目 录

Human Civilization and World Modernization

Chuanqi He
China Center for Modernization Research, Chinese Academy of Sciences

Generally, human beings emerged around 2.5 million years ago [1], human civilization appeared around 5500 years ago [2], modernization took place in 18th century [3]. So far there is no unified definition of civilization and modernization. From the perspective of operation, civilization is the high level stage of human development, and the sum of achievements of human development since 3500 B.C.E.; modernization is a world trend, and one kind of frontier changes of human civilization since the industrial revolution in 18th century [4]. This paper will focus on the human civilization and world modernization (Figure 1).

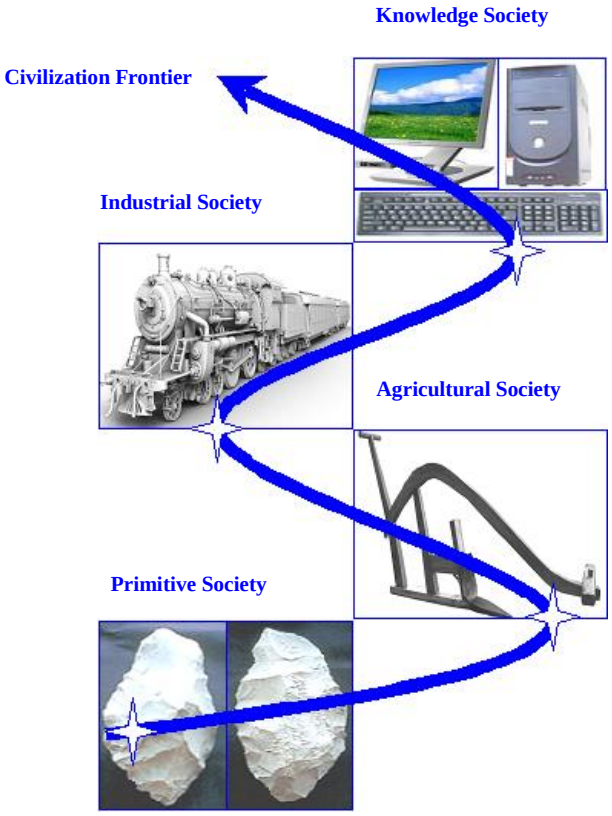

Figure 1 Four Forms, Three Shifts and Twice Modernizations in the Frontier Process of Human Civilization

Note: Ever since the birth of humankind, the frontier of human civilization has undergone three shifts. The first one is from primitive society and culture to agricultural society and civilization, the second one from agricultural to industrial society and civilization, and the third one from industrial to knowledge-based society and civilization. The second shift is the first modernization, the third one the second modernization. The four images above represent stone tool, plow, steam engine and computer respectively.

Source: He, 2010.

I. Frontier Process of Human Civilization

Human civilization is an organic whole and also an aggregation of the civilizations of different countries and nations whose process is not on a synchronous basis. The frontier trajectory of human civilization can be divided into different stages by the level and characteristics of civilization, but historians and sociologists have different ways to do so.

There are various views on the historical stages of human civilization, among which five are closely related to modernization study. They see the process of human civilization consisting of three, four, five, six, and seven historical stages respectively (Figure 2).

Chronology	B.C. / A.D.									
	2.5million	3500	500	0	500	1500	1750	1914	1970	2000	2100
Three stages	Antiquity				Middle Ages	Modern Times					
	Antiquity					Modern Times		Contemporary Age			
Four stages	Antiquity				Middle Ages	Modern Times		Contemporary Age			
	Prehistory	Antiquity			Middle Ages	Modern Times					
	Antiquity				Middle Ages	Modern Times			Post-modern Times		
	Tool Age	Agricultural Age					Industrial Age		Knowledge Age		
	Prehistory	Agricultural Age					Industrial Age		Information Age		
	Prehistory	Agricultural Age					Industrial Age		Network Age		
Five stages	Pre-civilization	Antiquity			Middle Ages	Modern Times			Post-modern Times		
Six stages	Pre-civilization	Antiquity	Classical Antiquity		Middle Ages	Modern Times			Contemporary Age		
Seven stage	Pre-civilization	Antiquity	Classical Antiquity		Middle Ages	Rise of the West	Western Superiority		The world since the 20th century		
	Pre-civilization	Antiquity	Classical Antiquity		Post-classical Antiquity	Rise of the West	Industrialization		The world since the 20th century		

Figure 2 Historical Stages of Human Civilization

Note: The process of human civilization can be divided into stages according to the level and characteristics of civilization frontier; time span is just a relative criterion. The frontier and average level of civilization vary greatly from stage to stage; countries and regions do not develop on a synchronous basis.

Source: RGCMS, 2010.

The Second Modernization Theory and *China Modernization Report* hold that human civilization has witnessed the process of four stages according to the level and structure of civilization's productivity, namely the Tool Age, the Agricultural Age, the Industrial Age and the Knowledge Age.

The views on the social stages of human civilization are also diversified and four of them,

which are closely related to modernization research, see the process of human civilization consisting of three, four, five, and six social stages respectively (Figure 3). The Second Modernization Theory and *China Modernization Report* hold that human civilization has witnessed the process of four stages according to the level and structure of social productivity, namely primitive society, agricultural society, industrial society and knowledge society.

Chronology	B.C. 2.5million	8000	3500	500	0	A.D. 500	1500	1750	1914	1970	2000	2100
Three stages	Traditional Society								Modern Society		Postmodern Society	
	Pre-industrial Society								Industrial Society		Postindustrial Society	
Four stages	Primitive Society			Agricultural Society					Industrial Society		Knowledge Society	
	Primitive Society			Agricultural Society					Industrial Society		Information Society	
	Primitive Society			Agricultural Society					Industrial Society		Network Society	
	Primitive Society			Agricultural Society					Industrial Society		Ecological Society	
	Primitive Society			Agricultural Society					Industrial Society		Risk Society	
Five stages	G & H Society	Horticultural Society	Agrarian Society	Agricultural Society					Industrial Society			
	G & H Society	Horticultural Society	Pastoral Society	Agricultural Society					Industrial Society			
	G & H Society	Pastoral Society	Agrarian Society	Traditional Civilization Society					Industrial Society			
	Primitive Society		Slavery Society	Feudalism Society			Capitalism Society		Socialist Society (Communist Society)			
Six stages	G & H Society	Horticultural Society	Pastoral Society	Agricultural Society			Capitalism Society				Postcapitalism Society	
	G & H Society	Horticultural Society	Pastoral Society	Agricultural Society					Industrial Society		Postindustrial Society	

Figure 3 Social Stages in the History of Human Civilization

Note: G & H Society refers to Gathering & Hunting Society. The division of social stages is based on the frontier characteristics of human civilization; time span is just a relative criterion. Countries and regions do not develop on a synchronous basis.

Source: RGCMS, 2010.

II. Frontier Process of World Modernization

The history of world modernization is the part of human civilization process, and the stage divisions of modernization and civilization process should coordinated each other. There is no consensus on the process and stages of the world modernization [4-13] (Figure 4).

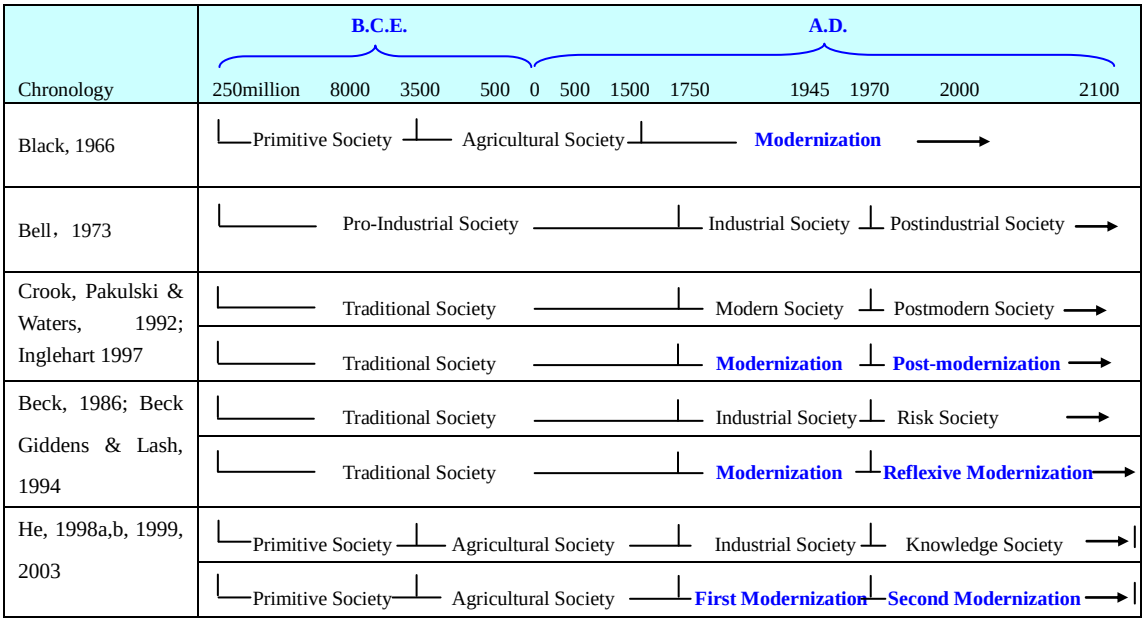

Figure 4 The stages of world modernization and human civilization [4-13]

Note：The stage divisions of world modernization and human civilization were based on the track of the forerunner of the modernization and civilization， the time of the division was relative. The development of different countries and regions was asynchronous.

Firstly, there are three ideas on the initiation of world modernization: (1) The science revolution in 16 -17th century was the starting point；(2) The Enlightenment in 17 -18th century was the beginning; (3) The Industrial Revolution of Britain and French Revolution in 18th century was the initial point.

The word “modernization” appeared in 18th century (1748～1770), and the modernization studies happened in 20th century. The *China Modernization Report* regarded the Industrial Revolution in 18th century as the beginning of world modernization [14], and process studies of world modernization covered the period since 18th century (1700) [15].

Secondly, there are seven ideas on the stage divisions of world modernization process (Table 1). According to the last three ideas, there are two stages of world modernization (although the name and contents of two stages are different in different schools), and the beginning of second modernization was about 1970 (information & knowledge revolution).

Table 1 Stage division of world modernization

	Stages	Contents	Annotation
1	Three waves	First wave（1780－1860）, second wave (second half of 19century to the early of 20th century), third wave (second half of 20th century)[16]	Sub-stages of classic modernization
2	Four phases	Challenge of modernity, consolidation of modernization leadership, economic and social transformation, integration of society [5]	
3	Five stages	Stages of economic growth：Traditional society, prepared for the take off, take off, push to mature, mass consumption [17]	
4	Four periods	Prepared, transformation, high modernization, international integration [18]	

5	Two stages	Classic and post modernization (modern and post modern society)[6-8]	Two times modernization
6	Two stages	Simple (orthodox) and reflexive modernization (industrial and risk society)[9,10]	
7	Two stages	First and second modernization (industrial and knowledge society)[4,13]	

The process of world modernization will sustain about 400 years from 18th to 21st century, and the two stage divisions of the process were not detail enough for the modernization study. The each of the two stages should be cut into the small phases.

The *China Modernization Report 2005*[15] put forward the six waves of economic modernization, and the *China Modernization Report 2006*[19] suggested six waves of social modernization (Table 2). In summary, the process of world modernization should include prepared period, first modernization and second modernization, and the first modernization included three waves, the second modernization also included three waves.

Table 2 Six waves of the economic and social modernization

Wave	Chronology	Economic modernization	Social modernization	Annotation
First	ca. 1763－1870	First industrial revolution	Urbanization, Mechanization	**First modernization**
Second	ca. 1870－1945	Second industrial revolution	Electrification, Compulsory education	Industrialization, Urbanization
Third	ca. 1946－1970	Third industrial revolution	Welfare, Automation	Democratization, Rationalization
Fourth	ca. 1970－2020	Information revolution	Network, Knowledge-based	**First modernization**
Fifth	ca. 2020－2050	New biological revolution	Biological economic society	Knowledge-intensive, Networking
Sixth	ca. 2050－2100	New physical revolution	Cultural economic society	Globalization, Greenization

Source: Research Group for China Modernization Strategies 2006[19].

Note: The six waves of the economic and social modernization were based on the track of the forerunner of the modernization. The fifth and sixth waves were some kind of forecast. The modernization of different countries and regions was asynchronous.

Firdly, Modernization is both a world trend and a social choice. Who accept the modernization, who will pursue modernization, and the process of modernization is asynchronous among them. Who cannot accept modernization, who will keep their traditional or existing life mode; although the social changes will take place, but the gap of material life between their and of the forerunner of human civilization will become bigger and bigger.

III. Evolution of Modernization Theories

Generally, modernization emerged in 18th century, modernization study took placed in 20th century, and classical modernization theory begun to take shape in 1950-60s, but the central ideas of the modernization could trace back to 18th century or more early (Figure 5). In the second half of the 20th century, there were three waves of modernization studies in the world （Figure 6）which brought forth a host of modernization theories [13], such as the classical modernization theory, the post-modernization theory, the ecological modernization theory, the reflexive modernization theory, the multiple modernities theory and the second modernization theory (Figure 7), etc. All these theories have different interpretations of the civilization process.

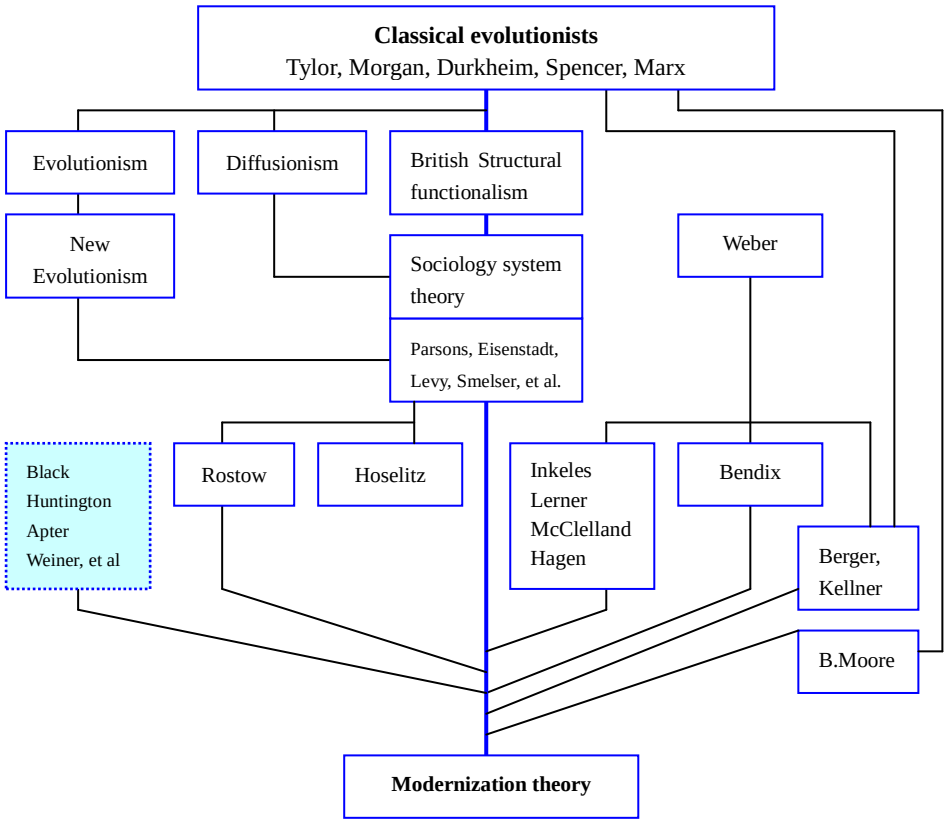

Figure 5 The development of modernization theory [20-46]

Source：Harrison 1988 [20]

Note：The contents in the blue box were added by the author of this paper.

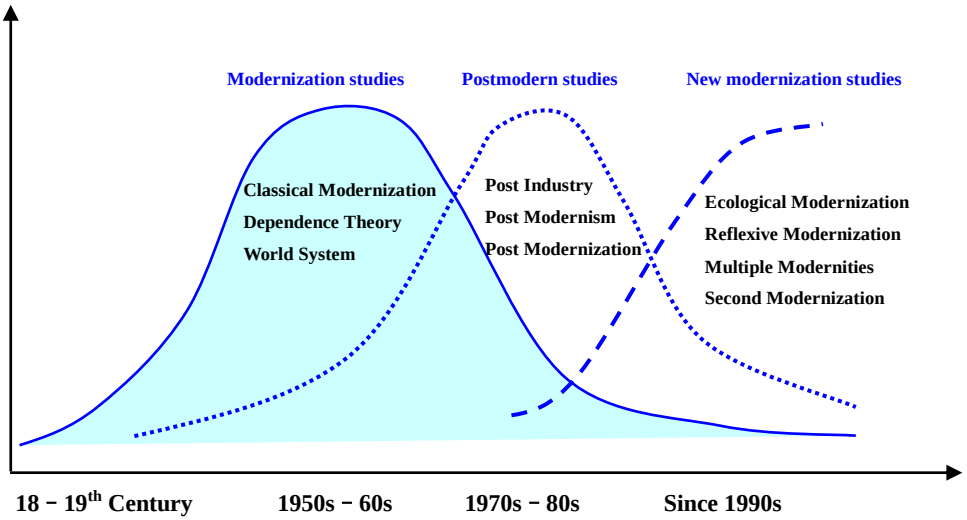

Figure 6 Three waves of modernization studies in the world [13]

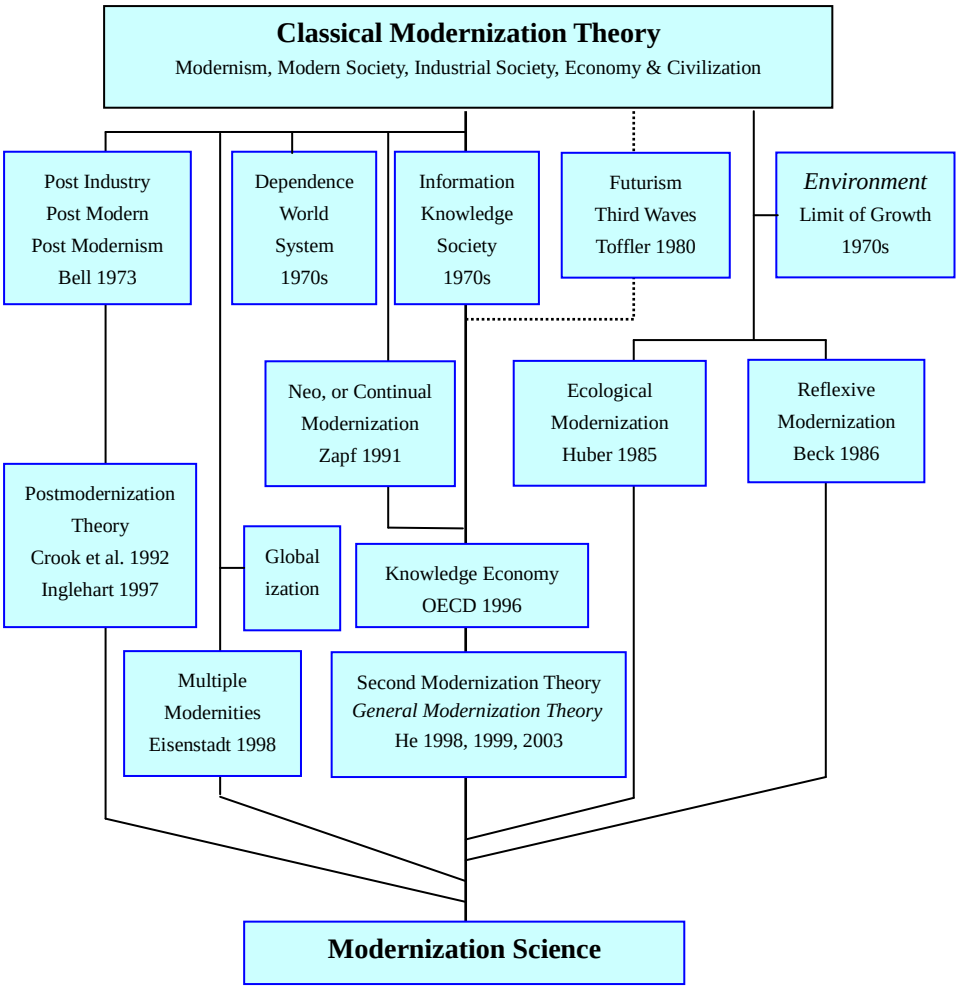

Figure 7 Historical evolution of modernization theories[4,6,8,9,11-13,47-58]

The "modernization theory" enjoyed both uninterrupted criticism and new development since 1970s. For example, the thoughts of the international interaction in the process of world modernization coming from the dependence theory and world system theory were very important issues, but the classical modernization theory did not pay much attention to that. The thinking and results on the postmodern studied and new modernization studies should be regarded as the new development of the modernization study and theory.

