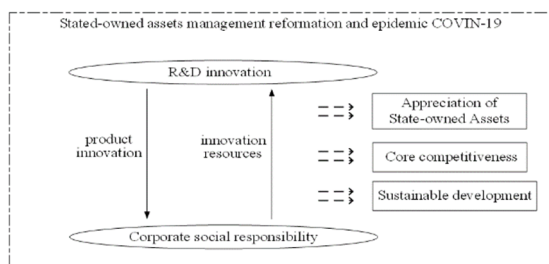


Figure 2. Framework of interaction between innovation and CSR.

Based on review and summary of existing research, this study builds an analytical framework for interaction between R&D innovation and CSR in promoting the sustainable development of SOEs in the context of state-owned capital reform and COVID-19, as shown in Figure 2. Enterprises gain economic and product benefits through R&D innovation, which is conducive for them to perform CSR (in a broad sense). In turn, by performing CSR, they win social trust and obtain more innovative resources for R&D innovation. Under the background of reform of state-owned capital management system and COVID-19, the interaction between R&D innovation and CSR facilitates the value creation of SOEs, increases the value of state-owned assets, and improves the core competitiveness of SOEs. This study focuses on the process of R&D innovation of SOEs, explores the mutual interaction and influence of CSR performance and R&D innovation in the context of COVID-19, and predicts that the reform of state-owned assets supervision system will promote this interaction mechanism to create value for SOEs.

### 3 EMPIRICAL METHODOLOGY

This part includes the empirical methodology as follows.

#### 3.1 Sample

This article follows the principle of typicality in case selection and sets out the criteria for selecting case company as follows (Patton M Q, 1987). (1) The company should have been focusing on R&D innovation for a long time, embrace matured innovation practice, and actively fulfill CSR, which is the basis for exploring the path of mutual interaction

between R&D innovation and CSR. (2) It should be a leader in the industry and perform well in COVID-19, which make it a representative typical case. (3) It should be easy to obtain data about the company, including public information to guarantee availability and comprehensiveness, which is conducive to the smooth progress of this study.

Following the above criteria, this study identified Da An Gene as the sample enterprise. First of all, Da An Gene is one of the state-owned university-run enterprises that was founded early, has relatively complete managerial mechanism, and embraces excellent performance. It is also the first listed high-tech enterprise run by a university in Guangdong. As a pharmaceutical company relying on the strong scientific research strength of Sun Yat-sen University, it has been emphasizing scientific and technological R&D since its establishment, and has achieved excellent results in vitro molecular diagnostics. The company adopts diverse innovation modes, including independent R&D, collaborative innovation and technology introduction. As a state-holding company, Da An Gene comprehensively fulfills CSR. Secondly, the company performed outstandingly in the fight against COVID-19. When COVID-19 broke out in China, it quickly developed nucleic acid detection kit (based on fluorescence PCR) with ensured quality and producing capacity, and earned a large number of domestic and foreign orders, which brought it surging profits and better development. In the meanwhile, Da An Gene has accelerated its pace of market-oriented reform. Guangzhou Finance Holdings will soon become its state-owned asset investment and operation company, thus realize modern governance of Da An Gene and promote its sustainable development. Last but not least, Da An Gene has been listed, so it is easier to collect data in an all-round manner. Therefore, the company is a very representative research case.

#### 3.2 Data

To ensure the rigor of case study and improve the reliability and validity of this study, we collected data with triangulation. The data are mainly primary and secondary data. Primary data include materials collected from semi-structured interviews, questionnaire, and field surveys, while secondary data mainly consist of public information such as assembly materials, minutes and reports of meetings, publicity materials, and public information retrieved via the Internet. They help us gain an in-depth understanding of the entire process of Da An Gene’s technological innovation, CSR fulfillment and state-

owned asset regulatory reform. Diversified sources of data ensure the integrity and richness of information. Table 1 shows details of sources of data about the case company.

Table 1. Access to data about case company.

Type	Sources	Access
Primary data	Financial manager of Da An Gene	Semi-structured interviews (sound recorded)
	Department head of Guangzhou Finance Holdings	Semi-structured interviews (sound recorded)
Secondary data	Assembly materials	Assembly materials, product information, annual reports
	Publicity materials	Brochures, press releases
	Other public information	Company website, public information retrieved via Internet tools such as browsers and databases

Field investigation and interview of case company were conducted by 7 team members. Before that, we prepared the outline for survey of case company and its controlling shareholder Guangzhou Finance Holdings, trained team members, and divided work among members to ensure smooth interview. During interviews, 2 people asked and answered questions, 3 made notes, and 2 recorded to ensure data accuracy. After that, recorded interviews were transcribed in a timely manner to avoid memory deviation.

