

Synchronous Development Strategy of China's New Four Modernizations: Theoretical Connotation and Current Development Status

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Abstract: The Chinese government has proposed a synchronous development strategy for new urbanization, industrialization, informatization, and agricultural modernization (called "New Four Modernization," NFM), which provides a crucial choice for solving China's current social contradictions, such as the irrational industrial structure, large urban-rural gap and environmental pollution. Firstly, this study focuses on elucidating the conceptual connotations of China's NFM. Secondly, this study systematically analyzes the theoretical foundation of China's NFM synchronous development strategy for the first time, providing a theoretical evidence for China's NFM synchronous development strategy. Lastly, this study analyzed the current development status of China's NFM, finding that China's new urbanization, industrialization, informatization, and agricultural modernization are developing steadily and synchronously. Therefore, this study contributes to a correct understanding of the theoretical connotation and current development status of China's NFM synchronous development strategy.

Keywords: China's NFM synchronous development strategy, Social contradictions, Conceptual connotations, Theoretical foundation, Current development status.

1. Introduction

During the reform and opening up period in 1978, due to limited resources such as human capital, material resources, scientific and technological capabilities, and financial resources, China adopted a strategy of unbalanced development. This unbalanced development strategy positively impacted China's economic and social development at that time. However, with the constant advancement of China's modernization process, problems such as the widening gap between the rich and the poor in the society and the apparent lagging behind rural economic development in the cities have gradually emerged brought about by this strategy. Therefore, the 19th National Congress of the Communist Party of China, held in October 2017, pointed out the promotion of synchronous development of new industrialization, informatization, urbanization, and agricultural modernization, which is also called the "New Four Modernization (NFM)" synchronous development strategy.

The concept of China's NFM synchronous development strategy is formed through continuous evolution and improvement in practice under a certain historical background. In 1954, the four modernizations of industry, agriculture, national defense, and transportation were proposed for the first time in the first National People's Congress. Since then, the four modernizations concept have occupied a unique position in China's long-term development. In 1964, Premier Zhou further expressed the Four Modernizations as modern industry, modern agriculture, modern science and technology, and modern national defense at the Three People's Conference. In 1979, Deng Xiaoping quantified China's modernization goal as achieving a well-off society with a per capita GDP of US\$1,000 by the end of the 20th century. In 2003, the 16th National Congress of the

Communist Party of China proposed the overall development of urban and rural areas. It proposed a new path of industrialization, pointing out that informatization drives industrialization, and industrialization promotes informatization. The 17th National Congress of the Communist Party of China further proposed to take the path of agricultural modernization with Chinese characteristics and vigorously promote the deep integration of informatization and industrialization. For the first time, the Fifth Plenary Session of the 17th Central Committee proposed the coordinated development of industrialization, urbanization, and agricultural modernization. Based on the "three modernizations", the 19th National Congress of the Communist Party of China (NCCPC) further proposed strengthening the overall development of the "New Four Modernizations".

The proposed concept of synchronous development of the NFM is a crucial choice for solving China's current social contradictions, such as the irrational industrial structure, the large urban-rural gap, and environmental pollution. It also provides developing countries with new ideas and practical experience to solve similar problems. However, the following questions may arise. Is there any theoretical basis to support the concept of synchronous development of the NFM? What is the current development status of China's New Four Modernizations? Therefore, this paper will elaborate on the theoretical basis and current development status of China's New Four Modernizations synchronous development strategy.

2. The Conceptual Connotation of China's NFM

The NFM studied in this paper refers to new urbanization, industrialization, agricultural modernization, and informatization. Compared with the traditional "four

modernizations", the focus was to highlight the connotation of "new" under the concept of sustainable development.

Different disciplines have different interpretations of urbanization. The urbanization studied in this article refers to a new type of urbanization closely related to industrialization, agricultural modernization, and informatization. It is the process of a surplus labor force transferring from countryside to town continuously. It is a process in which the proportion of the primary industry decreases with the agglomeration of non-agricultural industries to cities. It is not at the expense of agriculture and food, ecology and environment, but guided by the scientific concept of development and driven by industrialization and information. With the principle of overall consideration, it focuses on farmers, covering rural areas, and gradually realizing the process of urban-rural integration. It is a dynamic development process in which the way of life and production in towns can adapt to and promote the progress of social productivity. This new urbanization mainly includes population, economic, social, life, facility, and ecological urbanization.