IV. Modernization Theories and Human Civilization Process

1. Classical modernization theory and human civilization process

Some scholars began modernization studies in the 1950s and 1960s and published some works. They included *The Social System (1951)* [29], *the Passing of Traditional Society: Modernizing the Middle East (1958)* [31], *the Politics in Developing Areas (1960)* [59], *the Stages of Economic Growth (1960)* [17], *the Achievement Society* (1961) [60], *the Politics of Modernization (1965)* [36], *the Modernization and Social Structure (1966)* [38], *the Dynamics of Modernization (1966)* [5], *the Modernization: Protest and Change (1966)* [37], *the Political Order in Changing Societies (1968)* [42], and *the System of Modern Societies (1971)* [43], *Becoming Modern: Individual Changes in Six Developing Societies (1974)* [45] in the early

1970s and so on. With these works, the modernization theory was basically formed. Instead of being a single theory, the modernization theory is a general term for the theoretical results of world modernization studies done by scholars in various fields [20]. It was called as the classical modernization theory.

Generally, the classical modernization theory contains five basic elements (Table 3): The theoretical implications of classical modernization, the laws and features of classical modernization process, the results of classical modernization (modernity), the dynamics and modes of classical modernization.

Table 3 Basic elements of classical modernization theory

Element	Basic content
Definition	Classical modernization refers to the historical process and profound changes of the transformation from traditional agricultural society to modern industrial society since the Industrial Revolution in the 18th century. It both occurs in the social changes in the pioneering countries and also exists in the process in which the late-coming countries try to catch up with the advanced level.
Process	Classical modernization is a revolutionary, complex, systematic, global, long, staged and progressive process.
Result	The result of classical modernization is the formation and diffusion of modernity, and modernity refers to the characteristics of the state of a country where classical modernization is completed.
Dynamics	There are three views: determination by economic development, determination by cultural development, and interaction between political, economic and cultural elements.
Mode	It has many models and has path dependence.

Source: Research Group for China Modernization Strategies 2004[29].

So far, there has been no unified definition for modernization. In general, modernization has three interpretations: basic meaning, theoretical implications and policy implications. The classical modernization theory believes that modernization is a historical process of the transformation from traditional agricultural society to modern industrial society and its changes. It both occurs in the pioneering countries and also exists in the process in which the late-coming countries try to catch up with the advanced level.

American scholar Professor C.E. Black holds that the changes of human affairs experienced three great revolutionary transformations [5]: the first great transformation from pre-human to human society, the second great transformation from primitive society to civilized society and the third great transformation from traditional civilized society to modern society. The third transformation is the process and changes of modernization (Figure 8).

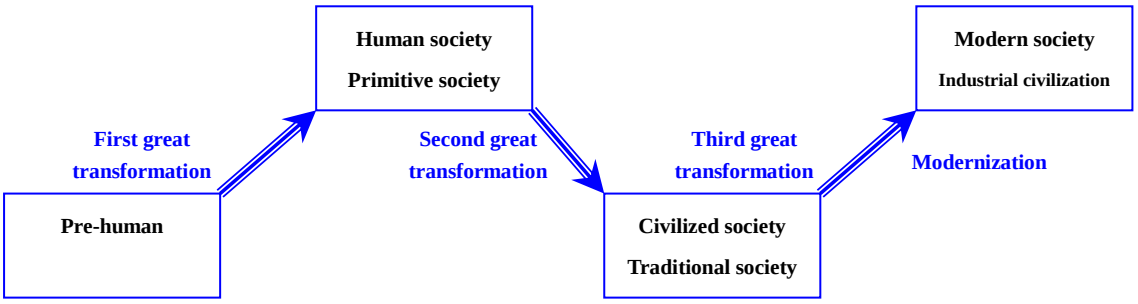

Figure 8 The three revolutionary transformation of human affairs[5]

According to the classical modernization theory, the development of human civilization comprises three major periods: primitive society, traditional agricultural society and modern industrial society. Modernization is a process and the changes of transformation from traditional agricultural civilization to modern industrial civilization.

2. Post-modernization theory and human civilization process

The industrial countries completed classical modernization and began entering a development period after classical modernization as early as in the 1960s. Some people called this development period "post-modern" [51]. The scholars noticed three phenomena.

(1) The industrial economy is not the climax of world economic development and the economic development in the developed industrial countries has shifted from industrialization to de-industrialization, with a constantly falling proportion of the industrial economy and a constantly rising proportion of the service economy.

(2) Industrial society is not the end of the development of human society and the social development in the developed industrial countries has begun shifting from urbanization to de-urbanization, in which urban population moves to the suburban areas and to the towns and townships.

(3) The industrial civilization is not the end of the civilization process and the developed industrial countries do not stop where they are and their development has surpassed and will continue to surpass the period of industrial civilization. Obviously, the classical modernization theory cannot interpret these new developments. In the 1970s and 1980s, the academic trends prefixed with "post-" became popular in American and European countries. The post-modernization theory is a collection of all these trends. The post-modernization theory comprises post-industrial society, post-modernism and post-modernization.

American scholar Professor D. Bell published the book entitled *The Coming of Post-Industrial Society (1973)* [6]. To Bell, the development of human society comprises three periods: pre-industrial society, industrial society and post-industrial society. The transformation from industrial society to post-industrial society involves some different phases. The United States already entered the first phase of post-industrial society in the 1970s. Post-industrial society does not replace industrial society. Instead, it eliminates some original characteristics of industrial society and adds some new features.

If the classical modernization theory describes an industrialized world for us, the post-modernization theory explores the development after industrialization. The

post-modernization theory holds that the transformation from traditional society to modern society (from agricultural society to industrial society) is modernization and the transformation from modern society to post-modern society (from industrial society to post-industrial society) is post-modernization. The result of post-modernization is post-modernity, and post-modernization will be followed by "post-post-modernization" [8].

According to the post-modernization theory, the development of human civilization also comprises three major periods: traditional society (pre-industrial society), modern society (industrial society) and post-modern society (post-industrial society) (Figure 9). If traditional society (pre-industrial society) is regarded as actually comprising the two periods of primitive society and traditional agricultural society, the development of human civilization can be divided into four periods.

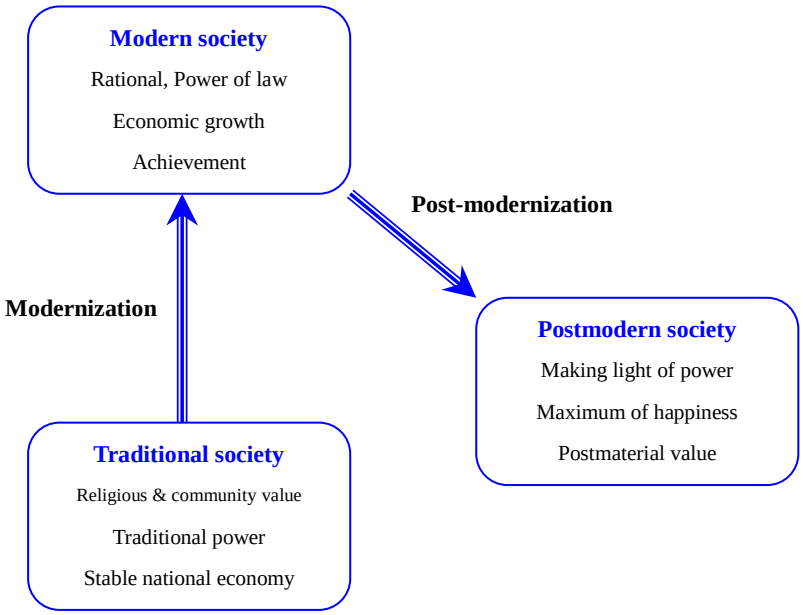

Figure 9 The transformation from modernization to postmodernization [9]

3. New modernization theories and human civilization process

In the 1980s and 1990s, modernization studies produced many new ideas. They included the ecological modernization theory by Professor J. Huber (1985) [53], the reflexive modernization theory by Professor U. Beck (1986) [9,10], the continuous modernization by Professor W. Zapf (1991)[54], the new modernization by Professor E. Tiryakian (1991) [55], the multiple modernities by Professor Eisenstadt (1998) [57,58], and the second modernization theory by Chinese scholar Professor Chuanqi He (1998) [4,11-13].

According to the ecological modernization theory, the transformation from agricultural society to industrial society is modernization and the transformation from industrial society to ecological society is ecological modernization. Ecological modernity is the characteristic of ecological society.

According to the reflexive modernization theory, the transformation from agricultural society to industrial society is simple (orthodox) modernization, and the transformation from industrial society to risk society is reflexive modernization. The modernity of industrial

society is general modernity, and the modernity of risk society is reflexive modernity. General modernity is the first modernity, while reflexive modernity is the second modernity (Figure 10).

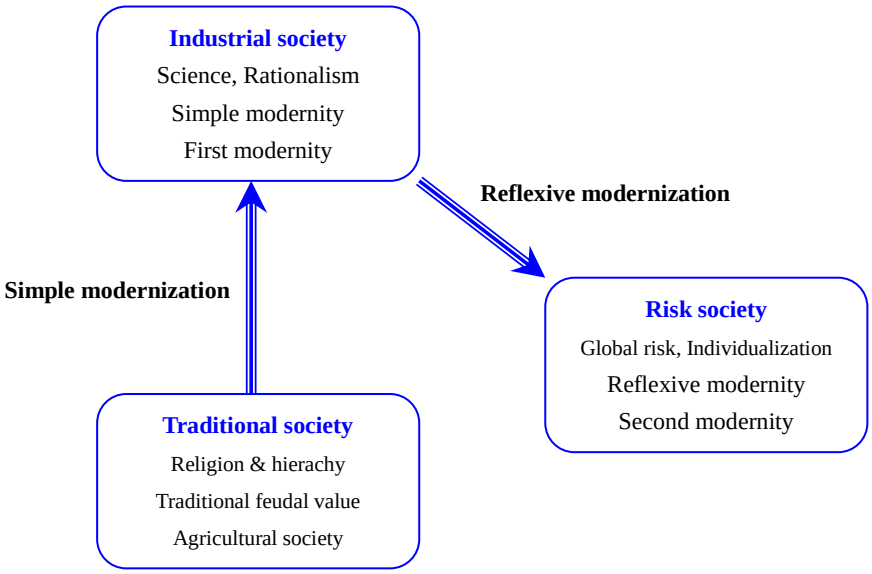

Figure 10 Reflexive modernization is the modernization of modernization[13]

Professor Zapf holds that a modern industrial society can continue to pursue modernization. Professor Tiryakian suggested the modernization of modern industrial society is the new modernization. The multiple modernities theory believes that modernity is a civilization and a modern industrial society has cultural diversity.

In 1998, Chinese scholar Chuanqi He published two papers on knowledge economy and second modernization [11,12], and advanced the second modernization theory. Seven books on second modernization have been published since 1999, and ten issues of the *China Modernization Report* have been published since 2001. In these books and reports, he systematically explained and examined the second modernization theory, a new theoretical model established by inheriting the scientific components of the classical modernization theory, the post-modernization theory and other new modernization theories. The second modernization theory is both a general theory of modernization and also a theory of civilization development (Figure 11).

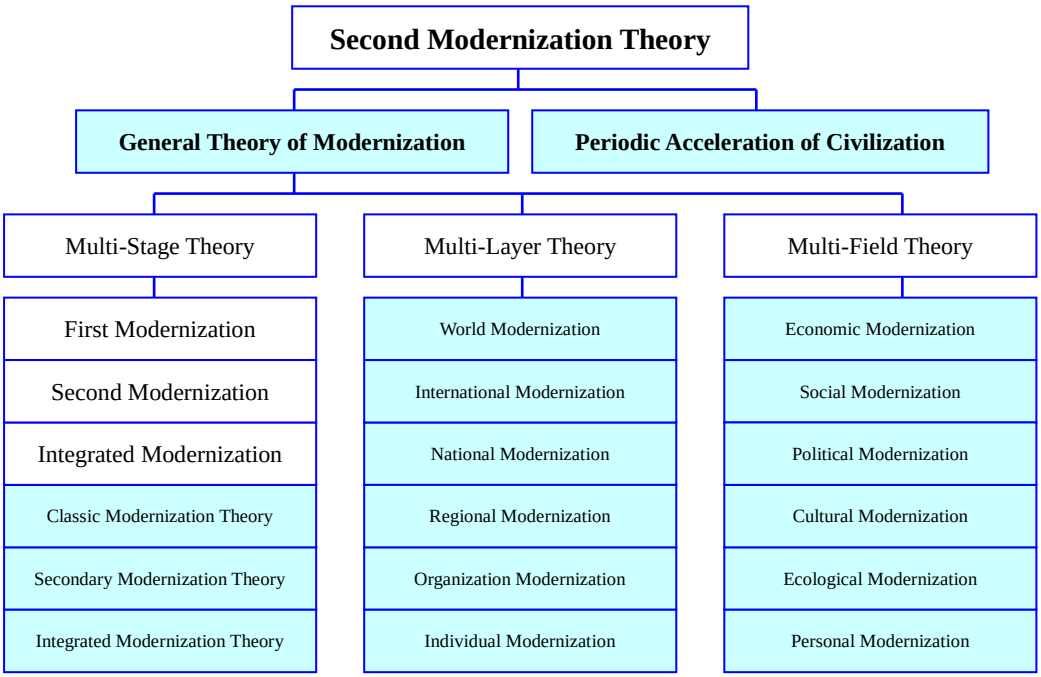

Figure 11 Structure of the second modernization theory [13]

The second modernization theory is a theory of civilization development and can be called the civilization periodic acceleration theory. It has the following three basic views.

(1) The periodic table of the process of human civilization. From the emergence of mankind to the year 2100, human civilization experiences four far-reaching revolutions: the tool-making revolution, the agricultural revolution, the industrial revolution and the knowledge revolution. The civilization process progressively goes through four ages: the tool age, the agricultural age, the industrial age and the knowledge age (Table 4). Each era comprises four phases: the starting phase, the developing phase, the mature phase and the transitional phase. In all, the process of human civilization comprises four eras and 16 phases (Table 5). Civilization development is both periodic and accelerative. The knowledge age is not the end of civilization process. Human civilization will develop further from there.

Table 4 Four ages of human civilization process

	Tool making age	**Agricultural age**	**Industrial age**	**Knowledge age**
Chronology	ca. 2.5 million years ago－3500 B.C.E.	ca. 3500 B.C.E.－A.D.1763	ca. 1763－1970	ca. 1970－2100
Time span	About 2.5 million years	About 5260 years	About 210 years	About 130 years
Four revolutions	Tool-making revolution (ca. 2.5 million years ago)	Agricultural revolution (ca. 10,000 － 5,500 years ago)	Industrial revolution (Second half of 18th century)	Knowledge revolution (Late years of 20th century)
Main characteristics	No written language No country Tribes Hunting & gathering Primitive culture Primitive economy	Written languages Emergence of countries Slave system Feudal system Agricultural civilization Agricultural economy	Industrialization Urbanization Democratization Rationalization Industrial civilization Industrial economy	Knowledge-intensive Informatization Globalization Ecologization Knowledge civilization Knowledge economy

Primitive society	Agricultural society	Industrial society	Knowledge society

Note：The stage divisions of human civilization process were based on the track of the forerunner of the civilization， the time of the division was relative. The civilization of different countries was asynchronous.

Source: He 1999[4].

Table 5 Periodic table of human civilization process

Phase	Chronology	Time span	Main characteristics	Annotation
Tool making age	**ca. 2.5 m－5500 years ago**	**2.5m years**	**Primitive culture, economy, society**	
Starting phase	ca. 2.5m－0.2m years ago	2.3m years	Early of Paleolithic Age, hunting & gathering	**Emergence of human being**, Socialization
Developing phase	ca. 0.2m－0.04m years ago	0.16m years	Middle of Paleolithic Age, consanguineous clans	
Mature phase	ca. 0.04m－0.01m years ago	0.03m years	Late of Paleolithic Age, matrilineal society	
Transitional phase	ca. 0.01m－5500 years ago	5000 years	Neolithic Age, horticulture, patrilineal society	
Agricultural age	**ca. 3500 B.C.E.－A.D.1763**	**5260 years**	**Agricultural civilization, economy, society**	
Starting phase	ca. 3500 B.C.E.－500 B.C.E.	3000 years	Ancient civilization, planting & breeding, slave system	**Birth of civilization**, Agriculturalization
Developing phase	ca. 500 B.C.E.－A.D.618	1100 years	Classical civilization, feudal system	
Mature phase	ca. A.D.618－1500	900 years	Thriving of Oriental Civilization, European Middle Ages	
Transitional phase	ca. 1500－1763	260 years	Rise of European Civilization, Spread of Renaissance	
Industrial age	**ca. 1763－1970**	**210 years**	**Industrial civilization, economy, society**	
Starting phase	ca. 1763－1870	110 years	First Industrial Revolution, mechanization	**First modernization**, Industrialization, Urbanization, De-agriculturalization
Developing phase	ca. 1871－1913	40 years	Second Industrial Revolution, electrification	
Mature phase	ca. 1914－1945	30 years	Family mechanization and electrification, mixed economy	
Transitional phase	ca. 1946－1970	20 years	Third Industrial Revolution, automation, electronic computer	
Knowledge age	**ca. 1970－2100**	**130 years**	**Knowledge civilization, economy, society**	
Starting phase	ca. 1970－1992	20 years	First Information Revolution, personal computer, knowledge-based	**Second modernization**, Knowledge intensive, Ecologization, De-industrialization
Developing phase	ca. 1993－2020	30 years	Second Information Revolution, networking, greenization	
Mature phase	ca. 2021－2050	30 years	Biological design and cloning, new biological revolution	
Transitional phase	ca. 2051－2100	50 years	New carrier vehicles, new physical revolution	

Note: The time of chronology and time span is sat according to the development phases of the forerunners in human civilization. Civilization development is asynchronous between different nations and countries. The m refer to million.