### 3.3 Measures

This paper adopts single case study to discuss mutual promotion of R&D innovation and CSR by longitudinal case analysis. In addition, it hopes to build a mechanism and path for the interaction between R&D innovation and CSR. Grounded Theory is a method of establishing a substantive theory from the bottom up, which generalizes original data to form theoretical system (Jantunen S and Gause D C, 2014), being suitable for constructing a deductive path and consistent with expectations of this paper.

Grounded Theory mainly includes three processes: open coding, axial coding and selective coding, as shown in Figure 3. Open coding refers to the process of decomposing, refining, and categorizing data acquired. We decomposed original data item by item, labeled and conceptualized them, refined them into initial categories (subcategories),

and completed open coding based on expert opinions; then conducted axial coding, namely to further generalize subcategories, analyze the nature of each subcategory and the connection relationship among them, and summarize interconnected independent subcategories into fundamental categories; and finally integrated main category codes into core categories through selective coding. Throughout the process, we interpreted data as objectively as possible, and repeatedly compared coding results with materials to ensure that the obtained categories are saturated.

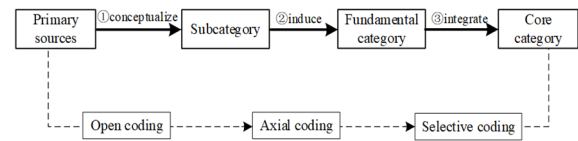


Figure 3. Grounded theory coding process.

## 4 RESULTS AND DISCUSSION

In this part, the results and discussions will be presented.

### 4.1 Framework of Innovation-CSR interaction

The framework of innovation-CSR interaction.

#### 4.1.1 Innovation

Innovation is an important cornerstone in enterprises' long-term development. In the 1990s, traditional PCR technology could not meet the needs of clinical diagnosis. Based on access to a large amount of foreign information, Da An Gene's scientific and technical personnel decisively worked on fluorescence PCR technology in developing next generation PCR products, which won support from the Ministry of Health and the National Science and Technology Commission, and was included as a key research project for "Ninth Five-Year Plan" on biotechnology. Da An Gene still focuses on the R&D of PCR genetic testing kits now. It has played an important role in several major epidemic disease outbreaks in China, which mainly owes to its emphasis on R&D innovation for more than 20 years. The important events in its innovation and development are shown in Table 2.

Table 2. Important innovation events in the development of Da An Gene.

	Events	Innovation capital accumulation (Fundamental category)
1996	Independently developed fluorescence quantitative PCR detection technology, achieving technical breakthrough in this regard in China.	Intellectual capital
1999	Completed property rights restructuring with the new mechanism and funds of the People's Government of Guangzhou Municipality, realized equity diversification, introduced capitals, and thus commercialized its innovative products.	Financial capital
2004	Got listed on the SME board of the Shenzhen Stock Exchange, became the first listed university-run company in Guangdong, and realized the combination of intellectual capital and financial capital.	Financial capital
2005	Applied for testing and calibration laboratory with China National Accreditation Board for Laboratories (CNAL) and was accredited.	Intellectual capital
2007	Acquired Zhongshan Biotech and obtained multiple immune diagnostic reagents, which were powerful supplements to its existing nucleic acid products and enriched its product lines.	Intellectual capital
2008	Purchased land and prepared to build Foshan Medical Devices Company as its equipment production base to strengthen its R&D ability, which will specialize in the research, development and production of life science analytical instruments.	Intellectual capital
2009	Passed the <i>Da An Gene's Incentive Plan for the First Batch of Stock Option (Draft)</i> , which injected vitality into its continuous innovation and development.	Intellectual capital
2011 till now	Established a professional big health incubator to focus on creating a "no wall" resource sharing platform for the big health industry and promote collaborative innovation among enterprises.	Intellectual capital

In the early days of its establishment, Da An Gene achieved independent innovation and breakthrough in fluorescence quantitative PCR detection technology relying on government subsidies and intellectual capital, embraced growth to some extent, but did not have the strength for industrial development. It launched capital increase and restructuring in 1999, successfully got listed in 2004, and established a perfect capital entry and exit mechanism, which brought it external financing and helped it further enhance R&D and innovation. In the meanwhile, the company strengthened its innovation capabilities and

improved market competitiveness through technology introduction, mergers and acquisitions. In 2011, it began to create a big health ecosystem, aiming to help entrepreneurs and SMEs, raise the success rate of entrepreneurship, and promote the collaborative innovation and development of enterprises.