Traditional industrialization takes industrial or economic structure as the perspective. The proportion of industry (especially manufacturing) in national income and labor population increases continuously. The new industrialization studied in this paper contains the meaning of traditional industrialization and pays more attention to industrial efficiency, resource consumption, and environmental pollution. It is new industrialization supported by information, guided by scientific and technological levels, and based on the concept of ecological civilization and circular economy.

Traditional informatization refers to the historical process of cultivating and developing the new productive forces represented by computer-based intelligent tools and making them benefit society. The new informatization studied in this paper includes computers and mobile communications, websites, traditional newspapers and periodicals, and other carriers conducive to information dissemination. It is a process that penetrates people's lives and enterprises' production. It is a process of continuously improving information transparency and reducing information occlusion, thus promoting the more effective use of various factors of production.

Unlike traditional agricultural modernization, the new modernization studied in this paper not only refers to modern agriculture but also integrates, promotes, and develops harmoniously with other "three modernizations". It is a process of arming agriculture with advanced technology and modern industry and promoting industrialization, scale, and intensification. It is a process in which the contemporary management concept continuously penetrates the agricultural production field. It is also a process of building beautiful, prosperous, civilized, and harmonious countryside in accordance with the requirements of socialist new countryside.

3. Theoretical Foundation for China's NFM Synchronous Development Strategy

3.1. General Systems Theory (GST)

General systems theory (GST) was first proposed by Bertalanffy in 1937. The basic idea of general systems theory (GST) is to regard the research object as a system, to study the law of the interactive relationship and change of various

elements in the system environment (Bertalanffy, 1973). Therefore, before discussing GST in more detail, it is important to have a shared understanding of the definition of a system. In the study of Boardman and Sauser, a system is defined as 'a collection of entities and their interrelationships gathered to form a whole greater than the sum of the parts'. Al-Dakhil contributes to this understanding by proposing that a system encompasses components with interrelated and mutual relationships, demarcated by boundaries. These systems can manifest in various forms, including physical, mechanical, social, or a combination of multiple types. Afifi consolidates the concept, defining a system as a unified whole comprised of subsystems that interact synergistically to sustain the overall system. In essence, this research adopts the definition of a system as a meaningful interaction between two or more entities where each distinctly influences the other.

There are two types of systems: open systems and closed systems. An open system is characterized by a feedback mechanism that allows for the free exchange of information between the system and its external entities. This means that an open system can both transmit and receive information from the outside world. On the other hand, a closed system is one that does not transmit any information to the outside world nor receives any information from it. Closed systems are rare in the real world, as most systems have some level of interaction or exchange with their environment.

GST holds that any system has the basic characteristics of integrity and structure, hierarchy and relevance, dynamic balance and timing. First, the core idea of general system theory is integrity; that is, any system is a unified whole according to a certain level and structure, the nature of the system is not possessed by each isolated part, and its function is greater than the sum of all parts. Second, the structural features of a system mean that any system, regardless of its size, has its own structure. A reasonable structure can promote the system to develop in a positive and orderly direction, whereas an unreasonable structure will cause the system to develop in a negative and disorderly direction. Third, any system has a hierarchy, such as from low level to high level, concrete to abstract, simple to complex and so on. Finally, the dynamic balance of a system means that any system is constantly developing, with the process of emergence, development and extinction, and its balance is relative and phased.

Therefore, it is essential that each element within the systems is properly scrutinized based on GST. The systems are generally made of elements such as environment, output, input, throughput, feedback, equilibrium and boundaries. Figure 1 shows the general model of GST.