Source: He 1999[4].

(2) Coordinate system of human civilization process (Figure 12). Human civilization process is asynchronous, and different countries have different performances in civilization process. If the four ages of civilization are taken as the abscissa and the level of social development is taken as the ordinate, we can establish a coordinate system for civilization process, in which different countries can find their locations in this system.

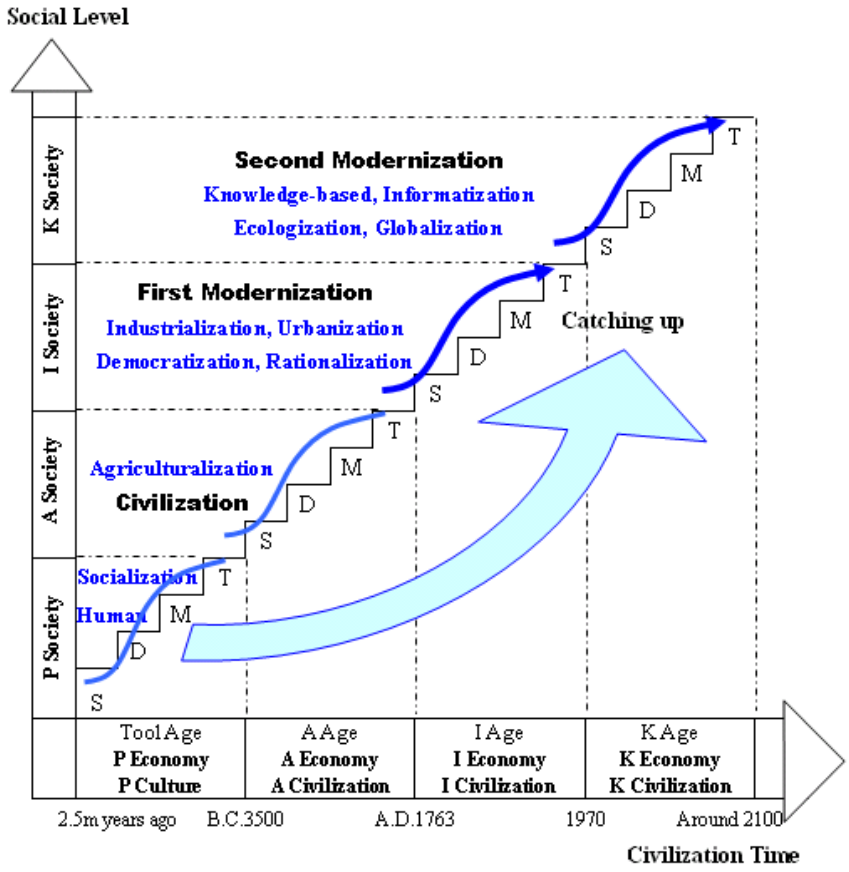

Figure 12 Coordinate system of civilization process and the two modernizations

Note: P, A, I and K refers to primitive, agricultural, industrial, and knowledge respectively. S, D, M and T refers to the starting, developing, mature and transitional phase respectively. The civilization time was the time based on the track of the forerunner of the civilization. Civilization development is asynchronous among different countries and regions.

Source: He 2003[13].

(3) Road map of human civilization process (Figure 13). Human civilization process is not linear. While social productivity rises, several turns occur to the direction of development and the structural changes of productivity. The process rises "spirally".

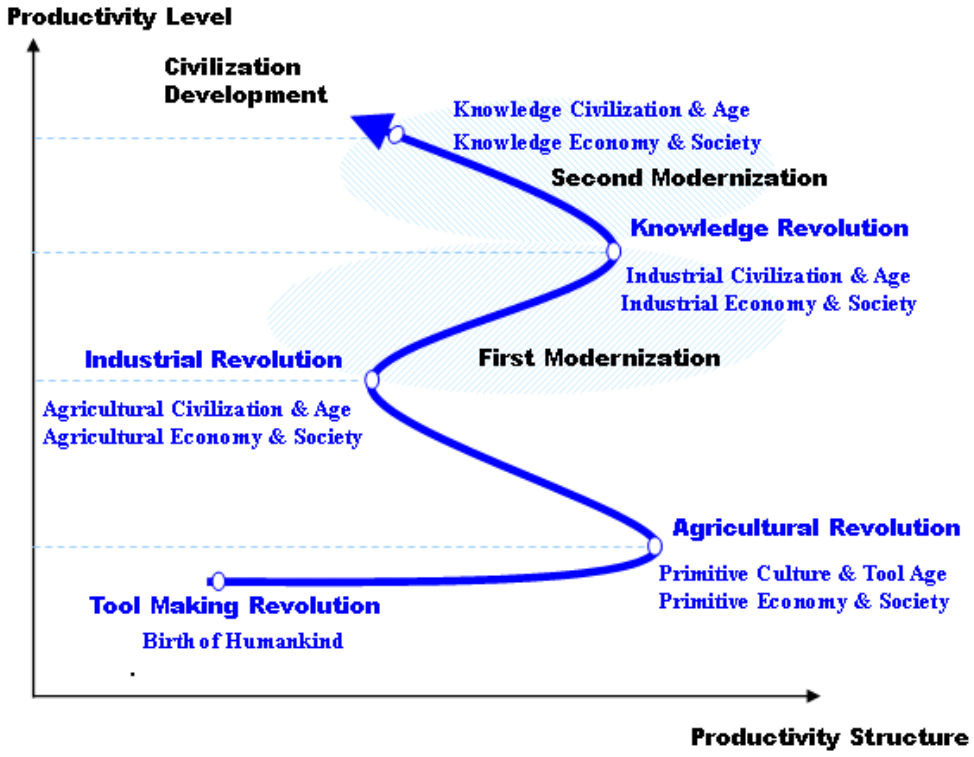

Figure 13 Road map of human civilization process and the world modernizations

Note: The central axis of human civilization had transferred three times, and four ages of the process of human civilization would be set, and so the different structure of civilization appeared in different age. The structure of productivity is taken as the abscissa and the level of productivity is taken as the ordinate. The unit of abscissa scale is the ratio of the agricultural to hunting-gathering labor in primitive culture, the ratio of the hunting-gathering to agricultural labor in agricultural civilization, the ratio of the industrial to agricultural labor in industrial civilization, and the ratio of the material (agricultural and industrial) to knowledge labor in knowledge civilization.

Source: He 2003[13].

The second modernization theory is a modernization theory, called the general theory of modernization (or the twice modernizations theory, or two-step modernization theory). It includes five basic elements (Table 6): The theoretical implications of general modernization, the laws and features of general modernization process, the results of general modernization (two types of modernity), the dynamics and modes of general modernization.

Table 6 Basic elements of second modernization theory

Element	Basic contents
Definition	Generally, modernization refers to the profound changes of human civilization since the Industrial Revolution in the 18th century. It took place in the fields of economy, society, politics, culture, environmental management and individual behaviors. It includes the formation, development, transformation and international interaction of modern civilizations, the innovation, selection, diffusion and recession of civilization elements, and also the international competition in which different countries try to catch up with, achieve and maintain the world's advanced level.
Process	During the 18th～21st centuries, the process of modernization can be divided into two major stages: first and second modernization. First modernization refers to the transformation from agricultural civilization to industrial civilization, and second modernization refers to the transformation from industrial civilization to knowledge civilization. Second modernization is not the end of history and there will be new modernizations in the future. Economic development is the first priority for the first modernization process, while the quality of life is the first priority for the second modernization process. The quality of material life may converge, but the spiritual and cultural life will become highly diversified.
Result	The result of first modernization is the crystallization and diffusion of first modernity, while the result of second modernization is the crystallization and diffusion of second modernity.
Dynamics	The dynamics of first modernization are capital, technology and democracy, while the dynamics of second modernization are knowledge innovation, institution innovation and human capital.
Mode	Both twice modernizations have many modes and path dependence. The coordinated development of the twice modernizations is integrated modernization.

Source: Research Group for China Modernization Strategies 2004[61], 2004[62].

In general, modernization refers to the profound changes of human civilization since the Industrial Revolution in the 18th century, the complex process of the formation, development, transformation and international interaction of modern civilizations, and the comlex process of the alternate operation of the innovation, selection, diffusion and recession of civilization elments. It includes the historical process and its changes of the transformation from traditional to modern society, economy, politics, culture and also the international competition in which different countries try to catch up with, achieve and maintain the world's advanced level. In short, modernization is a mixture of the development, transformation and international competition of civilizations, a quartet of innovation, selection, learning and elimination of civilization elements, and it appeared both in the forefront and late-coming countries of the human civilization.

World modernization is a long historical process. From the 18th century to the end of the 21st century, the 400 years process of world modernization can be divided into two major periods: First and second modernization. The first modernization refers to the transformation from agricultural to industrial civilization and age, and includes the transformation from agricultural to industrial economy, society, culture and so on. The second modernization refers to the transformation from industrial to knowledge civilization and age, and includes the transformation from industrial to knowledge economy, society and culture, and from material culture to ecological culture and so on. The second modernization does not represent the end of human history, and new modernizations will emerge in the future.

The result of first modernization is the crystallization and diffusion of the first modernity, featuring industrialization, urbanization, democratization, bureaucratization, institutionization, rationalization, secularization, Mechanization, Electrification, Automation, marketization, standardization, differentiation and integration, mobilization, generalization, concentration,

social welfare, de-agriculturalization (declining of the rate of the agricultural value added and labor in the GDP and all labor), modern science and energy, mass communication and universal compulsory education, etc.

The result of second modernization is the crystallization and diffusion of the second modernity, featuring knowledgeablization (process and act of becoming knowledge-intensive), informatization (information-intensive), service-intensive, networking, digitalization, globalization, innovation-drive, individualization, diversification, pluralism, deconcentration, greenization (process and act of greening), ecologization (process and act of making suitable for ecological law), dematerialization, de-industrialization (declining of the rate of the industrial value added and labor in the GDP and all labor), suburbanization, urban-rural equilibrium, life-time learning and universal higher education (Table 7), and so on at present.

Table 7 The traditions, modernities and the universals of human civilization

Fields	Civilization universals	Traditions	First modernity	Second modernity
Economy	Labor division, Exchange, Money, Poor & rich	Agricultural economy, Peasant autarky, Disperse, Handcraft	Industrial economy，Industrialization, Marketization, Standardization, Automation, De-agriculturalization	Knowledge economy，Knowledge, Information & Service-intensive, Ecologization, Globalization, De-industrialization,
Society	Family, Education, Medicine, Organization, Crime	Agricultural society, Rural, Familial, Stability, Non-universal education	Industrial society，Urbanization, Concentration, Social Welfare, Mobilization, Differentiation Universal compulsory education	Knowledge society，Informatization, Networking, Greenization, Knowledgeabilization, Sub-urbanization, De-concentration, Universal high education
Politics	Government, Army, Diplomacy, Power	Autocratic, Feudal, Religious	Democratization, Bureaucratization, Constitution	Knowledge-intensive, Internationalization, De-concentration
Culture	Language, Literature, Art, Religion, Morality	Religious, Fetishistic, Fatalism, Regional Dependence	Secularization, Rationalization, Generalization, Mass communication, national, Material values, Modernism	Networking, Pluralism, Cultural industrialization, Ecological consideration, Global, Quality of Life, Postmodernism
Environment Management	Change environment, Acclimation	Exploit nature, Fit to nature, Regional diversity	Economic priority, Conquer & control nature, Environmental degradation	Ecological balance, Win-win game, Guarding & reserve nature, Mutualism between human and nature
Individual Behaviors	Gender role, Love, Basic necessities of life, Courtesy	Conservative, Passive, Grading, Community value	Openness, Active, Equality, Independence, Achievement Individual value	Innovation, life-time learning, Individualization, happiness Self-realization

Source：He 2003 [13], North, 1981[63], Brown 1991[64].

Note: The universals of human civilization refer to the civilization elements existed continually in the process of human civilization, although the connotations and characteristics of them may be changeable.

In the process of first modernization, economic development is the first priority，and coupling with environment degradation. In the process of second modernization, the quality of life is the first priority, the economy and environment become mutual benefit each other. While the quality of material life may converge, the spiritual and cultural life will become

highly diversified. The developing countries may adopt the road of developing the first and the second modernization in a coordinated way, or the road of integrated modernization. The world modernization is of diversity at present.

World modernization observes 10 basic principles: the principle of asynchronous process, the principle of uneven distribution, the principle of stable structure, the principle of changeable status, the principle of predictable behaviors, the principle of selectable paths, the principle of progressive demand, the principle of decreasing return, the principle of non-repeatable state and the principle of changing central axis. Specifically, the process world modernization is asynchronous, the spatial distribution of the levels and elements of modernization is uneven, and the structure of the distribution of the levels of world modernization is relatively stable. However, the relative status and relative disparity of a country in the process of world modernization can change and such changes occur with regularity. As far as the relative level is concerned, about 90 percent of the developed countries in the world will continue to be developed in 20 years, about 90 percent of the underdeveloped countries will remain underdeveloped and about 10 percent of the moderately and preliminarily developed countries will see a rise in their status ranking, and about 20~30 percent of the countries will see a decline in their status ranking.

According to the second modernization theory, first modernization is in fact the classical modernization and second modernization is an ongoing new modernization. In a sense, if post-modernization reflects the transition from first modernization to second modernization, the post-modernization theory is a "theoretical transition" from the classical modernization theory to the second modernization theory. The ecological modernization theory and the reflexive modernization theory can be regarded as different theoretical interpretations of second modernization.

In our 2003 evaluation of the 1960~2000 modernization process in 131 countries around the world [65], we found that by 1960, about 14 countries had completed classical modernization. By 2000, about 61 countries completed or basically realized classical modernization, 24 countries had entered the period of second modernization, and more than 60 countries were yet to complete classical modernization, 10 countries remained in traditional agricultural society and some indigenous ethnic groups were still living in primitive society. This is an indication that the second modernization theory has factual grounds.

V. Conclusions

Modernization is one kind of profound changes of human civilization since 18th century

In general, modernization has four layers of theoretical implications.

First, modernization is one kind of profound changes of human civilization since the Industrial Revolution in the 18th century, which is composed of the changes of the activity, behaviour, process, content, structure, system and idea of human civilization. It includes the formation, development, transformation and international interaction of modern civilizations, the innovation, selection, diffusion and recession of civilization elements and so on. It took place in the fields of economy, society, politics, culture, environmental management and

individual behaviors, and happened both in the forefront and late-coming countries in the process of human civilization.

Next, modernization is a historical process since 18th century. It is a complex process of the formation, development, transformation and international interaction of modern civilizations, a complex process of the alternate operation of the innovation, selection, dissemination and recession of civilization elements. In the 400 years from the 18th century to the end of 21st century, the process can be divided into two major periods: first and second modernization. The first modernization refers to the process of the transformation from agricultural to industrial civilization, and includes the transformation from agricultural to industrial economy, society, culture and so on. The second modernization refers to the process of the transformation from industrial to knowledge civilization, and includes the transformation from industrial to knowledge economy, society and culture, from material to ecological culture and so on.

Third, modernization is an international competition in which different countries try to catch up with, achieve and maintain the world's advanced level.

Fourth, modernization can be viewed from both the absolute and relative perspectives. The domestic change and progress of modernization is absolute modernization, while the international comparison and status change of modernization is relative modernization.

Modernization is a trend to human beings and a choice to different people. If you did not embrace or simply refused the modernization, the gap of material life between yours and that of people living at advanced level of the world would increase noticeably.

2. Modernization theories describe the human civilization process since 18th Century

The modernization theories are the systematic expositions of the characteristics and laws of world modernization process. Since the 1950s, there have been three waves of modernization studies and many modernization theories have been produced. Different theories have different interpretations of civilization process.

First, the classical modernization theory describes the transformation of human civilization from traditional agricultural civilization to modern industrial civilization.

Next, the post-modernization theory, the ecological modernization theory and the reflexive modernization theory describe the civilization development after the industrial age. Specifically, the post-modernization theory describes the transformation from industrial society to post-industrial society, the reflexive modernization describes the transformation from industrial society to risk society, and the ecological modernization theory describes the transformation from industrial society to ecological society.

Third, the multiple modernities theory reflects the cultural diversity of modernization process.

Fourth, the second modernization theory explains the four ages and 16 phases of human civilization process and two modernizations. The Yangtze River Model of human civilization process can be analyzed by the second modernization theory. This model is also a practical example for the second modernization theory [13], which represents the unity between the human civilization theories and the modernization theories.

The relationship between modernization and civilization and the theoretical analysis of

modernization provide a theoretical and historical foundation for the China Modernization Report.