Accumulation of innovation capital over the past two decades has enabled Da An Gene to quickly adapt to crises brought by the outbreak of COVID-19 in 2020 and seize development opportunities. The epidemic resulted in surging demands for test kits in

China, to which Da An Gene quickly responded and developed 2019-nCoV nucleic acid test kit on January 20. On January 28, the test kit was approved by the National Medical Products Administration and available on the market in large quantities.

Based on above case analysis, we put forward the following research propositions:

Proposition 1: Enterprises that continue to focus on R&D innovation can accumulate R&D skills and innovation resources, and quickly adapt to changes when sudden crises such as COVID-19 come, when R&D skills and innovation resources will become their core competitiveness.

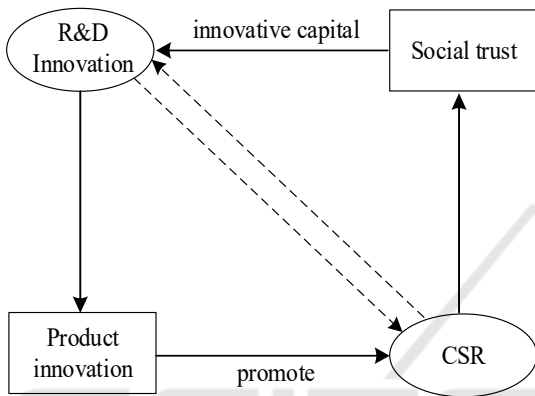


Figure 4. Framework of innovation-CSR interaction.

#### 4.1.2 Corporate Social Responsibility

As a high-tech biomedical company, Da An Gene actively fulfills its social responsibilities in a professional spirit. The process of its R&D and innovative development mentioned above shows that its innovative products in each stage have been promoting the development of fluorescence PCR gene detection in China. At first, it invented fluorescence PCR technology, which solved false positives and non-quantitative detection caused by the contamination of gene amplification products in traditional PCR technology. During the SARS epidemic in 2003, the H1N1 influenza in 2009 and the COVID-19 epidemic in 2020, it quickly launched test kits, made important contributions to preventing the further spread of diseases, and protected the health of the public.

Adhering to the mission of “reach the source of life and secure the foundation of health”, Da An Gene fully fulfills its CSR to ensure people’s health. During the Spring Festival of 2020, its R&D team still worked in the laboratory and finally developed test kits, thereby seizing the huge market opportunity of domestic and foreign demand for protective medical products. During the critical period of COVID-19, the

R&D team developed in vitro testing reagents and related instruments, ensured production capacity, and secured product quality. This shows that Da An Gene responded to problems occurred in the course of social development through innovative ways, has achieved profitability and sustainable development, and won social trust and respect.

On the basis of above analysis, we propose the following proposition:

Proposition 2: By fulfilling CSR, enterprises can win trust from the society, effectively coordinate the relationship with various stakeholders, obtain more external resources, and better survive crises.

#### 4.1.3 Innovation and CSR

Above-mentioned analyses reveal that continuous R&D innovation can help companies accumulate innovation resources, and that actively fulfilling CSR can help them win social trust and obtain social resources, but is there an interaction between them and how does it work if there is? Exploring the issue will help us better understand the mechanism of interaction between R&D innovation and CSR.

After summarizing original data about Da An Gene during the epidemic, we refined 18 concepts, further compared and analyzed them, and finally divided them into 8 subcategories and 5 core categories, as shown in Table 3.

Table 3. Coding of Da An Gene during the fight against COVID-19.