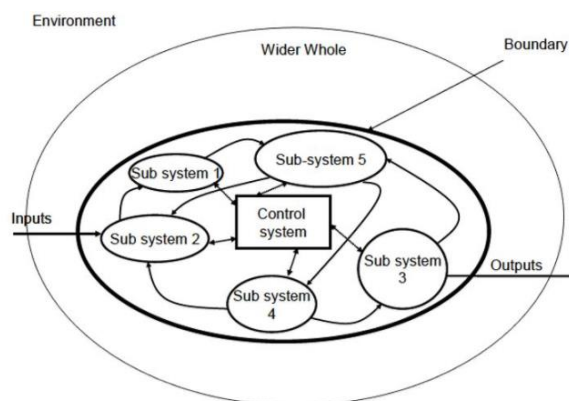


Figure 1. The model of general system theory

GST is a conceptual framework that aims to explain the behavior of complex systems by identifying their interacting components and the controls that maintain their stability and equilibrium. The concept of NFM synchronous development is an important embodiment of GST in practice. Specifically, from the perspective of general systems theory (GST), China's New Four Modernizations synchronous development strategy can be regarded as a dynamic open system. Comprising elements such as new urbanization, industrialization, informatization, and modernization, these components are interconnected, interact, and mutually influence each other, forming the structured system of China's New Four Modernizations synchronous development. The concept of NFM synchronous development also reflects the relevance and hierarchy of internal elements in social development systems, emphasizing the coordination of various subsystems' development. Therefore, based on the general laws of GST, these four subsystems interact, collaborate, and mutually reinforce each other, ultimately driving holistic societal and economic development. The specific analysis is as follows:

Initially, traditional agriculture holds a dominant position, resulting in a closed economic state with slow progress in industrialization and urbanization. However, the rapid development of labor-intensive and capital-intensive industries transforms the economic landscape, with the second industry overtaking agriculture as the dominant sector. This shift leads to the migration of labor and capital towards urban centers, thus fostering the advancement of urbanization.

As high-tech industries, modern service sectors, and information industries rapidly evolve, the pace of urbanization begins to plateau, while cities adopt a more networked distribution pattern. This transition not only promotes the efficiency of urban services but also enhances the overall development of the country.

In conclusion, this theory (GST) provides a theoretical foundation for China's NFM synchronous development strategy. It aids researchers in comprehending the holistic nature, interconnectedness, hierarchical structure, and dynamics of China's NFM synchronous development strategy through systems thinking (See Figure 2.3). This theory (GST) further demonstrates that China's NFM synchronous development strategy is instrumental in addressing social sustainable development problems, such as significant urban-rural disparities, unsustainable industrial structures, and environmental pollution.

3.2. Circular Cumulative Causation Theory (CCCT)

According to the viewpoint of system theory, famous economists such as Murdal and Kaldor proposed the circular cumulative causation theory. They believe that there is a cyclic cumulative effect among the subsystems in a dynamic economic system. When an initial change occurs in a subsystem, it causes changes in other subsystems, which in turn strengthens the changes in the original system, causing the economic system to continue to develop in the direction of the initial change, forming a trend of causal cycle accumulation.

The NFM examined in this study follows the circular cumulative causality theory. When a subsystem stimulates its development owing to some factors, it will break the original structure and balance, causing changes in the other "three modernizations", which in turn will strengthen the

development of the subsystem. Specifically, an improvement in the subsystem development level will affect the development of other subsystems, but this effect has a lag. The original balance is broken, and the system integration degree (measuring the system synchronization level) is reduced. However, with the development of other subsystems, the system integration degree gradually increases and reaches a new higher balance. In other words, in the rising stage of system development, its integration degree is in the fluctuation of "falling-rising-falling", but its development level is rising.

In summary, the Circular and Cumulative Causal Theory (CCCT) underscores the significance of feedback mechanisms, facilitating the exploration of interactive dynamics among subsystems within China's New Four Modernizations (NFM) synchronous development strategy. Hence, this theory serves as a theoretical basis for justifying the rationale behind China's NFM synchronous development strategy.

3.3. Government-Market Relationship Theory (GMRT)

Keynes and Friedman were the main contributors to the Government-Market Relationship Theory. According to the Government-Market Relationship Theory (GMRT), government and market are the "two hands" of the modern market economy system. The government is the "visible hand" in the market economy. It controls the allocation of resources, mainly through administrative measures, which have a significant impact on the market economy. The market is an "invisible hand" that allocates resources mainly through supply and demand, price, and competition. Obviously, the government and market have different mechanisms and measures of resource allocation. The market regulates production through price mechanism, and the survival of the fittest through competition mechanism to achieve reasonable and orderly production and consumption, and maximize the use of various resources. The market determines resource allocation, which is the basic value law of the market economy.