Reference

1. Leakey R (1994) The *Origin of Humankind*. New York, NY: Basic Books
2. Ralph PL (1991) *World Civilizations: Their History and Their Culture*. New York: W. W. Norton & Company Inc.
3. Zapf W (1999) *Modernisierung, Wohlfahrtsentwicklung und Transformation*. Berlin: Sigma
4. He C (1999) *Second Modernization: Inspiration From Human Civilization Process*. Beijing: High Education Press
5. Black CE (1966) *The Dynamics of Modernization*. New York: Harper & Row, Publishers
6. Bell D (1973) *The Coming of Post-Industrial Society: A Venture in Social Forecasting*. New York: Basic Books
7. Crook S, Pakulski J & Waters M (1992) *PostModernization: Change in Advanced Society*. London: Sage
8. Inglehart R (1997) *Modernization and Postmodernization*. Princeton, New Jersey: Princeton University Press
9. Beck U [1986] (1992) *Risk Society: Toward a New Modernity*. London: Sage
10. Beck U, Giddens A & Lash S (1994) *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. Stanford, California: Stanford University Press
11. He C (1998a) Knowledge Economy and China Modernization. *Guangming Daily*, April 7
12. He C (1998b) Knowledge Economy and Second Modernization. *Science & T*echnology *Review,* 6: 3-4
13. He C (2003) *Orient Renaissance: Three Roads to the Modernization*. Beijing: Commercial Press
14. Research Group for China Modernization Report. 2001. *China Modernization Report 2001: Modernization and Evaluation*. Beijing: Peking University Press
15. Research Group for China Modernization Strategies (2005) *China Modernization Report 2005: Economic Modernization.* Beijing: Peking University Press
16. Luo R (1993) *New Perspective of Modernization*. Beijing: Peking University Press
17. Rostow W（1960）The Stages of Economic Growth: A Non-Communist Manifesto. Cambridge: Cambridge University Press
18. Black CE (ed.) (1976) *Comparative Modernization*. New York: The Free Press
19. Research Group for China Modernization Strategies (2006) *China Modernization Report 2006: Social Modernization.* Beijing: Peking University Press
20. Harrison D (1988) *The Sociology of Modernization and Development*. London: Unwin Hyman
21. Marx K [1867] (1954) *Capital, Volume I*. London: Lawrence and Wishart
22. Tylor E (1871) *Primitive Culture*. London: John Murray
23. Morgan LH [1877] (1964) *Ancient Society*. (White LA ed.) Cambridge, Mass.: Harvard University Press
24. Durkheim E [1893] (1964) *The Division of Labour in Society*. New York: Free Press
25. Spencer H (1898) *The Principles of Sociology*. New York: Appleton
26. Weber M [1904] (1930) *The Protestant Ethic and the Sprit of Capitalism*. London: Allen & Unwin
27. White LA (1949) *The Science of Culture*. New York: Farra and Strauss
28. Brown DE (1991) *Human Universals*. New York: McGraw-Hill
29. Parsons T (1951) *The Social System*. Glencoe, Ill.: Free Press
30. Hoselitz B (ed.) (1952) *The Progress of Underdeveloped Areas*. Chicago, Ill.: University of Chicago Press
31. Lerner D (1958) *The Passing of Traditional Society: Modernizing the Middle East*. Glencoe Ill.: Free Press
32. Smelser NJ (1959) *Social Change in the Industrial Revolution*. London: Routledge
33. McClelland DC (1961) *The Achieving Society*. New York: Free Press
34. Hagen E (1962) *On the Theory of Social Change*. Homewood, Ill.: Dorsey Press
35. Bendix R (1964) *Nation-building and Citizenship*. New York and London: Wiley

36. Apter DE (1965) *The Politics of Modernization*. Chicago: University of Chicago Press
37. Eisenstadt SN (1966) *Modernization: Protest and Change*. Englewood Cliffs NJ: Prentice-Hall
38. Levy MJ (1966) *Modernization and the Structure of Society*. Princeton: Princeton University Press
39. Weiner M (ed.) (1966) *Modernization: The Dynamics of Growth*. New York: Basic
40. Bendix R (1967) Tradition and Modernity Reconsidered. *Comparative Studies in Society and History*, IX (3): 292-346
41. Moore B (1967) *Social Origins of Dictatorship and Democracy*. Harmondsworth: Penguin
42. Huntington SP (1968) *Political Order in Changing Society*. New Haven and London: Yale University Press
43. Parsons T (1971) *The System of Modern Societies*. Englewood Cliffs NJ: Prentice Hall
44. Berger P, Berger B & Kellner H (1974) *The Homeless Mind*. Harmondsworth: Penguin
45. Inkeles A and Smith D (1974) *Becoming Modern: Individual Changes in Six Developing societies*. Combridge, Mass.: Harvard University Press.
46. Inkeles A (1983) Exploring Individual Modernity. New York: Columbia University Press
47. Machlup F (1962) *The Production and Distribution of Knowledge in the United States*. New Jersey: Princeton University Press
48. Meadows DH et al (1972) *The Limits to Growth*. New York: New American Library
49. Porat MU (1977) *The Information Economy*. Washington, DC: DOC. GPO. USA
50. Taylor JG (1979) *From Modernization to Modes of Production: A Critique of the Sociologies of Development and Underdevelopment*. London: Macmillan
51. Lyotard Jean-Francois [1979] (1984) *The Postmodern Condition: A Report on Knowledge*. Minneapolis: University of Minnesota
52. Toffler A (1980) *The Third Wave*. New York, NY: Bantam Books
53. Huber J (1985) *Die Regenbogengesellschaft: Okologie and Sozialpolitik*. Frankfurt am Main: Fischer
54. Zapf W (ed.) (1991) *Die Modernisierung Moderner Gesellschaften*. Frankfurt: Campus Verlag
55. Tiryakian E (1991) Modernization: Exhumetur in Pace (Rethinking Macrosociology in the 1990s'). *International Sociology*, 6(2): 165-80
56. OECD (1996) *Science, Technology and Industry Outlook*. Paris: OECD
57. Eisenstadt SN (1998) Multiple and Changing Modernities in Settings of Globalization. Paper given at the 34th World Congress of the International of Sociology, Tel Aviv, July 11-15
58. Eisenstadt SN (2003) *Comparative Civilization and Multiple Modernities*. Leiden: Brill
59. Almond G & Coleman J (eds.) (1960) *The Politics of Developing Areas*. Princeton, NJ: Princeton University Press
60. McClelland DC (1961) The Achievement Society. New York: Free Press
61. Research Group for China Modernization Strategies (2004) *China Modernization Report 2004: Regional Modernization.* Beijing: Peking University Press
62. Research Group for China Modernization Strategies (2010) *China Modernization Report 2010: World Modernization Outline*. Beijing: Peking University Press
63. North DC (1981) *Structure and Change in Economic History*. New York: Norton
64. Brown DE (1991) *Human Universals*. New York: McGraw-Hill
65. Research Group for China Modernization Strategies (2003) *China Modernization Report 2003: Modernization Theories and Prospect*. Beijing: Peking University Press

人类文明与世界现代化

何传启

中国科学院中国现代化研究中心

一般而言，人类诞生于 250 万年前[1]，文明诞生于 5500 年前[2]，现代化诞生于 18 世纪[3]。迄今为止，关于文明和现代化没有统一定义。从操作角度看，文明是人类发展的高级阶段[2]，是公元前 3500 年以来人类发展成就的总和。现代化是一种世界潮流，是 18 世纪工业革命以来人类文明的一种前沿变化[4]。本文重点讨论人类文明与世界现代化的关系（图 1）。

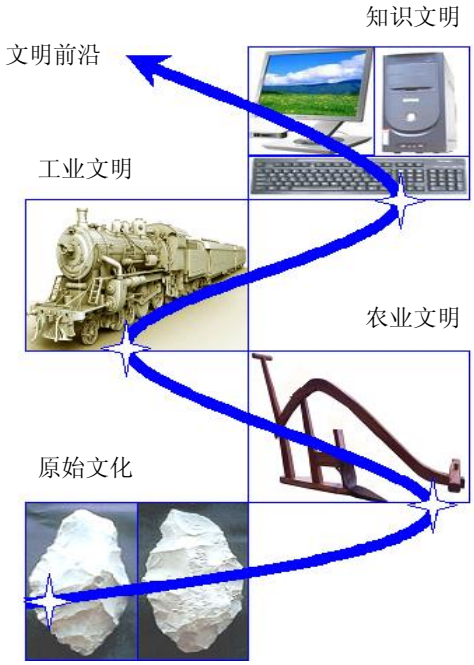

图 1 人类文明前沿过程的四种形态、三次转变和两次现代化

注：人类诞生以来，人类文明前沿发生了三次转变。第一次转变是从原始文化向农业文明的转变，第二次是从农业文明向工业文明的转变，第三次是从工业文明向知识文明的转变。从农业文明向工业文明的转变是第一次现代化，从工业文明向知识文明的转变是第二次现代化。图片分别为石器、犁、蒸汽机和计算机。

一、人类文明的前沿轨迹

人类文明既是一个有机的整体，又是不同国家和民族的文明的一个集合。文明发展是不同步的。依据文明水平和特征，可以对人类文明进程的前沿轨迹进行阶段划分。关于人类文明的阶段划分，历史学家和社会学家有不同划分方法。

关于人类文明的历史阶段划分没有统一认识。其中，大致有五种观点与现代化研究有紧密关系。它们分别是 3 阶段、4 阶段、5 阶段、6 阶段和 7 阶段的划分等（图 2）。第二次现代化理论和《中国现代化报告》等采用工具时代、农业时代、工业时代和知识时代的 4 阶段

划分，它们是以人类文明的生产力水平和结构为基础的阶段划分。

阶段划分	公元前				公元						
	250 万年	3500 年	500 年	元年	500 年	1500 年	1750 年	1914 年	1970 年	2000 年	2100 年
三个阶段	古代				中世纪	现代					
	古代					近代		现代			
四个阶段	古代				中世纪	近代		现代			
	史前	古代			中世纪	现代					
	古代				中世纪	现代			后现代		
	工具时代	农业时代					工业时代		知识时代		
	史前时代	农业时代					工业时代		信息时代		
	史前时代	农业时代					工业时代		网络时代		
五个阶段	文明之前	古代			中世纪	现代			后现代		
六个阶段	文明之前	古代	古典		中世纪	近代			现代		
七个阶段	文明之前	古代	古典		中世纪	西方兴起	西方优势		20 世纪以来的世界		
	文明之前	古代	古典		后古典	西方兴起	工业化		20 世纪以来的世界		

图 2　人类文明史的历史阶段

注：关于人类文明进程的阶段划分，一般是依据人类文明的前沿水平和特征进行划分，阶段划分的时间节点是相对的。在不同阶段，人类文明的前沿水平与它的平均水平有很大差别，不同国家和地区的发展不同步。

关于人类文明的社会阶段的划分，同样有不同认识。其中，大致有四种观点与现代化研究有紧密关系。它们分别是3阶段、4阶段、5阶段和6阶段的划分等（图3）。第二次现代化理论和《中国现代化报告》等采用原始社会、农业社会、工业社会和知识社会的4阶段划分，它们是以人类社会的生产力结构和水平为基础的阶段划分。

阶段划分	公元前				公元						
	250 万年	8000 年	3500 年	500 年	元年	500 年	1500 年	1750 年	1914 年	1970 年	2000 年	2100 年
三个阶段	传统社会							现代社会		后现代社会		
	前工业社会							工业社会		后工业社会		
四个阶段	原始社会		农业社会					工业社会		知识社会		
	原始社会		农业社会					工业社会		信息社会		
	原始社会		农业社会					工业社会		网络社会		
	原始社会		农业社会					工业社会		风险社会		
	原始社会		农业社会					工业社会		生态社会		
五个阶段	狩猎采集	园艺社会	农耕社会		农业社会			工业社会				
	狩猎采集	园艺社会	游牧社会		农业社会			工业社会				
	狩猎采集	游牧社会	农耕社会		传统文明社会			工业社会				
	原始社会		奴隶社会		封建社会		资本主义社会		社会主义社会（共产主义社会）			
六个阶段	狩猎采集	园艺社会	游牧社会		农业社会		资本主义社会			后资本主义社会		
	狩猎采集	园艺社会	游牧社会		农业社会			工业社会		后工业社会		

图 3　人类文明史的社会阶段

注：社会阶段依据人类文明的前沿特征进行划分，时间节点是相对的。不同国家和地区的发展是不同步的。

二、世界现代化的前沿轨迹

世界现代化史是人类文明史的组成部分。世界现代化进程的阶段划分，应该与人类文明的阶段划分相协调。目前，关于世界现代化的历史和阶段划分没有统一认识[4-13]（图 4）。

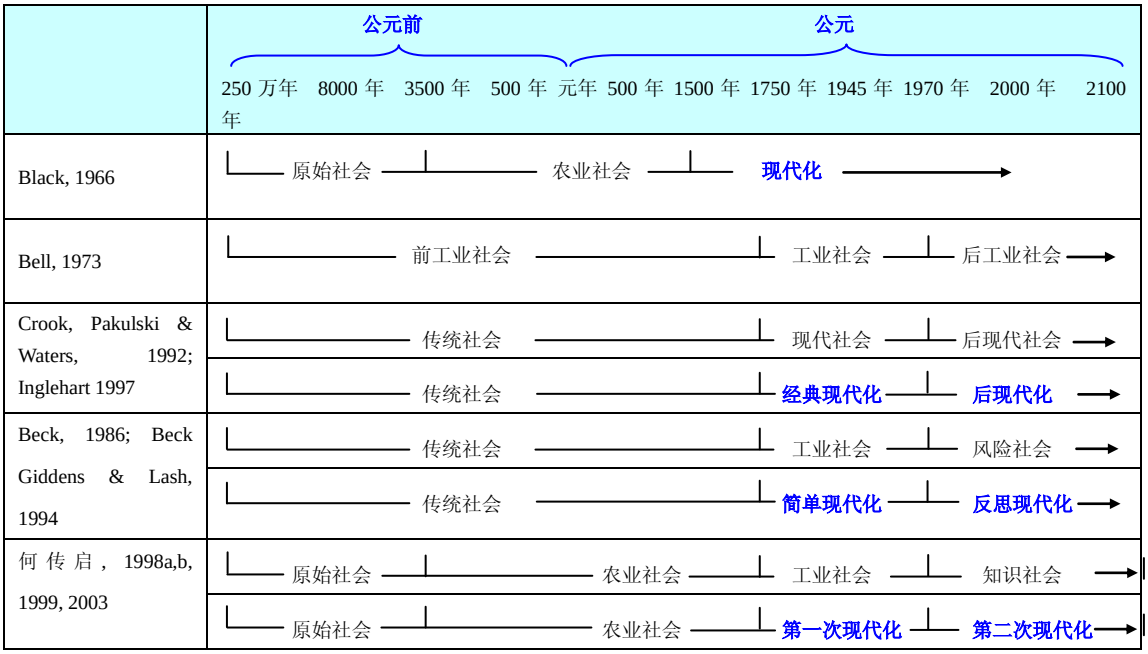

图 4　世界现代化的历史和阶段[4-13]

注：依据世界现代化的前沿轨迹划分，时间节点是相对的。不同国家的现代化进程是不同步的。

首先，关于世界现代化的起点没有统一认识。目前大致有三种主要观点。（1）16～17 世纪的科学革命是世界现代化的起点;（2）17～18 世纪的启蒙运动是世界现代化的起点;（3）18 世纪的英国工业革命和法国大革命是世界现代化的起点。

在英文里，“现代化”一词诞生于 18 世纪（1748～1770 年），现代化研究则是 20 世纪开始的。《中国现代化报告》把 18 世纪的工业革命作为世界现代化的起点[14]，世界现代化过程分析则从 18 世纪初（1700 年）开始[15]。

其次，关于世界现代化的阶段划分没有统一认识。目前大致有七种观点（表 1）。根据后 3 种观点（第 5、第 6 和第 7 种观点），世界现代化可以分为两大阶段（虽然两个阶段的名称和内容各有差异），两个阶段的分界点大约是 1970 年前后（知识和信息革命）。

表 1　世界现代化的阶段划分

	阶段	内容	注释
1	三次浪潮	第一次浪潮（1780～1860 年）、第二次浪潮（19 世纪下半叶至 20 世纪初）和第三次浪潮（20 世纪下半叶）[16]	经典现代化的内部阶段
2	四个阶段	现代性的挑战、现代化领导集团的巩固、社会和经济转型和社会整合[5]	
3	五个阶段	经济成长的五个阶段：传统社会、为起飞创造前提条件阶段、起飞阶段、向成熟推进阶段和大众消费阶段[17]	
4	四个时期	准备时期、转变时期、高级现代化时期和国际一体化时期[18]	
5	两大阶段	经典现代化和后现代化（现代社会和后现代社会）[6-8]	两次现代化
6	两大阶段	简单现代化和反思现代化（工业社会和风险社会）[9,10]	
7	两大阶段	第一次现代化和第二次现代化（工业社会和知识社会）[4,13]	

世界现代化 400 年进程（18 至 21 世纪）可以分为两大阶段，每个大阶段可以分为若干小阶段。《中国现代化报告 2005》提出经济现代化六次浪潮[15]，《中国现代化报告 2006》提出社会现代化六次浪潮[19]（表 2）。综合起来，世界现代化进程可以分为准备阶段、第一次现代化和第二次现代化，第一次现代化包括 3 次浪潮，第二次现代化包括 3 次浪潮。

表 2　经济和社会现代化的六次浪潮[19]

浪潮	大致时间	经济现代化	社会现代化	注释
第一次	1763～1870	第一次工业革命、机械化	城市化、社会分化流动	**第一次现代化**
第二次	1870～1945	第二次工业革命、电气化	电气化、普及义务教育	工业化、城市化、民主化
第三次	1946～1970	第三次产业革命、自动化	福利化、普及中等教育	理性化、福利化、流动化
第四次	1970～2020	知识和信息革命、信息化	网络化、普及高等教育	**第二次现代化**
第五次	2020～2050	新生物学革命、生物经济	仿生化、生物经济社会	知识化、信息化、生态化
第六次	2050～2100	新物理学革命、文化经济	体验化、文化经济社会	全球化、个性化、多元化

注：依据世界现代化的前沿轨迹。第五和第六次浪潮是一种预测。不同国家的现代化进程是不同步的。

其三，现代化既是一种世界潮流，也是一种社会选择。选择现代化的国家，就会推进现代化，但不同国家的现代化进程是不同步的。没有选用现代化的国家和社会，就会努力保持现有（原有）生活方式；虽然社会变化也会发生，但与人类文明前沿的物质生活差距会逐步扩大。

三、现代化理论的演化

一般而言，现代化诞生于 18 世纪，现代化研究诞生于 20 世纪，经典现代化理论形成于 20 世纪 50 至 60 年代，但其基本思想可以追溯到 18 世纪或更早（图 5）。在 20 世纪后 50 年里，世界现代化研究出现了三次浪潮[13]，产生了众多理论（图 6）。其中，比较有代表性的理论大约有六个，它们分别是：经典现代化理论、后现代化理论、生态现代化理论、反思现代化理论、多元现代性理论和第二次现代化理论等（图 7）。它们对人类文明进程的解释有所不同。

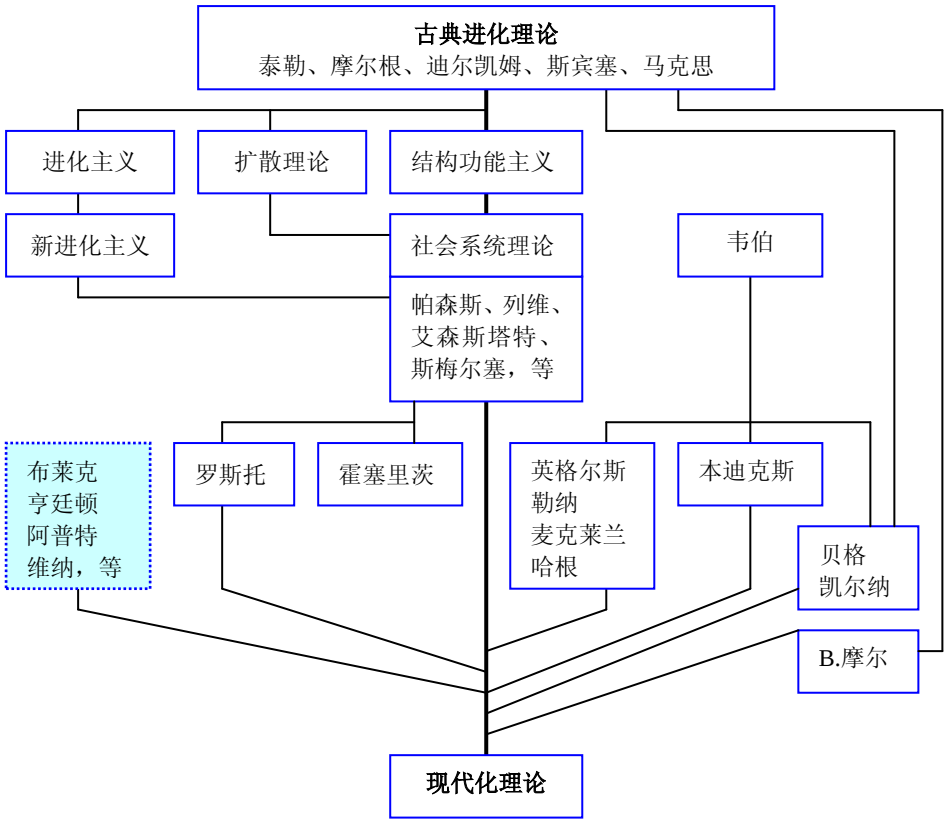

图 5 现代化理论的形成[20-46]

注：蓝色背景框中的内容是本文作者添加的。资料来源：Harrison 1988[20]