Primary data	Conceptualization	Subcategory	Fundamental category
In the face of sudden outbreak of COVID-19 across the country, almost all designated hospitals were in short supply of nucleic acid detection kits.	A1 domestic demand (a1)	AA1 market demand (A1, A2)	Impacts of COVID-19
Beginning in late February, overseas markets showed great demands for detection kits.	A2 international demand (a2)		
As the epidemic continued to spread globally, formalities of applying for CE certification became simpler and the threshold was continuously lowered.	A3 low certification threshold (a3)	AA2 industry status (A3, A4)	
On March 25, Spanish newspaper <i>El Pais</i> reported that a batch of rapid detection kits purchased from China were inaccurate.	A4 some companies only pursued profits (a4)		
Starting from March 29, Chinese companies must obtain relevant qualifications from the National Medical Products Administration while exporting protective products against COVID-19.	A5 Chinese policies tightened (a5)	AA3 related policies (A5, A6, A7)	
The threshold set by the country did not affect export of medical supplies, as there is huge demand. This is a good news for compliant manufacturers.	A6 favorable policies (a6)		
The State Council stipulated that in addition to people, objects should be included for COVID-19 testing.	A7 expanded detection range (a7)		
On January 24, President Xi Jinping clearly put forward the requirement of scientific prevention and targeted policy implementation, and emphasized resolutely winning the battle against the epidemic.	A8 science and technology-based anti-epidemic measures (a8)	AA4 response to the epidemic in China (A8, A9, A10)	Fight against COVID-19
Beginning on February 2, under the guidance of the Central Steering Group, Wuhan launched dragnet investigation, centralized treatment, and thorough investigation.	A9 strengthened COVID-19 screening (a9)		
Rapid spread of the epidemic was contained. The epidemic was generally stable across the country except Hubei.	A10 China made progress in epidemic prevention and control (a10)		
China consolidated and deepened the results of epidemic prevention and control, promptly deal with outbreak in clusters, resumed work and production in an orderly manner, and cared for overseas Chinese citizens.	A11 Epidemic prevention and control abroad (a11)	AA5 response to the epidemic in foreign countries (A11)	
After the outbreak of COVID-19, Da An Gene quickly launched 2019-nCoV nucleic acid detection kit (based on fluorescence PCR).	A12 independent innovation (a12)	AA6 R&D innovation (A12)	R&D innovation
The company's nucleic acid detection technology enabled timely prevention, control, diagnosis and treatment of the epidemic.	A13 product function (a13)	AA7 products and services (A13, A14, A15)	CSR



After successfully developing the test kit, the company quickly put it into production, providing a large amount of “ammunition” support for the “fight” against the epidemic.	A14 guaranteed production capacity (a14)		Corporate sustainable development
The company has its own fluorescence quantitative PCR instrument, nucleic acid extraction instrument and molecular hybridization instrument, but also sells imported fluorescence quantitative PCR instrument and nucleic acid extraction instrument to meet demands in different scenarios.	A15 instrument R&D (a15)		
The company witnessed CNY 2.133 billion of revenue in the first half of 2020, an increase of 313.63% year-on-year with a gross profit margin of 67.41%.	A16 profits surged (a16)	AA8 capital inflow (A16, A17, A18)	
From January 2 to July 31, the company’s stock price rose from CNY 10.45/share to CNY 43.34/share, an increase of 314.83%.	A17 stock price rose (a17)		
The joining of Guangzhou Finance Holdings brought it government endorsements and enabled it to obtain more social capitals, which promoted its R&D innovation.	A18 new milestone in development (a18)		

Through data analysis, we found that there is a story line at different stages of Da An Gene’s development: internal factor (accumulated innovation capital) and external factors (shock by COVID-19, response to it) → action strategy (R&D innovation, CSR) → result (sustainable development).

Under the impact of the epidemic (external factor), market demand increased dramatically, bringing opportunities to companies. Whether companies can seize the opportunities depends mainly on if they can produce normally and have certain technical strength. As shown in the history of its R&D innovation, Da An Gene laid the foundation for subsequent R&D innovation (internal factor) by accumulating innovation capital in the early days. During the Spring Festival when COVID-19 broke out, Da An Gene persisted in protecting people’s health and safety. Its R&D personnel remained at their post, actively responded China’s policy against the epidemic, and soon developed nucleic acid detection kits (R&D innovation), which were produced in sufficient capacity with guaranteed quality. In doing so, it not only contributed to the prevention and control of the epidemic (CSR), but also made a lot of profits and embraced raised stock price (corporate sustainable development).

While enjoying economic benefits brought about by epidemic prevention and control, Da An Gene also further promoted market-oriented reform. On December 21, 2020, Sun Yat-sen University, the shareholder of Guangzhou Zhongda Holding Co., Ltd., and Guangzhou Finance Holdings completed

changes in equity, which changed the status of Da An Gene who did not have goals of strategic growth as a university-run enterprise. Therefore, this equity transfer was a new milestone in the development of Da An Gene (corporate sustainable development). The Figure 4 is a simple diagram of the mechanism of interaction between R&D innovation and CSR.

By above analysis, we put forward another proposition:

Proposition 3: R&D innovation promotes pharmaceutical companies to solve social problems. By actively performing CSR, companies win social trust and embrace inflow of social capitals, which further promote their innovation and development, form a mechanism of interaction between R&D innovation and CSR, and thus help them seize opportunities and achieve rapid development in times of crisis.