NFM is an important system of the social economy, and the government and the market have an important impact on it. The market mechanism is only efficient when information is complete. However, real-world information is incomplete, and the market mechanism will fail. The development of informatization can effectively promote the flow and exchange of information and significantly alleviate the failure of the market mechanism.

In addition, the effects of circular cumulative causality theory and government market relations theory on NFM are interrelated rather than isolated. Specifically, under the effect of market forces, one subsystem of NFM cumulative growth will have diffusion and reflux effects on the other systems. On one hand, the diffusion effect will have a positive effect on the development of other systems. On the other hand, the reflux effect will make the capital, technology, and other favorable conditions of other subsystems return to this subsystem. Diffusion and return effects are often unequal, depending on the development speed of the system under the influence of market forces. The result is that the weak are weaker and the strong are stronger, which causes the gap between the systems to become increasingly larger. Therefore, to achieve the synchronous development of new urbanization, industrialization, informatization, and agricultural

modernization, it cannot simply rely on the market mechanism but also the supervision and regulation of the government.

Market forces play a dominant role in facilitating the China's NFM synchronous development strategy, with government policies assuming a supportive role (See Figure 2). Hence, this theory (GMRT) elucidates the roles of market forces and government policies in the China's NFM synchronous development, serving as a policy foundation for government officials to advance this strategy effectively.

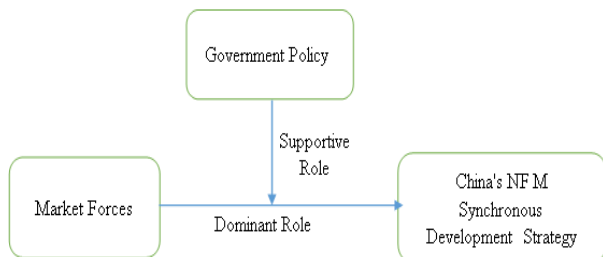


Figure 2. Theoretical model of the role of government and market in China's NFM synchronous development

4. An overview of the China's NFM development

4.1. An Overview of the Urbanization Development in China

Since the reform and opening up in 1978, urbanization construction in China has experienced a process of low starting point, strong momentum and fast speed along with the advancement of modern industrialization. Specifically, the permanent urban population increased from 170 million in 1978 to 933 million in 2023, and the corresponding urbanization rate increased from 17.92% to 66.16%. Figure 3 shows that since the reform and opening up, the urbanization rate and urban population in China has maintained rapid growth.

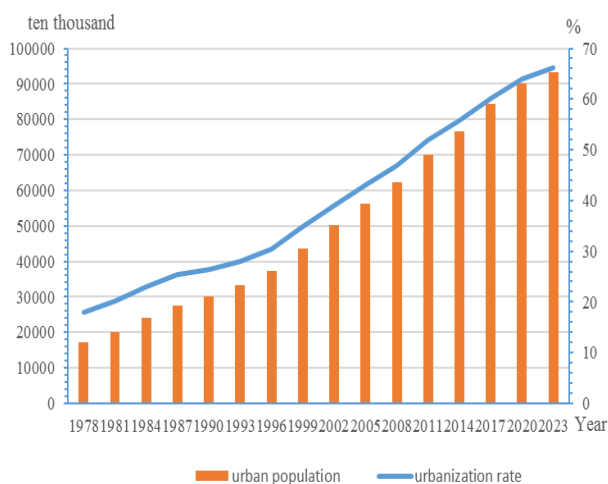


Figure 3. Urban population and urbanization rate in China since reform and opening up

Table 1 shows the changes of urban infrastructure and service facilities in China in the past 30 years. In China, the

per capita urban road area increased from 3.10 square meters in 1990 to 19.28 square meters in 2022. Per capita green space increased from 1.8 square meters in 1990 to 15.29 square meters in 2022. The number of buses per 10,000 people increased from 2.2 in 1990 to 14.06 in 2022. The gas penetration rate and water penetration rate reached over 98% in 2022, which shows that China's urban infrastructure has improved significantly. The number of health technicians per capita increased from 6.59 in 1990 to 10.20 in 2022, less than doubling in 30 years. The urban population density has increased from 279 (people per square kilometer) in 1990 to 2,854, which shows that the size of China's cities is expanding rapidly, and the medical conditions and living conditions in cities still need to be improved.