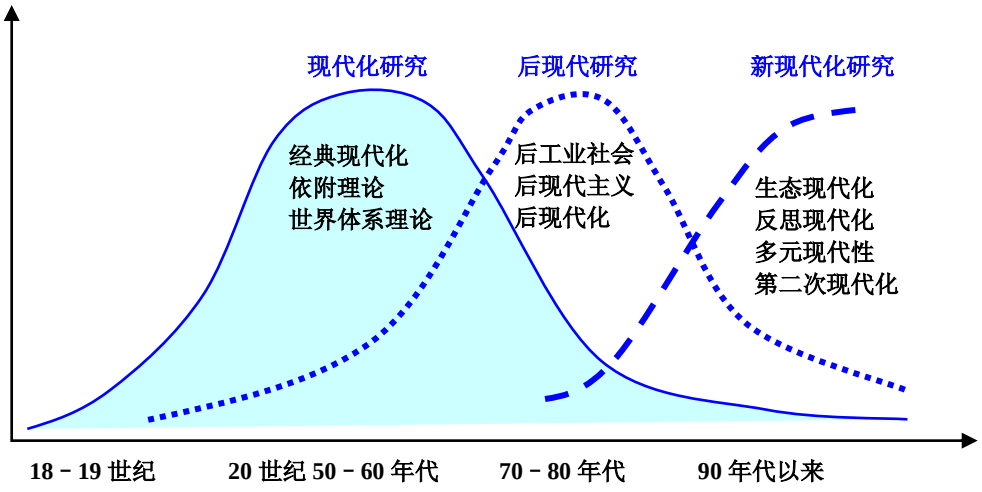

图 6 世界现代化研究的三次浪潮[13]

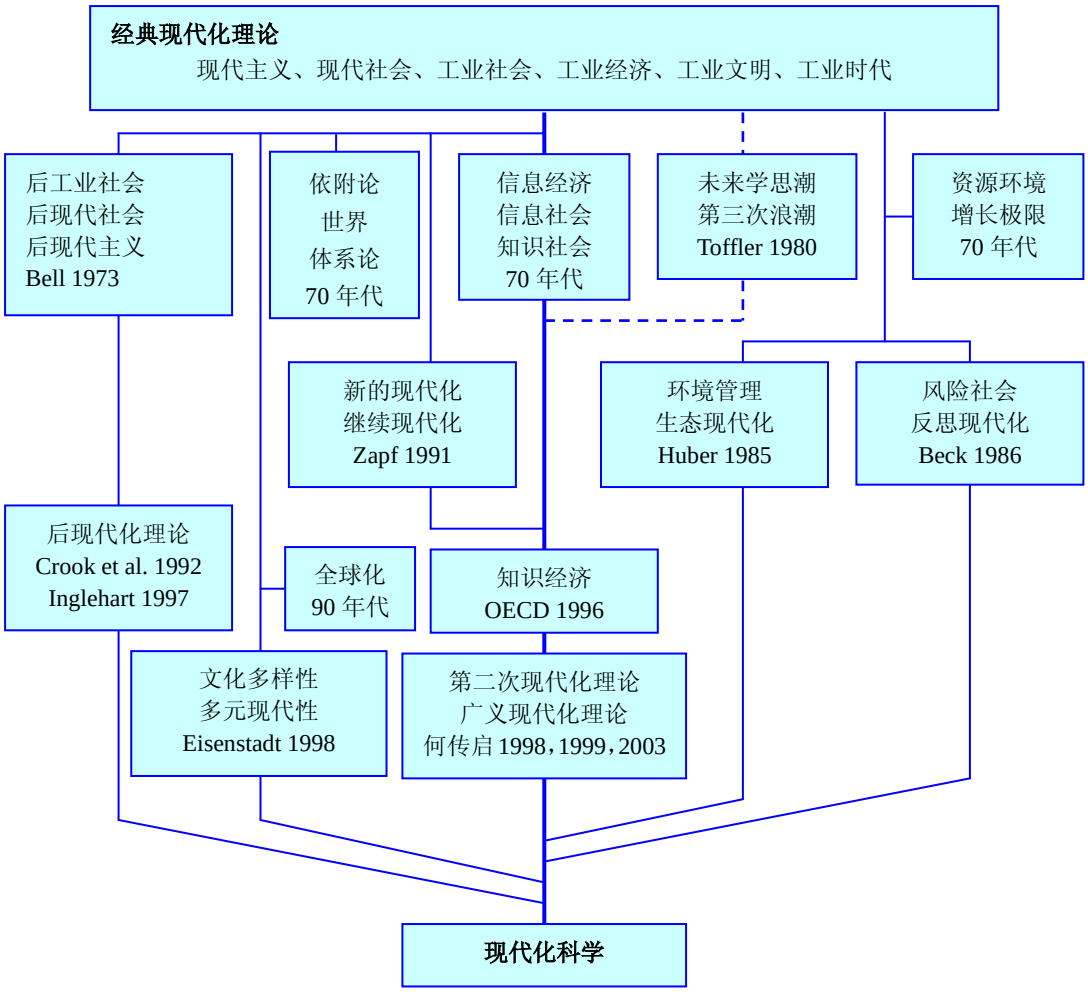

图 7　现代化理论的发展[4,6,8,9,11-13,47-58]

20 世纪 70 年代以来，“现代化理论”在不断受到批评的同时，衍生出许多新理论。其中，依附理论和世界体系理论关于现代化过程的国际互动的阐述，弥补了经典现代化理论的不足；后现代研究和新现代化研究及其研究成果，则可以看成是现代化理论的新发展。

四、现代化理论与人类文明的关系

1、经典现代化理论与人类文明进程

在 20 世纪 50～60 年代，一批学者相继开展了现代化研究，并出版了一批学术著作，如《社会系统》（1951）[29]、《传统社会的消逝：中东现代化》（1958）[31]、《发展中地区的政治学》（1960）[59]、《经济成长的阶段》（1960）[17]、《成就社会》（1961）[60]、《现代化的政治》（1965）[36]、《现代化：抗拒与变迁》（1966）[37]、《现代化和社会结构》（1966）[38]、《现代化的动力》（1966）[5]和《变化社会中的政治秩序》（1968）[42]等，以及 70 年代初的《现代社会系统》（1971）[43]和《人的现代化：六个发展中国家人的变化》（1974）[45]等，现代化理论基本形成。现代化理论并不是一个单一的理论[20]，而是不同领域的学者关于世界现代化研究的理论成果的统称。学者们称之为经典现代化理论。

概括地说，经典现代化理论包括五个方面内容（表 3）：经典现代化的理论涵义、经典现代化过程的规律和特点、经典现代化的结果（现代性）、经典现代化的动力和模式等。

表 3　经典现代化理论的基本内容

方面	基本内容
定义	经典现代化指 18 世纪工业革命以来从传统农业社会向现代工业社会转变的历史过程及其深刻变化；它既发生在先锋国家的社会变迁里，也存在于后进国家追赶先进水平的过程中。
过程	经典现代化过程是革命的、复杂的、系统的、全球的、长期的、有阶段的和进步的过程
结果	经典现代化的结果是现代性的形成和普及，现代性指已经完成经典现代化的国家的状态特征
动力	有三种观点：经济发展决定论、文化发展决定论、政治经济文化综合作用
模式	有多种模式，具有路径依赖性

资料来源：中国现代化战略研究课题组 2004[61].

迄今为止，关于现代化并没有统一的定义。一般而言，现代化有基本词义、理论涵义和政策涵义三种解释。经典现代化理论认为，现代化是一个从传统农业社会向现代工业社会转变的历史过程及其变化，它既发生在先锋国家，也存在于后进国家追赶先进水平的过程中。

美国学者布莱克教授认为[5]，人类事务（Human affairs）经历了三次革命性转变：第一次是从动物（Prehuman）向人类社会的转变，第二次是从原始社会向文明社会的转变，第三次是从传统文明社会向现代社会的转变，第三次转变就是现代化（图 8）。

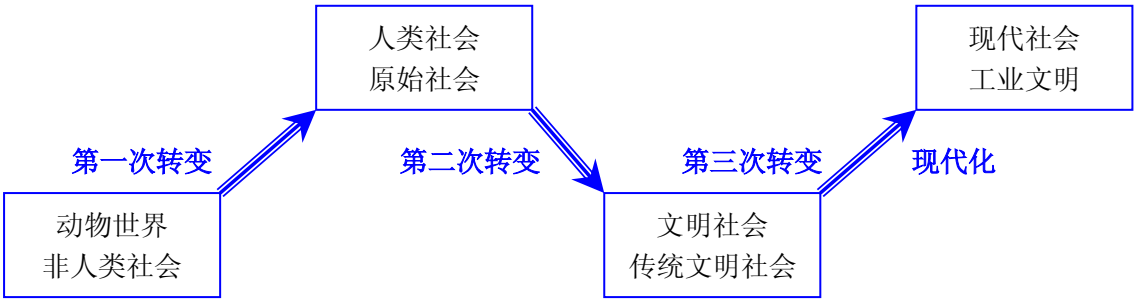

图8　人类事务的三次革命性转变[5]

根据经典现代化理论，人类文明的发展包括三大阶段：原始社会、传统农业文明和现代工业文明，现代化就是一个从传统农业文明向现代工业文明的转变过程。

2、后现代化理论与人类文明进程

早在 20 世纪 60 年代，发达工业国家已经完成经典现代化，开始迈入经典现代化以后的发展阶段，有人称其为“后现代”[51]。学者们注意到三个现象。

（1）工业经济不是世界经济发展的顶点，发达工业国家经济发展已经从工业化转入非工业化轨道，工业经济比例持续下降，服务经济比例持续上升。

（2）工业社会不是人类社会发展的终点，发达工业国家社会发展开始从城市化转入非城市化（或逆城市化）轨道，城市人口向郊区和乡镇迁移。

（3）工业文明不是文明进程的终结，发达工业国家没有止步不前，它们的发展已经并将继续超越工业文明阶段。

显然，经典现代化理论不能解释这些新发展。20 世纪 70～80 年代，以“后”冠名的各种学术思潮在美欧国家广泛传播，后现代化理论是这些思潮的一个集合。后现代化理论包括后工业社会、后现代主义和后现代化等内容。

1973 年美国学者贝尔教授推出《后工业社会的来临》一书[6]。在贝尔看来，人类社会的发展包括前工业社会、工业社会、后工业社会三个阶段，从工业社会向后工业社会的过渡，有着某些不同的阶段；20 世纪 70 年代的美国，已经进入后工业社会的第一阶段。后工业社会并不会取代工业社会，而是消除工业社会的一些原有特征，增加一些新的特点。

如果说，经典现代化理论向我们描述了一个工业化世界，那么，后现代化理论探索了工业化以后的发展。后现代化理论认为，从传统社会向现代社会（农业社会向工业社会）的转变是现代化，从现代社会向后现代社会（工业社会向后工业社会）的转变是后现代化。后现代化的结果是后现代性，后现代化以后是“后后现代”[8]。

根据后现代化理论，人类文明的发展也包括三大阶段：传统社会（前工业社会）、现代社会（工业社会）和后现代社会（后工业社会）（图 9）。如果考虑到传统社会（前工业社会）实际包括原始社会和传统农业社会两个阶段，那么，人类文明发展可以分为四个阶段。

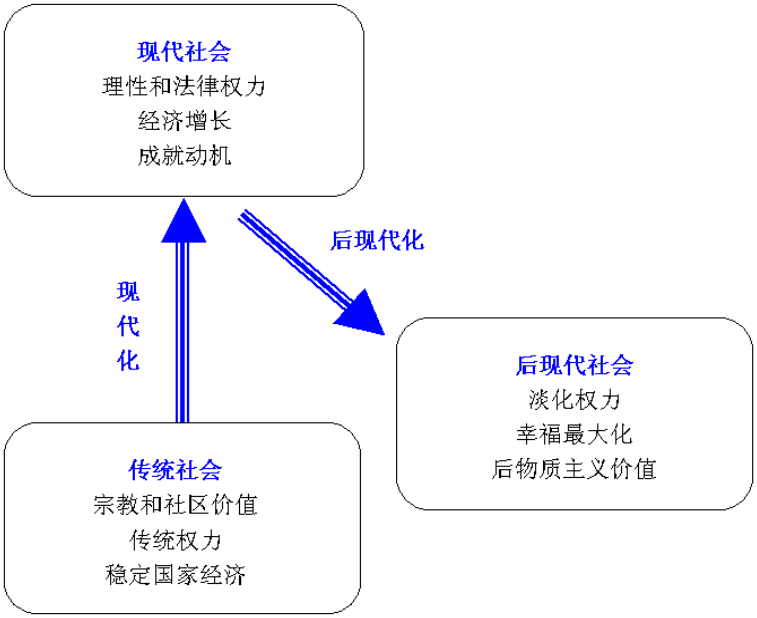

图 9　从现代化到后现代化的转变[9]

3、新的现代化理论与人类文明进程

在 20 世纪 80～90 年代，现代化研究孕育了许多新思想，如胡伯教授的生态现代化理论（1985）[53]、贝克教授的反思现代化理论（1986）[9,10]（有人译成自反性现代化、再现代化等）、查普夫教授的继续现代化（1991）[54]、图亚江教授的新现代化（1991）[55]、艾森斯塔特教授的多元现代性（1998）[57,58]和中国科学院何传启研究员的第二次现代化理论（1998）[4,11-13]等。

根据生态现代化理论，从农业社会向工业社会的转变是现代化，从工业社会向生态社会的转变就是生态现代化，生态社会的特征是生态现代性。根据反思现代化理论，从农业社会向工业社会的转变是简单现代化（正统的现代化），从工业社会向风险社会的转变是反思现代化；工业社会的现代性是普通现代性，风险社会的现代性是反思现代性，普通现代性是第一现代性，反思现代性是第二现代性（图10）。查普夫教授认为现代工业社会可以继续现代化。图亚江教授认为工业社会的现代化是一种新现代化。多元现代性理论认为现代性是一种文明，现代工业社会具有文化多样性。

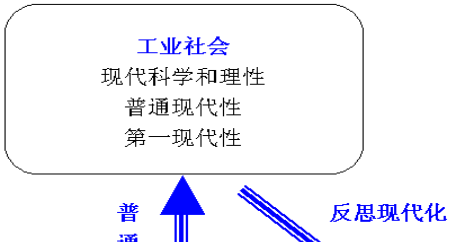

图10　反思现代化是现代化的现代化

资料来源：何传启 2003[13].

1998 年，中国学者何传启研究员发表了知识经济与第二次现代化的两篇论文[11,12]，提出第二次现代化理论。1999 年以来出版《第二次现代化丛书》7 本，2001 年以来出版《中国现代化报告》10 本，系统阐述和检验了第二次现代化理论。第二次现代化理论在继承经典现代化理论、后现代化理论和其他新现代化理论的科学成分的同时，建立了一种新的理论范式。第二次现代化理论既是一种广义现代化理论，也是一种文明发展理论（图 11）。

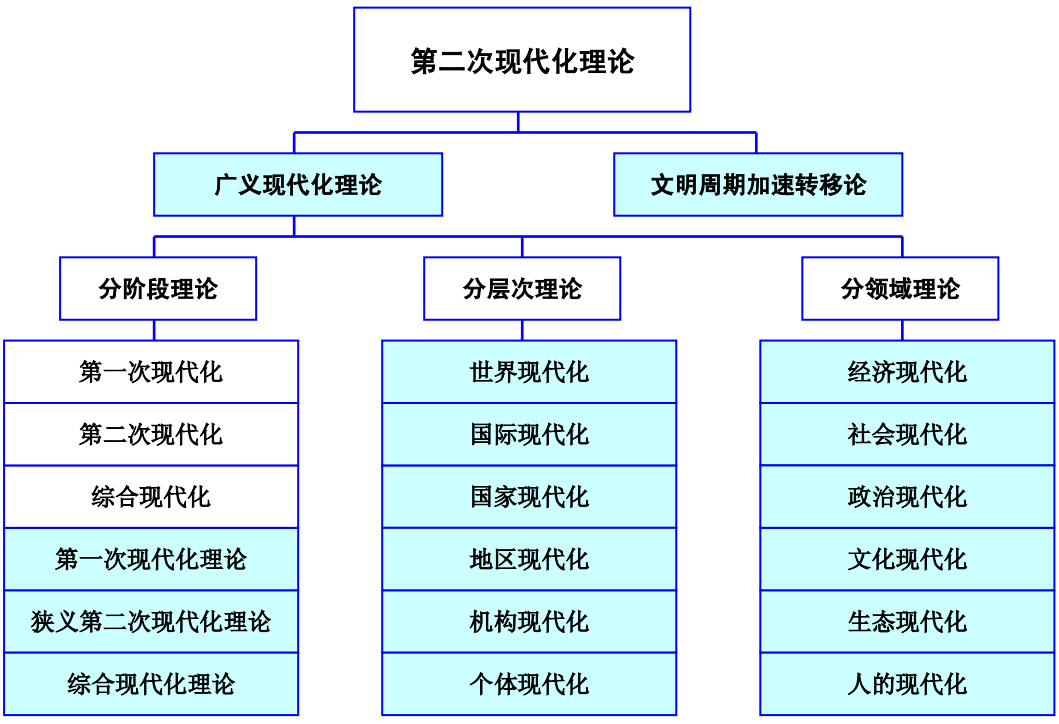

图 11　第二次现代化理论的结构

注：综合现代化是两次现代化的协调发展，是与第二次现代化阶段基本平行的一个阶段。

参考资料：何传启 2003[13].

第二次现代化理论是一种文明发展理论，简称为文明周期加速论。它有三个基本观点：

（1）人类文明进程的周期表。从人类诞生到2100年，人类文明先后发生工具制造革命、农业革命、工业革命和知识革命等四次意义深远的革命，文明进程依次分为工具时代、农业时代、工业时代和知识时代等四个时代（表4），每一个时代都包括起步期、发展期、成熟期和过渡期等四个阶段，人类文明进程包括四个时代和十六个阶段（表5）；文明发展具有周期性和加速性，知识时代不是文明进程的终结，将来还会有新发展等。

表4　人类文明进程的四个时代

项目	工具时代	农业时代	工业时代	知识时代
大致时间	250万年前至公元前3500年	公元前3500年至公元1763年	1763年至1970年	1970年至约2100年
时间跨度	大约250万年	大约5260年	大约210年	大约130年
四次革命	工具制造革命	农业革命	工业革命	知识和信息革命
	250万年前	公元前8000年～3500年	18世纪下半叶	20世纪后期
主要特征	没有文字	发明文字	工业化、城市化	知识化、信息化
	没有国家	国家出现	民主化、理性化	全球化、多样化
	狩猎采集	奴隶制、封建制	福利化、市场化	绿色化、生态化
	原始文化	农业文明	工业文明	知识文明
	原始经济	农业经济	工业经济	知识经济
	原始社会	农业社会	工业社会	知识社会

注：依据人类文明先行者的发展经历划分时间段，不同国家文明发展是不同步的。

资料来源：何传启 1999[4].