## 4.2 Innovation-CSR and Institutional Background

Universities do not place goals of strategic growth performance on their enterprises, which makes it difficult for such enterprises to have long-term development impetus. Therefore, the performance of listed university-run companies is not ideal. In recent years, China accelerated the reform of separation of SOEs and state-owned assets, implemented separated operation of SOEs and state-owned assets, and transferred to capital management from assets management. In 2020, Sun Yat-sen University, the

actual controller of Da An Gene, signed the Agreement on Transfer of State-owned Property Rights with Guangzhou Finance Holdings, transferring its 100% equity of Guangzhou Zhongda Holding (including 16.63% of equity of Da An Gene) to Guangzhou Finance Holdings for free, as shown in Figure 5.

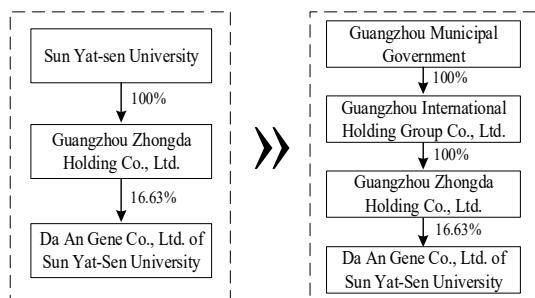


Figure 5. Changes in Da an Gene’s Actual Controller.

After the equity transfer, Da An Gene’s direct controller is Guangzhou Zhongda Holding, actual controller is changed to Guangzhou Finance Holdings, and ultimate controller is Guangzhou Municipal Government. This brings government endorsements to the company and helps it gain more social capitals. Stable flow of capitals is also conducive to its continuous R&D innovation and guarantees the interaction between R&D innovation and CSR. In addition, Guangzhou Finance Holdings’ capital operation capabilities can help the company maintain a leading position in the biomedical industry, promote integration of resources in the pharmaceutical industry, bring new milestones for its development, and maintain its sustainable future development.

There, we propose the following proposition:

Proposition 4: Under the institutional background of reform of state-owned assets management system, Da An Gene embraced stronger capital operation ability, which guarantees its long-term and stable interaction between R&D innovation and CSR.

Above analyses show that external environmental impacts promote companies to adopt the strategy of launching R&D innovation and fulfilling CSR at the same time. Accumulation of innovation capital is an important internal support for companies to quickly complete R&D. “R&D innovation and CSR” can be transformed into their core competitive advantages in crises like COVID-19 and help them secure further development, as shown in Figure 6. Da An Gene completed equity transfer in 2020. In the future, its actual controller Guangzhou Finance Holdings may continue to maintain this core competitiveness

through capital operation and market value management.

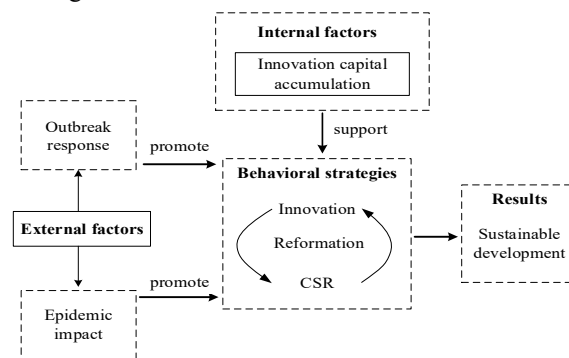


Figure 6. Selective decoding graph.

## 5 CONCLUSIONS

This study explores the mechanism of interaction between “R&D innovation and CSR” and the path of how the reform of state-owned capital regulatory system creates value for enterprises with Da An Gene as a representative case.

First, enterprises should emphasize accumulating innovative resources during boom times, and maintain social trust by actively fulfilling their CSR. Second, pharmaceutical companies solve social problems through innovation. Actively performing CSR is conducive for them to win the trust of the public. Inflow of social capitals to companies further promotes their innovation and development, facilitates interaction between R&D innovation and CSR, and helps them tide over crises. Third, in the context of the transformation of state-owned assets supervision mode, the mechanism of interaction between R&D innovation and CSR and capital operation help enterprises form core competitive advantages.

## 6 LIMITATIONS

Although single case study has unique advantages for constructing theories in this paper, the conclusions drawn need to be treated with caution. A representative company whose development was promoted by interaction between R&D innovation and CSR under the impact of COVID-19 was analyzed, but due to limitations of the case, research conclusions are not universally applicable. That is, the promotive relationship between R&D innovation and CSR shown in this study may not be the only

possibility. In the future, the validity of research conclusions can be tested and expanded by empirical research or other methods.

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