Table 1. Changes in urban infrastructure and service facilities

Index	1990	2000	2010	2022
Per capita urban road area (square meter)	3.10	6.10	13.20	19.28
Gas penetration rate (%)	19.10	45.40	92.00	98.06
Water penetration rate (%)	48.00	63.90	96.70	99.39
Per capita park green space (square meter)	1.80	3.70	11.20	15.29
Number of buses per 10,000 people	2.20	5.30	9.70	14.06
Urban population density (people per square kilometer)	279	442	2209	2854
Health technicians per 1,000 people	6.59	5.17	7.62	19.28

Source: China Statistical Yearbook (2023)

Overall, since the reform and opening up in 1978, the advancement of China's urbanization has absorbed 278 million surplus laborers in the primary industry (Source: China National Bureau of Statistics). The construction of new urbanization has enabled the rapid flow of production factors between urban and rural areas, improved the efficiency of resource allocation, promoted the sustained, rapid and healthy development of the national economy, and comprehensively improved the living standards of urban and rural people.

4.2. An Overview of the Industrialization Development in China

Over the past 40 years, China's economy has made great achievements, and China has rapidly developed into the world's second largest economy. It is undoubtedly a long-term, complex and arduous task to promote industrialization in a country with a large population and a weak foundation. China's industrialization took decades to complete the process of industrialization that developed countries have gone through for hundreds of years, and established the world's most complete modern industrial system, making China the world's second largest economy and the largest manufacturing country. This is of great historical and global significance.

Table 2. The comparison of output of China's main industrial products since the reform and opening up

Product Name	1978	2022	Index (2022)	World Ranking (2022)
Raw coal (100 million tons)	6.20	45.59	7.35	1
Crude oil (10,000 tons)	10405.00	20472.24	1.97	6
Natural gas (billion cubic meters)	137.30	2201.10	16.03	4
Cement (10,000 tons)	6524.00	212927.18	32.65	1
Steel (10,000 tons)	2208.00	134033.48	60.7	1
Cars (10,000 units)	14.90	2713.63	182.42	1
Power generation (100 million kilowatts)	2566.00	88487.12	34.48	1
Sugar (10,000 tons)	227.00	1486.75	6.55	1
Chemical fibers (10,000 tons)	25.80	6697.80	259.6	1

Source: China Statistical Yearbook (2023)

After four decades of industrialization, China has transformed from a backward agricultural country into an industrial power. As shown in Table 2, over the past four decades of reform and opening up, China's output of major industrial products in 2022 has increased by several times, tens of times or even hundreds of times compared with 1978, ranking among the top in the world. The output of major industrial products such as crude oil, cement, steel, cars, electricity generation, sugar and chemical fibers all ranks first in the world. China has become a major producer of industrial commodities in the world.

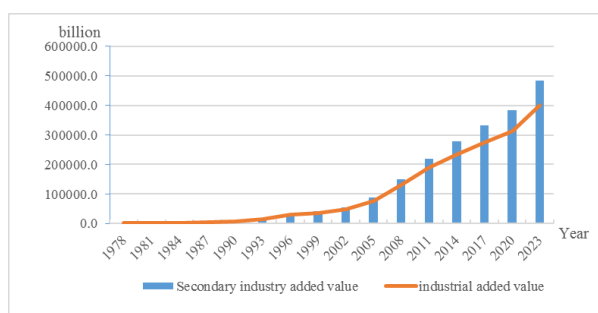


Figure 4. The changing trend of China's secondary industry added value and industrial added value over the years

Figure 4 shows that the added value of China's secondary industry and industrial industry both show an upward trend, which indicates that China has made great progress in its industrialization development. In 2023, the added value of China's secondary industry reached 48258.9 billion yuan, accounting for 38.3 percent of the country's GDP; the added value of industry was 39910.3 billion yuan, accounting for 82.70 percent of that of the secondary industry.