表5　人类文明进程的周期表（文明和现代化的周期性和加速性）

发展阶段	大致时间*	大约跨度	主要特征	备注
工具时代	250 万～0.55 万年前	250 万年	原始文化、原始经济、原始社会	
起步期	250 万～20 万年前	230 万年	旧石器早期、狩猎采集、原始人群	人类诞生
发展期	20 万～4 万年前	16 万年	旧石器中期、狩猎采集、血缘氏族	社会化
成熟期	4 万～1 万年前	3 万年	旧石器晚期、狩猎采集、母系社会	
过渡期	1 万～0.55 万年前	0.5 万年	新石器时期、作物栽培、父系社会	
农业时代	公元前 3500～公元 1763 年	5260 年	农业文明、农业经济、农业社会	
起步期	公元前 3500～500 年	3000 年	古代文明、种植养殖、奴隶制	农业化
发展期	公元前 500～公元 618 年	1100 年	古典文明、封建制	文明化
成熟期	公元 618～1500 年	900 年	东方文明繁荣、欧洲中世纪	
过渡期	公元 1500～1763 年	260 年	欧洲文明崛起、文艺复兴传播	
工业时代	1763～1970 年	210 年	工业文明、工业经济、工业社会	
起步期	1763～1870 年	110 年	第一次工业革命、机械化	第一次现代化
发展期	1871～1913 年	40 年	第二次工业革命、电气化	工业化
成熟期	1914～1945 年	30 年	家庭机械电器化、混合经济	城市化
过渡期	1946～1970 年	20 年	第三次产业革命、自动化、电子计算机	非农业化
知识时代	1970～2100 年	130 年	知识文明、知识经济、知识社会	
起步期	1970～1992 年	20 年	第一次信息革命、微电脑、知识化	第二次现代化
发展期	1993～2020 年	30 年	第二次信息革命、网络化、绿色化	知识化
成熟期	2021～2050 年	30 年	生物设计和克隆、新生物学革命	生态化
过渡期	2051～2100 年	50 年	新型运载工具、新物理学革命	非工业化

注：*依据人类文明先行者的发展经历划分时间段，不同民族和国家文明发展是不同步的。

资料来源：何传启 1999[4].

（2）人类文明进程的坐标系（图 12）。人类文明进程是不同步的，不同国家在文明进程中有不同表现。如果以文明的四个时代为横轴，以社会发展水平为纵轴，可以建立文明进程的坐标系，不同国家可以在文明坐标系中找到自己的位置。

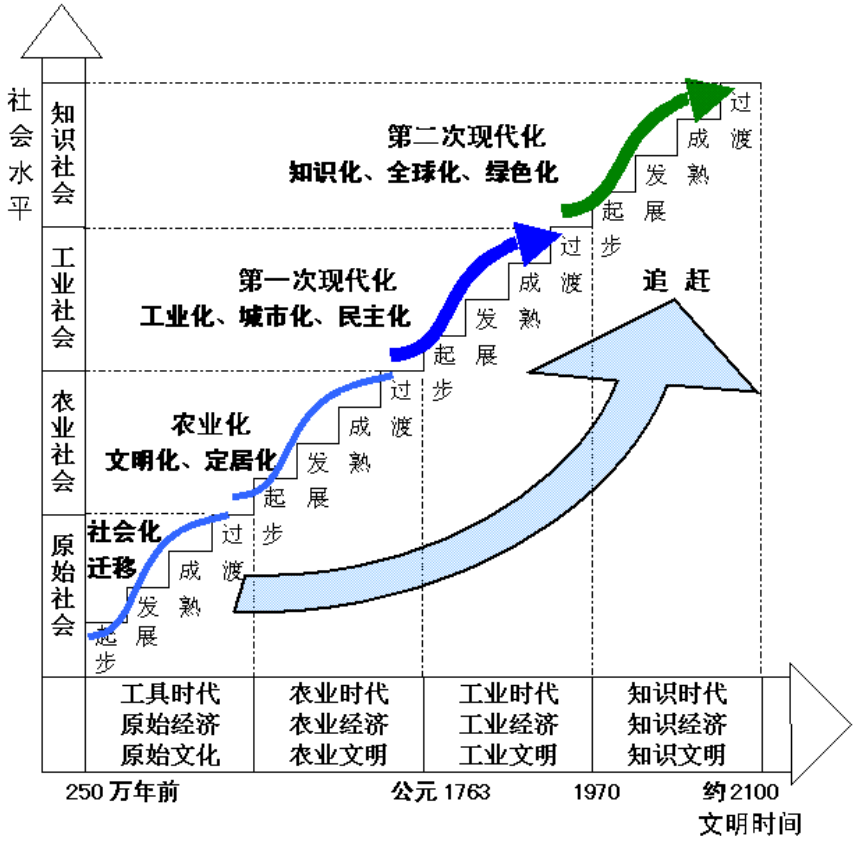

图12 文明进程的坐标系（广义现代化的两个阶段）

注：文明时间是依据人类文明的前沿轨迹标记的时间，时间节点是相对的。不同国家的文明进程是不同步的。

资料来源：何传启 2003[13].

（3）人类文明进程的路线图（图13）。人类文明进程不是直线的，社会生产力在提高，但发展方向和生产力结构变化发生了几次转折，具有“螺旋式”上升的特点。

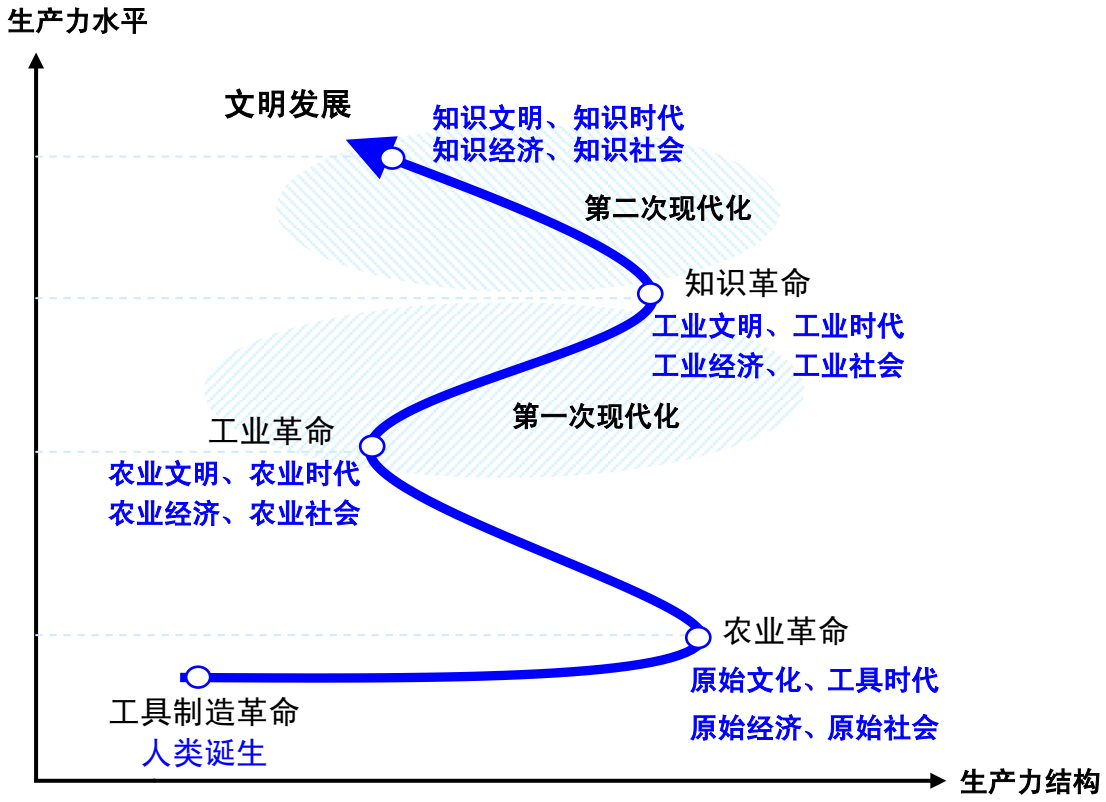

图13 人类文明进程的路线图（广义现代化的路线图）

注：人类文明中轴发生了三次转换，形成四个时期，每个时期文明结构不同。坐标横轴为生产力结构，纵轴为生产力水平。横轴刻度：原始文化时期为农业与狩猎采集劳动力之比，农业文明时期为狩猎采集与农业劳动力之比，工业文明时期为工业与农业劳动力之比，知识文明时期为物质产业与知识产业劳动力之比。圆圈代表工具制造革命、农业革命、工业革命和知识革命（包含信息革命和生态革命）等。

资料来源：何传启 2003[13].

第二次现代化理论是一种现代化理论，简称为广义现代化理论（或两次现代化理论）。它包括五个方面的内容（表6）：广义现代化的理论涵义、广义现代化过程的规律和特点，广义现代化的结果（两种现代性）、广义现代化的动力和模式等。

表 6 第二次现代化理论的基本内容

方面	基本内容
定义	现代化指 18 世纪工业革命以来人类文明的一种深刻变化，是现代文明的形成、发展、转型和国际互动的复合过程，是文明要素的创新、选择、传播和退出交替进行的复合过程，是追赶、达到和保持世界先进水平的国际竞争。现代化发生在经济、社会、政治、文化、个人和环境领域，发生在先行国家和后进国家
过程	在 18～21 世纪期间，现代化过程可以分为两大阶段：第一次现代化指从农业文明向工业文明、传统文明向现代文明的转型，包括从农业经济向工业经济、农业社会向工业社会、农业政治向工业政治、农业文化向工业文化、传统文化向现代文化的转变等；第二次现代化指从工业文明向知识文明、物质文明向生态文明的转型，包括从工业经济向知识经济、工业社会向知识社会、工业政治向知识政治、工业文化向知识文化、物质文化向生态文化的转变等；第二次现代化不是历史的终点，将来还有新的现代化。现代化过程既有共性又有多样性，约有 20 个共性特点，遵循 10 个基本原理。第一次现代化是第二次现代化的基础，第二次现代化是第一次现代化的部分继承和部分转向，两次现

	代化的协调发展是综合现代化
结果	国家层次的结果主要是现代性、特色性和多样性的形成，包括劳动生产率和生活质量提高，社会进步，政治民主，文化多元，环境变化，个人全面发展，国家水平达到和保持世界先进水平等。国际体系层次的结果是国际体系和国家地位的变化，包括国际结构相对稳定，国家地位变化较大，国际分化和国家分层，欠发达国家相对贫困化等。第一次现代化的主要结果是第一现代性、特色性和多样性的形成，第一现代性的特点包括工业化、城市化、民主化、理性化、市场化、福利化、制度化、科学化、普及义务教育和非农业化等；副作用包括环境污染等。第二次现代化的主要结果是第二现代性、特色性和多样性的形成，第二现代性的目前特点包括知识化、信息化、生态化、绿色化、郊区化、城乡平衡、创新化、个性化、多元化、全球化、普及高等教育和非工业化等，副作用包括国际不平等扩大等。部分传统价值持续存在并发挥作用
动力	现代化的动力因素包括创新、竞争、适应、交流、国家利益和市场需求等，动力机制包括创新–选择–传播–退出的超循环、创新驱动、双新驱动、双轮驱动、联合作用、复合互动、创新扩散、创新溢出、竞争驱动和生产力函数等。不同阶段和不同领域的现代化动力有所不同，不同层次和不同部门的现代化动力有所不同，不同国家和不同模式的现代化动力有所不同
模式	现代化具有路径多样性、模式多样性和路径依赖性；现代化大致有 3 条基本路径和 50 多种模式

资料来源：中国现代化战略研究课题组 2004[61]，2010[62].

一般而言，现代化指 18 世纪工业革命以来人类文明所发生的一种深刻变化，是现代文明的形成、发展、转型和国际互动的复合过程，是文明要素的创新、选择、传播和退出交替进行的复合过程，它包括从传统社会向现代社会、传统经济向现代经济、传统政治向现代政治、传统文化向现代文化转变的历史过程及其变化，以及不同国家追赶、达到和保持世界先进水平的国际竞争。简而言之，现代化是文明发展、文明转型和国际竞争的交集，是文明要素的创新、选择、扩散和淘汰的四重奏，它发生在人类文明的前沿国家和后进国家。

世界现代化遵循 10 个基本原理：进程不同步原理、分布不均衡原理、结构稳定性原理、地位可变迁原理、行为可预期原理、路径可选择原理、需求递进原理、效用递减原理、状态不重复原理和中轴转变原理。具体而言，世界现代化进程是不同步的，现代化水平和要素的空间分布是不均衡的，世界现代化水平分布的结构是相对稳定的，但是，国家在世界现代化进程中的相对地位和相对差距是可以变化的，而且变化是有规律的。就相对水平而言，在 20 年内，世界大约 90%的发达国家仍将是发达国家，大约 90%的欠发达国家仍将是欠发达国家，中等发达和初等发达国家地位升级的概率约为 10%，降级的概率约为 20～30%。

世界现代化是一个漫长的历史过程。从 18 世纪到 21 世纪末，世界现代化过程可以分为两大阶段：第一次和第二次现代化。第一次现代化指从农业文明向工业文明、农业时代向工业时代的转变过程，它包括从农业经济向工业经济、农业社会向工业社会、农业文化向工业文化的转变等。第二次现代化指从工业文明向知识文明、工业时代向知识时代的转变过程，它包括从工业经济向知识经济、工业社会向知识社会、工业文化向知识文化、物质文明向生态文明的转变等。第二次现代化不是人类历史的终结，将来还有新的现代化。

在第一次现代化过程中，经济发展是第一位的，工业化带来环境退化。在第二次现代化过程中，生活质量是第一位的，经济与环境双赢；物质生活质量可能趋同，但精神和文化生活将高度多样化。发展中国家可以采取第一次现代化和第二次现代化协调发展的道路，简称为综合现代化。目前，世界现代化具有多样性。

第一次现代化的结果是第一现代性、特色性和多样性的形成，第二次现代化的结果是第二现代性、特色性和多样性的形成；两次现代化都有副作用；同时部分传统价值持续存在并发挥作用，如文化遗产等；人类文明的共性长期存在并发挥作用（表 7）。

表 7　传统性、现代性和人类文明的共性

领域	文明的共性	传统性	第一现代性	第二现代性
经济	分工、交换、货币、贫富	农业经济，手工的、分散的、自给自足	工业经济，工业化、市场化、标准化、非农业化	知识经济，知识化、生态化、全球化、非工业化
社会	家庭、教育、医疗、犯罪	农业社会、家族的、稳定性、教育不普及	工业社会，城市化、福利化、流动化、普及义务教育	知识社会，信息化、郊区化、绿色化、普及高等教育
政治	政府、军队、外交、权力	专制的、封建的、宗教的	民主化、法治化、科层化	知识化、国际化、分散化
文化	语言、艺术、宗教、道德	宗教的、迷信的、宿命论、依赖性	世俗化、理性化、大众文化、物质价值	文化多元化、文化网络化、文化产业化、生活质量
环境	改变环境、适应环境	开发自然、适应自然、因地而异	经济主义、控制自然、征服自然、生态环境破坏	生态平衡、守护自然、互利共生、经济环境双赢
个人行为	性别角色、衣食住行、礼仪	保守的、被动的、等级的、社区价值	开放性、参与性、平等性、成就感、个人利益	创新、学习、个性化、幸福感、自我实现

注：文明的共性指在人类文明进程中始终存在的文明要素，它们的内涵或特点可能会发生变化。

参考资料：何传启 2003[13] , North 1981[63], Brown 1991[64].

第二次现代化理论描述的第一次现代化就是经典现代化，描述的第二次现代化是正在进行尚没有完成的新现代化。在某种意义上，如果说，后现代化反映了从第一次现代化向第二次现代化的过渡，那么，后现代化理论是从经典现代化理论向第二次现代化理论的“理论过渡”；生态现代化理论和再现代化理论，可以看成是关于第二次现代化的不同理论解释。

我们对世界131个国家1960～2000年的现代化进程进行了评价[65]，发现1960年约有14个国家完成经典现代化，2000年约有61个国家完成或基本实现经典现代化，有24个国家已经进入第二次现代化，同时有60多个国家没有完成经典现代化，有10个国家处于传统农业社会，一些少数民族生活在原始社会。这表明第二次现代化理论是有事实依据的。

五、主要观点

1、现代化是18世纪工业革命以来人类文明的一种深刻变化

一般而言，现代化有六层理论涵义。

首先，现代化是一种深刻变化，是18世纪工业革命以来人类文明的深刻变化，包括现代文明的形成、发展、转型和国际互动，文明要素的创新、选择、传播和退出等；它发生在经济、社会、政治、文化、环境管理和个人行为等各个领域，发生在人类文明的前沿国家和后进国家。

其次，现代化是一个长期过程。在18～21世纪的400年里，它可分为第一次现代化和第二次现代化两大阶段。第一次现代化包括三次浪潮：机械化、电气化和自动化；第二次现代化预计将包括三次浪潮：信息化、仿生化和体验化。

其三，现代化是一种文明转型。其中，第一次现代化是从农业文明向工业文明的转变过程，包括从农业经济向工业经济、农业社会向工业社会、农业文化向工业文化的转变等；第二次现代化是从工业文明向知识文明的转变过程，包括从工业经济向知识经济、工业社会向知识社会、工业文化向知识文化、物质文化向生态文化的转变等。

其四，现代化是一种国际竞争，是追赶、达到和保持世界先进水平的国际竞争。

其五，现代化具有两种视角。国内视角：现代化的国内变迁和进步，包括国内的文明发展和文明转型。国际视角：现代化的国际比较和地位变化，达到世界先进水平才是真正的现

代化。

其六，现代化具有两种性质。对于人类文明而言，现代化是一种必然趋势；对于不同人来说，现代化是一种理性选择。如果你不选择或拒绝现代化，那么，你的物质生活与世界先进水平的差距就会扩大。

2、现代化理论描述了18世纪工业革命以来的人类文明进程

首先，经典现代化理论描述了人类文明从传统农业文明向现代工业文明的转变。

其次，后现代化理论、生态现代化理论、反思现代化理论等刻画了工业时代以后的文明发展，其中，后现代化理论描述了从工业社会向后工业社会的转变，反思现代化理论描述了从工业社会向风险社会的转变，生态现代化理论阐述了从工业社会向生态社会的转变。

其三，多元现代性理论反映了现代化过程中的文化多样性。

其四，第二次现代化理论阐述了人类文明进程的四个时代、十六个阶段和两次现代化。人类文明进程的“长江模型”可以用第二次现代化理论来分析，“长江模型”也是第二次现代化理论的一个现实案例[13]。第二次现代化理论是人类文明理论和现代化理论的一种统一。

现代化与文明的关系以及现代化理论分析，为中国现代化报告提供了理论和历史基础。

参考文献

66. Leakey R (1994) The *Origin of Humankind*. New York, NY: Basic Books
67. Ralph PL (1991) *World Civilizations: Their History and Their Culture*. New York: W. W. Norton & Company Inc.
68. 查普夫 (2000) *现代化与社会转型（第二版）*. 陈黎，陆成宏译. 北京：社会科学文献出版社
69. 何传启（1999）*第二次现代化:人类文明进程的启示*. 北京: 高等教育出版社
70. Black CE (1966) *The Dynamics of Modernization*. New York: Harper & Row, Publishers
71. Bell D (1973) *The Coming of Post-Industrial Society: A Venture in Social Forecasting*. New York: Basic Books
72. Crook S, Pakulski J & Waters M (1992) *PostModernization: Change in Advanced Society*. London: Sage
73. Inglehart R (1997) *Modernization and Postmodernization*. Princeton, New Jersey: Princeton University Press
74. Beck U [1986] (1992) *Risk Society: Toward a New Modernity*. London: Sage
75. Beck U, Giddens A & Lash S (1994) *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. Stanford, California: Stanford University Press
76. 何传启（1998a） 知识经济与中国现代化. *光明日报*, 4-7
77. 何传启（1998b） 知识经济与第二次现代化. *科技导报*, **6**: 3-4
78. 何传启（2003）*东方复兴: 现代化的三条道路*. 北京: 商务印书馆
79. 中国现代化报告课题组（2001）*中国现代化报告2001:现代化与评价*. 北京: 北京大学出版社
80. 中国现代化战略研究课题组等（2005）*中国现代化报告2005: 经济现代化研究*. 北京: 北京大学出版社
81. 罗荣渠（1993）*现代化新论*. 北京: 北京大学出版社
82. Rostow W（1960）The Stages of Economic Growth: A Non-Communist Manifesto. Cambridge: Cambridge University Press
83. Black CE (ed.) (1976) *Comparative Modernization*. New York: The Free Press
84. 中国现代化战略研究课题组等（2006）*中国现代化报告2006: 社会现代化研究*. 北京: 北京大学出版社
85. Harrison D (1988) *The Sociology of Modernization and Development*. London: Unwin Hyman
86. Marx K [1867] (1954) *Capital, Volume I*. London: Lawrence and Wishart
87. Tylor E (1871) *Primitive Culture*. London: John Murray
88. Morgan LH [1877] (1964) *Ancient Society*. (White LA ed.) Cambridge, Mass.: Harvard University Press

89. Durkheim E [1893] (1964) *The Division of Labour in Society*. New York: Free Press
90. Spencer H (1898) *The Principles of Sociology*. New York: Appleton
91. Weber M [1904] (1930) *The Protestant Ethic and the Sprit of Capitalism*. London: Allen & Unwin
92. White LA (1949) *The Science of Culture*. New York: Farra and Strauss
93. Brown DE (1991) *Human Universals*. New York: McGraw-Hill
94. Parsons T (1951) *The Social System*. Glencoe, Ill.: Free Press
95. Hoselitz B (ed.) (1952) *The Progress of Underdeveloped Areas*. Chicago, Ill.: University of Chicago Press
96. Lerner D (1958) *The Passing of Traditional Society: Modernizing the Middle East*. Glencoe Ill.: Free Press
97. Smelser NJ (1959) *Social Change in the Industrial Revolution*. London: Routledge
98. McClelland DC (1961) *The Achieving Society*. New York: Free Press
99. Hagen E (1962) *On the Theory of Social Change*. Homewood, Ill.: Dorsey Press
100. Bendix R (1964) *Nation-building and Citizenship*. New York and London: Wiley
101. Apter DE (1965) *The Politics of Modernization*. Chicago: University of Chicago Press
102. Eisenstadt SN (1966) *Modernization: Protest and Change*. Englewood Cliffs NJ: Prentice-Hall
103. Levy MJ (1966) *Modernization and the Structure of Society*. Princeton: Princeton University Press
104. Weiner M (ed.) (1966) *Modernization: The Dynamics of Growth*. New York: Basic
105. Bendix R (1967) Tradition and Modernity Reconsidered. *Comparative Studies in Society and History*, IX (3): 292-346
106. Moore B (1967) *Social Origins of Dictatorship and Democracy*. Harmondsworth: Penguin
107. Huntington SP (1968) *Political Order in Changing Society*. New Haven and London: Yale University Press
108. Parsons T (1971) *The System of Modern Societies*. Englewood Cliffs NJ: Prentice Hall
109. Berger P, Berger B & Kellner H (1974) *The Homeless Mind*. Harmondsworth: Penguin
110. Inkeles A and Smith D (1974) *Becoming Modern: Individual Changes in Six Developing societies*. Combridge, Mass.: Harvard University Press.
111. Inkeles A (1983) Exploring Individual Modernity. New York: Columbia University Press
112. Machlup F (1962) *The Production and Distribution of Knowledge in the United States*. New Jersey: Princeton University Press
113. Meadows DH et al (1972) *The Limits to Growth*. New York: New American Library
114. Porat MU (1977) *The Information Economy*. Washington, DC: DOC. GPO. USA
115. Taylor JG (1979) *From Modernization to Modes of Production: A Critique of the Sociologies of Development and Underdevelopment*. London: Macmillan
116. Lyotard Jean-Francois [1979] (1984) *The Postmodern Condition: A Report on Knowledge*. Minneapolis: University of Minnesota
117. Toffler A (1980) *The Third Wave*. New York, NY: Bantam Books
118. Huber J (1985) *Die Regenbogengesellschaft: Okologie and Sozialpolitik*. Frankfurt am Main: Fischer
119. Zapf W (ed.) (1991) *Die Modernisierung Moderner Gesellschaften*. Frankfurt: Campus Verlag
120. Tiryakian E (1991) Modernization: Exhumetur in Pace (Rethinking Macrosociology in the 1990s'). *International Sociology*, 6(2): 165-80
121. OECD (1996) *Science, Technology and Industry Outlook*. Paris: OECD
122. Eisenstadt SN (1998) Multiple and Changing Modernities in Settings of Globalization. Paper given at the 34th World Congress of the International of Sociology, Tel Aviv, July 11-15
123. Eisenstadt SN (2003) *Comparative Civilization and Multiple Modernities*. Leiden: Brill
124. Almond G & Coleman J (eds.) (1960) *The Politics of Developing Areas*. Princeton, NJ: Princeton University Press
125. McClelland DC (1961) *The Achieving Society*. New York: Free Press.
126. 中国现代化战略研究课题组等（2004）*中国现代化报告2004：地区现代化之路*. 北京：北京大学出版社
127. 中国现代化战略研究课题组等（2010）*中国现代化报告2010：世界现代化概览*. 北京：北京大学出版社

128. North DC (1981) *Structure and Change in Economic History*. New York: Norton
129. Brown DE (1991) *Human Universals*. New York: McGraw-Hill
130. 中国现代化战略研究课题组等（2003）*中国现代化报告2003：现代化理论与展望*. 北京：北京大学出版社

Science &Technology and Modernization

Jing Jin
China Center For Modernization Research
Chinese Academy of Sciences

Since the 18th century, science and technology and modernization have been mutually promoting each other, because innovation is the fundamental driving force for modernization. Currently, many developed countries' investments in science and technology generally account for about 2%-3% of their respective national GDP. Despite the low investment ratio, science and technology play an important role in national modernization.

In general, modernization relies on the scientific and technological progress, and significantly spurs the development of science and technology out of enormous demands. This paper briefly discusses the priority fields in science and technology and related forecasts in some countries, and the relations between scientific and technological revolution and modernization.

I. Priority fields of scientific and technological advance in the early 21st century

The 21st century is refreshingly new. The development in science and technology constantly continues, and the world economy rapidly transforms, from being driven by resources and capital to being driven by innovation, so science and technology have become the main impetus to economic development and social progress. Since the early 21st century, both developing and developed countries have drawn up their development strategies for science and technology, and deployed key fields with priority supports one after another. This paper briefly presents the priority fields involved in the development strategies for science and technology in America (the United States), Europe (UK, Germany and EU) and Asia (Japan, Korea and China).

At present, the priority fields involved in the development strategies for science and technology in 6 countries and the EU cover life and health, IT, nanometer and materials, space science and technology, earth and environment, energies and

resources, food and agriculture, manufacturing and engineering, national security, social sciences, etc. Of all these fields, such five fields as life and health, IT, nanometer and materials, earth and environment and energies and resources are universally valued by the above mentioned 6 countries and the EU. (See Table1)

Table 1 Key Fields Involved in the Science and Technology Development Strategies of the 6 Countries and the EU

State	Life and Health	IT	Nanometer and Materials	Space Science and Technology	Earth and Environment	Energies and Resources	Food and Agriculture	Manufacturing and Engineering	State Security	Social Sciences
United States	√	√	√	√	√	√			√	
Germany	√	√	√		√	√		√	√	√
UK	√	√	√		√	√		√		
EU	√	√	√	√	√	√	√	√	√	√
Japan	√	√	√		√	√				
South Korea	√	√	√	√	√	√		√		√
China	√	√	√	√	√	√	√	√	√	√

1. America

United States is the greatest, also the first scientific and technological power in America. The U.S. government views it as a state goal to maintain its leading role and most advanced position in all scientific knowledge[1]. According to the *Budget Report of the United States Government*[2]*, Fiscal Year 2012*, it values the national defense technologies most, then health, energies and space. And other priority fields also include biotechnology, nanotechnology, IT and related fields, climate changes and its effects, and biodiversity and sustainable development-based studies on resources demands, etc.

2. Europe

UK comes first. It is one of the strongest powers in science and technology in the world. In 2000, it published whitepaper *Excellence and Opportunity-A Science and Innovation Policy for the 21st century*, planning to emphatically invest and achieve a

leading role in genomics, information science, nanotechnology, quantum computing and bioengineering, etc. that could change human life[3]. In 2010, it released *Technological Innovation Center Report*, considering that UK's key fields include stem cell and regenerative medicine, the coming Internet technologies, plastic electronics, recyclable energies and climate change technologies, satellite communications technologies, full cells, advanced manufacturing technologies, composite material technologies, etc.[4]

Germany comes the second. Germany is one of the strongest science and technology powers in the world. In 2010, it released *Germany 2020 High Technology Strategies*, implying that it would pay close attention to such fields as climate, energies, health, nutrient, traffic, safety and communications. The first group of "coming projects" that it has defined covers carbon dioxide-neutral and highly energy-efficient cities that could adapt to climate changes; intelligent energy transfer; recyclable energies that substitute petroleum; personalized disease-treating drugs; attaining health through targeted nutriment and health preservation; living an independent life at the advanced age; there being 1 million electric vehicles in Germany by 2020; effective protection of the communications network; Internet energy conservation; global knowledge digitalization and popularization; the coming working environment and organizations, etc. [5]

EU comes the third. It is a political, economic, and technological union. In 2005, EU Committee released the *7th Framework Program*, in which the selected priority fields cover information and communication technology; health; transportation (including airline); nanotechnology, intelligent materials and new manufacturing techniques; security and space research; energy; the environment (including climate changes); food, agriculture and biotechnology; socioeconomics and human[6]. In 2010, it released *European Studies and Innovation Strategy*, in which climate changes, energy and the effective utilization of resources, health and ageing are listed as priority fields[7].

3. Asia

Japan comes first. It is one of the strongest powers in science and technology in the world. In 2006, it began to carry out the 3rd-phase *Basic Plan for Science and Technology*, in which fields to be given privileged supports cover biotechnology, IT,

environmental technology, nanotechnology and materials, energy technology, manufacturing techniques, traffic networks and some other fundamental social technologies as well as the development of universe and ocean, etc. The plan also proposed 10 pillar technologies such as 1 trillion Hz electromagnetic wave testing and analytical technology; the highly-accurate electron microscope, under which 3D observation at the atomic level is possible; the super computer, which is capable of computing 1000 trillion times every second and can be used to imitate the pharmaceutical design and super fine materials[8]. The 4th-phase *Basic Plan for Science and Technology* is expected to come out soon.

South Korea comes the second. In 2000, it carried out the *2025-oriented Long-term Plan for the Development of Science and Technology*, in which it proposed, as priority fields, information, biology, nanometer, the environment, astronautics, culture, etc. In 2005, the key technologies defined by South Korea covered nuclear fusion technology, maritime territory administration techniques, super-high performance computer technology, artificial satellite technology, highly value-added bio-resource technology, regenerative medical science technology, high-performance material technology, weather forecast technology, artificial intelligence technology, cleansing and renewable energy technology, etc.[9] In 2011, the 6 industrial technologies that have been chosen by South Korea cover the transparent and flexible display monitor manufacturing technology, the integration of cerebral nervous information through IT; the technology related to multi-purpose small-modular nuclear reactors; ocean technology for the exploitation of deep-sea resources; the technology for manufacturing superbly-sophisticated and continuous electronic printers; the technology for manufacturing multi-purpose patterning materials, etc.[10]

China comes the third. In 2006, it formulated *National Medium and Long-term Plan for the Science and Technology Development (2006-2020)*[11], in which it proposed such key fields as energy, water and mineral resources, the environment, agriculture, manufacturing, transportation, information and modern service industry, population and health, urbanization and urban development, public security, national defense, etc.; the cutting-edge technologies include biotechnology, IT, new material technology, advanced manufacturing technology, advanced energy technology, ocean

technology, laser technology, aerospace technology, etc.

II. Scientific and technological forecasts made by the scientific research institutes in the United States, UK and China

As the 21st century comes, scientists in the United States, UK and China pay great attention to the development trends of science and technology in the world. Some scientific research institutes and scholars have forecast the cutting-edge science and technology in the coming future. Table 2 lists the related work that the Royal Society, National Academy of Engineering and Chinese Academy of Science have done. As different scientific research institutes are different in their respective functions and positioning, they have different emphases and perspectives. Nevertheless, such three fields as life and health, IT, and earth and environment are universally valued.

Table 2 Forecasts of Cutting-edge Technologies and Challenges by Scientific Research Institutes in the United States, UK and China

Subject Fields	Royal Society (UK)	National Academy of Engineering (U.S.A.)	Chinese Academy of Science
Life and Health	Ageing process research, cognition and computation, extra-terrestrial life, new vaccines, stem cell biology	Genomic medicine development, human brain reserve engineering	Molecular designing for agricultural animal and plant varieties, stem cell and regenerative medical science, early diagnosis and preventative interventions on serious and chronic diseases, artificial life and synthetic biology, and photosynthetic system
IT	Network science	Network space protection, virtual reality enhancement	New theoretical and technological research on "post-IP" network and experimental network studies, Exa (10^{18}) super computation technology, spatial distribution sensor network
Nanometer and Materials	—	—	Nanotechnology
Space Science and Technology	—	—	Space science detection and satellite group
Earth and Environment	Biodiversity, geo-engineering, and	Research and development of the	Plans for the 4000m transparency underground in China

	greenhouse gases	carbon dioxide seal and storage technology, nitrogen cycle control	
Energy and Resources	—	How to economically and effectively use the solar energy, nuclear fusion and power generation	Electric power system for new recyclable energies, deep geothermal power generation technology, new nuclear power system, ocean capacity expansion program
Manufacturing and Engineering	—	—	Green preparation of high-grade basic raw materials, process engineering of the highly-efficient, clean, and recyclable use of resources, ubiquitous sensor information-based manufacturing system
National Security	—	Avoiding nuclear terrorism	—
Physical Science	—	—	Exploration of dark matters and dark energy, material construction regulation and control
Social Science	Cultural revolution, global sustainability	Personalized learning development	—
Others	Science uncertainties	providing clean water for the world people, sustained urban planning, building of the human physical health information system, pushing forward the development of natural science	Social computation and parallel management system, mathematics and complex system

Source: **The Royal Society's forecasts** are from the newest *Science Sees Further* by the Royal Society to celebrate its 350th anniversary in 2010[12]. **The forecasts made by the National Academy of Engineering** are from the 14 grand engineering challenges faced by human beings in the 21st century unrevealed by the National Academy of Engineering in 2008[13]. **The forecasts made by the Chinese Academy of Science** is from the 22 strategic technological challenges that affect China's modernization advance in *Science & Technology in China: A Roadmap to 2050* published by the Chinese Academy of Science in 2009[14].

III. Scientific and technological revolution and modernization

Scientific and technological revolution is an objective phenomenon since the 16th century. At present, scientific and technological revolution has not been universally defined. In this paper, scientific revolution and technological revolution is collectively referred to as scientific and technological revolution[15]. According to the American scientific philosopher Kuhn Thomas, scientific revolution refers to the transformation of the scientific paradigm, and technological revolution refers to the transformation of technological paradigm. Scientific revolution is not simply the change of the scientific paradigm, but also the scientific change that gives rise to the revolutionary change of human concepts; technological revolution is not simply the change of the technological paradigm, but also the technological change that gives rise to the revolutionary change of the modes of human living and production. Many science and technology historians hold that since the 16th century, the world has witnessed about 5 scientific and technological revolutions (See Table 3).

Table 3 Scientific and Technological Revolutions and Industrial Revolutions since the 16th Century[14]**1617**

Scientific and Technological Revolutions	General Time	Main Contents	Common Name	Industrial Revolutions
First	The 16th-17th century	Birth of modern sciences	The first scientific revolution	—
Second	The middle and late 18th century	Steamer and mechanical revolution	The first technological revolution	First
Third	The middle and late 19th century	Power and transport revolution	The second technological revolution	Second
Fourth	The first half of the 20th century	Relativity, quantum, etc.	The second scientific revolution	—
Fifth	The mid-20th century	Electron technology and automation	The third technological revolution	Third
	The middle and late 20th century	IT and networking	The fourth technological revolution	Fourth

Notes: Some scholars believe that the tech-netronic and IT revolution is part of the third technological revolution, and that the third and fourth industrial revolutions can be collectively referred to as "the third industrial revolution. Industrial revolution refers to the substantial changes in human's mode of production and the industrial structure.

Modernization, an objective phenomenon since the 18th century, has not been universally defined till now. Researcher He Chuanqi believes that as a cutting-edge change and international competition of the human civilization since the 18th century, it covers the formation, development, transformation and international interactivity of the modern civilization; innovation in, selection, dissemination, withdrawal of civilization elements; international competition and polarization to reach and keep abreast with the world advanced level[18].

1. Scientific and technological revolution spurs world modernization.

In the past 300 years, the world modernization experienced 4 tides in total. The first three caused transformation from the agricultural economy to the industrial economy, and the fourth once is bringing about the change from the industrial economy to the knowledge economy. Each tide is expedited by significant inventions and technological innovations, and each technological revolution affects national advance.

The first tide occurred during 1763 - 1870, with the first technological revolution being its core impetus. During the first tide, only an extremely small number of countries were winners, a small number closely followed, and a large number remained at the agricultural economy period. Taking the opportunity, UK experienced the rapidest economic growth among European countries before replacing Holland to become the world economic center.

The second tide occurred during 1870 - 1945. The first technological revolution is characterized by coal, steamer and mechanization, and the second by power, internal-combustion engine and electrification. Taking the opportunity, United States and Germany upgraded themselves into developed countries, and the world economic center began to divert from UK to United States and Germany. Profiting from the great impetus of the second technological revolution, the postnate United States replaced UK and became the world economic center in the mid-20th century.

The third tide occurred during 1946 - 1970. The major fields of technological

innovation included artificial synthesis techniques, electronic industry, industrial automation, new materials, new energy, aerospace industry, etc. Taking the opportunity, Japan, Finland, Ireland and some other countries upgraded themselves into developed countries. During this period, the economy of Western Europe and Japan had once grown faster than that of United States, so the world economy trended toward being plural and multi-polar from being dominated by two great powers, United States and the Soviet Union.

The fourth tide occurred after 1970. The first three tides were spurred by the industrial revolutions, and the fourth by the knowledge revolution. The industrial revolutions led to the increase of industrial proportion and decrease of the agricultural proportion while the knowledge revolution led to the decrease of the industrial proportion and increase of the knowledge revolution. The fourth tide knowledge revolution covers scientific revolution, hi-tech revolution, information revolution, learning revolution, national innovation system, etc. It is expected to end before and after 2020 in developed countries.

In the four tides, many countries failed. For example, for negligence of the first and second technological revolutions, Portugal downgraded itself into a developing country; for negligence of the second and third technological revolutions, Argentina also downgraded itself into a developing country.