4.3. An Overview of the Informatization Development in China

With the advent of the information age, China's social economy has undergone tremendous changes. The extensive use of information technology has changed the traditional mode of production and improved the technological gold content of the development of various industries. The development and application of information resources makes social life networked, makes people more convenient and quicker to obtain various kinds of information, and promotes the all-round development of people.

Table 3 Changes in the basic indicators of China's informatization development over the years

Year	Internet penetration rate (%)	Mobile phone penetration rate (%)	E-commerce transaction volume (trillion yuan)	Number of website domain names (ten thousand)
1999	0.96	3.47	0.033	12
2000	1.78	6.72	0.077	30
2001	2.64	11.47	0.11	69.25
2002	4.6	16.14	0.38	94.03
2003	6.2	21.02	0.66	118.74
2004	7.3	25.91	0.93	185.23
2005	8.5	30.26	1.3	259.2
2006	10.5	35.3	1.55	410.9
2007	16	41.64	2.17	1193.1
2008	22.6	48.53	3.14	1682.6
2009	28.9	56.27	3.67	1681.8
2010	34.3	64.36	4.55	865.6
2011	38.3	73.55	6.09	774.8
2012	42.1	82.5	8.11	1341.2
2013	45.8	90.33	10.40	1843.6
2014	47.9	94.03	16.39	2059.6
2015	50.3	92.49	21.79	3101.4
2016	53.2	95.6	26.10	4227.6
2017	55.8	101.97	29.16	3848.0
2018	59.6	112.23	31.63	3792.8
2019	64.5	114.38	34.81	5094.2
2020	70.4	112.91	37.21	4197.8
2021	73.0	116.30	42.30	3593.1
2022	75.6	119.25	43.83	3440.0

Source: China Statistical Yearbook (2000-2023), CNNIC

According to Table 3, China's informatization level is developing rapidly. First, from the point of view of Internet users, in 1999, China's Internet penetration rate and mobile phone penetration rate were only 0.71% and 3.47% respectively. However, in 2022, China's Internet penetration rate reached 75.6%, which shows that the vast majority of Chinese use the Internet. The penetration rate of mobile phones is 119.25%, that is, the per capita mobile phone has reached 1.19. From the perspective of information infrastructure, in 1999, the number of website domain names and website pages in China was 120,000 and 90 million,

respectively. Lastly, with the rapid development of the Internet, the transaction amount of China's e-commerce industry keeps growing. In 1999, China's e-commerce transaction volume was only 0.033 trillion yuan, but in 2022, it reached 43.84 trillion yuan, increasing more than 1,000 times in 20 years.

4.4. An Overview of the Agricultural Modernization in China

China is a large agricultural and population country. Agricultural modernization has always been a key issue in China's economic development. Before the reform and opening up, China's agricultural development was very slow. With the continuous progress of agricultural technology, especially the development of information technology in the 21st century, China's agricultural modernization has made great progress, but it also faces many problems. First, over the 40 years from 1980 to 2022, China's population increased by 420 million people, but the grain sown area decreased from 120,587 thousand hectares in 1980 to 118,332 thousand hectares in 2022, which was obviously insufficient per capita. Second, China's per capita GDP has exceeded US \$10,000 in 2022, but the annual disposable income of rural residents is less than US \$3,000, which means the income of rural residents is still low. Finally, in 2022, the disposable income of urban residents exceeded 6,000 US dollars, more than twice that of rural residents, indicating that the income gap between urban and rural residents is too large.

5. Conclusion

China's NFM synchronous development strategy provides a new idea for solving China's current social contradictions, such as the irrational industrial structure, large urban-rural gap and environmental pollution. Accordingly, this paper aims to systematically expound on the conceptual connotations, theoretical foundations, and current development status of China's NFM synchronous development strategy. Firstly, this paper systematically elucidates the conceptual connotations of China's New Four Modernizations. Secondly, it introduces for the first time the General System Theory (GST), Circular Cumulative Causation Theory (CCCT) and Government-Market Relationship Theory (GMRT) to provide a theoretical foundation for China's NFM synchronous development strategy. Lastly, the paper provides a detailed analysis of the current development status of China's new urbanization, industrialization, informatization, and agricultural modernization, indicating that China's NFM are progressing steadily in synchronization.

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