Table 4 World Modernization Tides and Technological (Industrial) Revolutions [17]

Modernization Tides	General Time	Technological (Industrial) Revolution	General Time
First	1763-1870	The first technological (industrial) revolution	The middle and late 18th century
Second	1870-1845	The second technological (industrial) revolution	The middle and late 19th century
Third	1946-1970	The third technological (industrial) revolution	The middle 20 century

Fourth	1970-2020	The fourth technological (industrial) revolution	The middle and late 20th century

Notes: As the prelusion of the world modernization, the first scientific and technological revolution prepared scientific knowledge, methods and spirit for the world modernization and the first industrial revolution. The relation between the technological and industrial revolutions is that the former spurs the later.

Table 5 Scientific and Technological Revolutions and National Rise and Fall [17]

Country	General Time	Seize or disregard of the opportunity of technological revolutions	Results
UK	The 17th-19th century	Seized the opportunity of the first scientific revolution and first technological revolution	World power, developed country
United States	The 19th-20th century	Seized the opportunity of the second and third technological revolutions	World power, developed country
Germany	The 19th-20th century	Seized the opportunity of the second and the third technological revolutions	World power, developed country
Japan	The 20th century	Seized the opportunity of the third technological revolution	Upgraded into a developed country
Finland	The 20th century	Seized the opportunity of the third technological revolution	Upgraded into a developed country
Ireland	The 20th century	Seized the opportunity of the third technological revolution	Upgraded into a developed country
Portugal	The 18th-19th century	Disregarded the first and second technological revolutions	Downgraded into a developing country
Argentina	The 20th century	Disregarded the second and third technological revolutions	Downgraded into a developing country

2. Influences posed by scientific and technological revolutions on the economy and the society

Firstly, scientific and technological evolutions promote the rapid advance of the social productive forces. It could bring about many reforms in manufacturing

techniques, laborers' quality, organization, administration, etc. such as automation and intelligentization of manufacturing techniques, specialization of the laborers' quality, efficient organization and administration, etc., all of which stimulate the rapid growth of social productive forces.

Secondly, scientific and technological revolutions bring about substantial changes in the industrial structure. Influences that they have posed on the industrial structure are manifested mainly in two aspects. The first is that they facilitate the shift of the structural focus among industrial sectors. The shift is from agriculture to industry. From the final phase of the primitive society to the early period of the industrial revolution, agriculture remained a leading industry. After the industrial revolution, both the industrial output value and the number of employees increased, and industry became a leading industrial sector. The second shift is from industry to the service industry. Because the postwar scientific and technological revolution reemerged, the proportion of the primary industry in the national economy dropped sharply, the secondary industry began to gradually descend from suspension, and on the contrary the tertiary industry ascended rapidly. The second is that they facilitate the shift of focus of the internal industrial structure. Take the industrial structure for instance. Pushed by scientific and technological revolutions, the industrial structure also almost changed for three times. The first is the industrialization characterized by the light textile industry, when manufactured textiles mainly met the agricultural world's demands for living goods; the second is the industrialization characterized by the heavy chemical industry, which provided for the industrial world raw materials and driving forces such as iron steel, coal, petroleum, etc.; the third is the rise of new technological and industrial groups, which stimulated the industrial high-technologicalization. The overall trend is from the light textile industry to the heavy chemical industry, then to the hi-tech industry. During the transition from the labor- and resource-intensive to the knowledge- and technology-intensive industry, investments in science and technology and administration increased substantially, and the industrial structure as a whole developed in the direction of automation, high-technology and intelligentization.

Thirdly, scientific and technological revolutions significantly influence economic

globalization. They spurred the international division of labor. By spreading high technology involved products all over the world, they pushed forward the international division of labor, and stimulated the transnational flow of commodities, personnel, technologies, capital and currencies, thus forming the international commodity market, labor force market, technology market, capital market and currency market. They also made it possible for multinational companies to operate globally, and greatly sped up the course of globalization.

Fourthly, scientific and technological revolutions bring about reforms in people's life structure and way of life. While influencing the economic structure, they also bring about reforms in people's life structure and way of life. The human way of life witnessed the course from mechanization, electrification and automation to informationization, from the rural and urban to the international style, and from the substantive to the network life.

Fifthly, discussions about the side effects of science and technology; while pushing forward social advance and economic development, science and technology also initiated discussions about their negative effects on the society. For example, a series of social problems caused by the uncontrolled biotechnological development; the significant impacts that may be posed by the new biology on love, birth, cultivation, family pattern, moral ethics, etc. how the genetic engineering affects agriculture, etc. The side effects of science and technology have decided that they can't proceed smoothly, and people will inevitably pay during scientific and technological development and application. So long as human exploration into the nature continues, scientific and technological development will see no bounds. We should be more concerned about how to squarely face diverse problems that science and technology may cause, and how to analyze countermeasures according to the problems, and perfect the appraisal, supervision and inspection systems to better develop science and human life.

Reference

[1] Sun Chengquan, Zhang Haihua, Wang Zhenxin, et al. *Developed Countries' Scientific and Technological Planning and Strategic Layout. Information Research Report by Data Center for Resources and Environmental Sciences of the Chinese Academy of Science*, February 2006.

[2] *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2010*. Washington:

Office and Management and Budget. 2001.

[3] Hou Guoqing, Jiang Guixing, *UK's Whitepaper for Scientific and Technological Policies*, Science & Technology Industry Parks, 2006, 2:85-87

[4] Portal of the Ministry of Science and Technology, *Technological Innovation Center Report* by the UK, May 9th, 2011, available at http://www.most.gov.cn/gnwkjdt/ 201101/t20110 120 _84416.htm.

[5] Portal of the Ministry of Science and Technology, *Introduction to Germany's 2020 Highly Scientific and Technological Strategies*, May 9th, 2011, available at http://www. most.cn/gnwkjdt/201008 /t201008 17_78933.htm.

[6] Jin Qiming, EU's *7th Research and Development Framework Program*, *Review of the World Science and Technology and Economy*, 2005 (7): 6-8

[7] Portal of the Ministry of Science and Technology, *EU Science and Technology Committee member Quinn's Talks about New European Research and Innovation Strategies*, May 9th, 2011, available at http://www.most. gov.cn /gnwkjdt/201006 /t20100629_78178.htm, 2010.

[8] Cao Xia, Sun Chengquan and Wu Xin, *New Strategies and Characteristics of Developed Countries' Scientific and Technological Development*, *Science and Technology Review*, 2006, 24 (09):88-92

[9] Zhang Jinfang, *Korea's Decided to Develop Key Sciences and Technologies to Improve Its Comprehensive National Strength*, Xinhua News Agency, August 31st, 2005

[10] Portal of the Chinese government, *Korea Selects out 6 Advanced Technologies in the Future Industry*, May 9th, 2011, available at http://www.most.gov.cn/ gnwkjdt/201105/ t20110504_86412.htm.

[11] Portal of the Chinese government, *National Medium and Long-term Plan for the Science and Technology Development (2006-2020)*, May 9th, 2011, available at http://www.gov.cn/jrzg/2006-02/09/content_183787.htm.

[12] Name unknown, *Science Is Fundamental for Solving the World Deep-seated Problems*, *Science Technology and Publication*, 2011, 3:66

[13] National Academy of Engineering, *Introduction to the Grand Challenges for Engineering*, April 20, 2011, available at http://www.engineeringchallenges.org/cms/8996/9221.aspx

[14] Chinese Academy of Science, *Science & Technology in China: A Roadmap to 2050*, Science Press, 2009

[15] Kuhn Thomas, *The Structure of Scientific Revolution*, Shanghai: Shanghai Science and Technology Press, 2003

[16] Qian Shiti, *Past, Present and Future of the Revolution of Science and Technology*, Beijing: Guangdong Education Press, 2007

[17] He Chuanqi, *Strategic Opportunities on the Sixth Revolution of Science and Technology*, Beijing: Science Press, 2012

[18] He Chuanqi, *Modernization Science: Principles of National Advance*, Beijing: Science Press, 2010

科技与现代化

靳京
中国科学院中国现代化研究中心

18 世纪以来，科技与现代化是相互促进的，创新是现代化的根本动力。目前，许多发达国家的科技投入占 GDP 的比例一般为 2%～3%左右。虽然科技投入比例不高，但科技在国家现代化过程当中发挥了重要作用。

一般而言，现代化既依赖于科技进步，又对科技发展形成巨大的需求拉动。发达国家与发展中国家的科技需求有所不同。这里简要讨论部分国家的科技优先领域和科技预测，以及科技革命与现代化的关系。

一、21 世纪初科技发展的优先领域

21 世纪是一个全新的世纪。科技发展日新月异，世界经济迅速转型，从资源驱动、资本驱动向创新驱动型经济转变，科学技术成为经济发展和社会进步的主要动力。在 21 世纪初，发达国家和发展中国家纷纷制定科技发展战略，部署优先支持的重点领域。这里简要介绍美洲（美国）、欧洲（英国、德国和欧盟）和亚洲（日本、韩国和中国）科技发展战略的优先领域。

目前，六国和欧盟科技发展战略的优先领域涉及生命与健康、信息科技、纳米与材料、空间科技、地球与环境、能源与资源、食品与农业、制造与工程、国家安全、社会科学等。其中，生命与健康、信息科技、纳米与材料、地球与环境、能源与资源五个领域，受到六国和欧盟的普遍重视（表 1）。

表 1 六个国家和欧盟科技发展战略的重点领域

国家	生命与健康	信息科技	纳米与材料	空间科技	地球与环境	能源与资源	食品与农业	制造与工程	国家安全	社会科学
美国	√	√	√	√	√	√			√	
德国	√	√	√		√	√		√	√	√
英国	√	√	√		√	√		√		
欧盟	√	√	√	√	√	√	√	√	√	√

日本	√	√	√		√	√				
韩国	√	√	√	√	√	√		√		√
中国	√	√	√	√	√	√	√	√	√	√

1. 美洲

美国既是世界第一科技强国，也是美洲的第一科技大国。美国政府把保持美国在全部科学知识最前沿的领先地位作为国家目标[1]。从美国 2012 财年预算报告[2]看，国防技术研发是美国最重要的领域，其次是健康、能源和空间领域，其他的优先领域还包括生物技术、纳米技术、信息技术及其相关领域，气候变化及其影响，基于生物多样性和可持续发展的资源需求研究等。

2. 欧洲

其一，英国。英国是世界科技强国之一。2000 年发布《卓越与机遇——21 世纪的科学和创新》白皮书，计划在 21 世纪改变人类生活的基因组学、信息科学、纳米技术、量子计算和生物工程等方面重点投资并取得领先地位[3]。2010 年英国出台了《技术创新中心报告》，认为英国的重点领域包括：干细胞和再生医药、未来互联网技术、塑料电子、可再生能源和气候变化技术、卫星通讯技术、燃料电池、先进制造技术和复合材料技术等[4]。

其二，德国。德国是世界科技强国之一。2010 年德国提出了《德国 2020 高科技战略》，重点关注的领域有：气候、能源、健康、营养、交通、安全和通信。它确定的第一批“未来项目”包括：二氧化碳中性、高能源效率和适应气候变化的城市；智能能源转换；作为石油替代的可再生资源；个性化的疾病治疗药物；通过有针对性的营养保健获得健康；在晚年过独立的生活；德国 2020 年拥有 100 万辆电动车；通信网的有效保护；互联网的节能；全球知识的数字化及普及；未来的工作环境和组织等[5]。

其三，欧盟。欧盟是政治和经济联盟，也是科技联盟。2005 年,欧盟委员会提出了《第七框架计划》,选择的优先领域包括：信息与通讯技术;健康;运输(含航空);纳米技术、智能材料与新的生产工艺；安全和空间研究；能源；环境(含气候变化)；食品、农业和生物技术；社会经济学和人类[6]。2010 年欧盟发表的《欧洲研究和创新战略》，把气候变化、能源和资源的有效利用、健康与老龄化

列为优先领域[7]。

3. 亚洲

其一，日本。日本是世界科技强国之一，2006 年开始实施的第三期《科学技术基本计划》的重点支持领域包括：生物技术、信息技术、环境技术、纳米技术与材料、能源技术、制造技术、交通网络等社会基础技术和宇宙、海洋开发等。该计划还提出了十大支柱技术，如：万亿 Hz 电磁波检测分析技术;高精确度电子显微镜，能够在原子水平上进行三维观测；每秒运算能力达 1000 万亿次的超级计算机，以用于制药设计和超微细材料的模拟等[8]。“第四期科学技术基本计划”有望近期出台。

其二，韩国。韩国是新兴的创新型国家。2000 年，韩国实施《面向 2025 年的科学技术发展长期计划》，提出的优先领域包括信息、生物、纳米、环境、宇航、文化等[8]。2005 年，韩国认定的重点技术包括核聚变技术、海洋领土管理技术、超高性能电脑技术、人造卫星技术、高附加值生物资源技术、再生医学科学技术、高性能材料技术、气象预报技术、人工智能技术、清洁和再生能源技术等[9]。2011 年，韩国选定的六大产业技术包括：可以生产透明柔性显示器的技术；脑神经信息 IT 融合技术；多用途小型模块核反应堆的相关技术；用于开采深海资源的海洋技术；生产超精密连续电子印刷的技术；生产多功能图形材料的技术等[10]。

其三，中国。2006 年中国制定了《国家中长期科学和技术发展规划纲要 2006—2020》[11]，提出的重点领域包括：能源、水和矿产资源、环境、农业、制造业、交通运输业、信息产业及现代服务业、人口与健康、城镇化与城市发展、公共安全、国防等；提出的前沿技术包括：生物技术、信息技术、新材料技术、先进制造技术、先进能源技术、海洋技术、激光技术、空天技术等。

二、美英中三国科研机构的科技预测

进入 21 世纪，美英中三国的科学家高度关注世界科技发展趋势。一些科研机构和学者对未来的科技前沿进行了预测。表 2 列举了英国皇家学会、美国工程院和中国科学院的相关工作。由于不同科研机构本身功能和定位的差异，各自的侧重和视角有所差异，但是，生命与健康、信息科技、地球与环境三个领域，受到普遍的重视。

表 2 美英中科研机构关于科技前沿和难题的预测

学科领域	英国皇家学会	美国工程院	中国科学院
生命与健康	衰老过程研究，认知与计算，外太空生命，新疫苗，干细胞生物技术	开发基因药物，对人脑的逆向工程	农业动植物品种的分子设计，干细胞与再生医学，重大慢性病的早期诊断与预防干预，人造生命和合成生物学，光合作用机理
信息科技	网络科学	保护网络空间，增强虚拟现实	“后 IP”网络的新原理新技术研究和实验网研究，艾级（10^{18}）超级计算技术，空间态势感知网络
纳米与材料	—	—	纳米科技
空间科技	—	—	空间科学探测及卫星系列
地球与环境	生物多样性，地理工程，温室气体	研发二氧化碳封存技术，控制氮循环	中国地下 4000 米透明计划
能源与资源	—	如何经济有效地利用太阳能，核融合发电	新型可再生能源电力系统，深层地热发电技术，新型核能系统，海洋能力拓展计划
制造与工程	—	—	高品质基础原材料的绿色制备，资源高效清洁循环利用的过程工程，泛在感知信息化制造系统
国家安全	—	防止核恐怖事件	—
物质科学	—	—	暗物质与暗能量的探索，物质结构调控
社会科学	文化的演进，全球可持续增长	发展个性化学习	—
其　他	科学的不确定性	使全球民众喝上洁净水，可持续发展的城市规划，建立人体健康信息系统，推动自然科学的发展	社会计算与平行管理系统，数学与复杂系统

来源：**英国皇家学会的预测来源于** 2010 年为了庆祝成立 350 周年，英国皇家学会推出的最新报告《科学是解决世界性深层次问题的根本》[12]。**美国工程院的预测来源于** 2008 年美国工程院提出的 21 世纪人类面临的 14 大科技难题[13]。**中国科学院的预测来源于** 2009 年中国科学院出版的《科技革命与中国的现代化》一书中提出的影响中国现代化进程的 22 个战略性科技问题[14]。

三、科技革命与现代化

科技革命是 16 世纪以来的一种客观现象。目前，关于科技革命没有统一定义。本文的科技革命是科学革命和技术革命的统称。根据美国科学哲学家库恩的观点，科学革命指科学范式的转变[15]，技术革命指技术范式的转变。科学革命不仅是科学范式的变化，而且是引发人类思想观念的革命性变化的科学变迁；技术

革命不仅是技术范式的变化，而且是引发人类生活方式和生产方式的革命性变化的技术变迁。许多科技史学家认为，十六世纪以来，世界上大约发生了五次科技革命（表 3）。

表 3　16 世纪以来的科技革命与产业革命[14]、[16]、

科技革命	大致时间	主要内容	习惯用名	产业革命
第一次	16～17 世纪	近代科学的诞生	第一次科学革命	—
第二次	18 世纪的中后期	蒸汽机和机械革命	第一次技术革命	第一次
第三次	19 世纪的中后期	电力和运输革命	第二次技术革命	第二次
第四次	20 世纪上半叶	相对论和量子论等	第二次科学革命	—
第五次	20 世纪的中期	电子技术和自动化	第三次技术革命	第三次
	20 世纪的中后期	信息技术和网络化	第四次技术革命	第四次

注：有学者认为，电子技术和信息技术革命是第三次技术革命的组成部分，第三次产业革命和第四次产业革命可以合称为“第三次产业革命”。产业革命是指人类的生产方式和产业结构的巨大变化。

现代化是 18 世纪以来的一个客观现象，迄今没有统一定义。何传启研究员认为，现代化是 18 世纪以来人类文明的一种前沿变化和国际竞争，它包括现代文明的形成、发展、转型和国际互动、文明要素的创新、选择、传播和退出、以及追赶、达到和保持世界先进水平的国际竞争和国际分化[17]。

1. 科技革命推动了世界现代化

在过去 300 年里，世界现代化共经历了四次浪潮。前三次浪潮导致了从农业经济向工业经济的转变，第四次浪潮正在促成从工业经济向知识经济的转变。每一次浪潮都是由重要发明和技术创新推动的，每一次技术革命都影响了国家的兴衰。

第一次浪潮发生在 1763～1870 年间。第一次技术革命是核心推动力。在第一次浪潮里，只有极少数国家成为赢家，少数国家紧紧跟进，多数国家仍然停滞在农业经济阶段。英国把握住了这次机会，成为欧洲经济增长最快的国家，进而取代荷兰成为世界经济中心。

第二次浪潮发生在 1870～1945 年间。第一次技术革命以煤、蒸汽机和机械化为特点，而第二次技术革命以电、内燃机和电气化为特点。美国和德国把握住

了这次机会而晋级为发达国家，世界经济中心开始从英国向美国和德国转移，后起的美国得益于第二次技术革命的强大动力，在 20 世纪中叶全面代替英国成为世界经济的中心。

第三次浪潮发生在 1946～1970 年间，主要的技术创新领域有：人工合成技术、电子工业、工业自动化、新材料、新能源和航空航天工业等。日本、芬兰、爱尔兰等国家抓住了此次机会，晋级为发达国家，在此期间，西欧和日本的经济增长也曾快于美国，世界经济从美苏两极走向多元化和多极化世界。

第四次浪潮发生在 1970 年以后。前三次浪潮都是由工业革命推动的，第四次浪潮是由知识革命推动的。工业革命导致了工业比重的上升和农业比重的下降，知识革命导致了工业比重的下降和知识产业比重的上升。第四次浪潮的知识革命，包括科学革命、高技术革命、信息革命、学习革命和国家创新体系等内容，预计发达国家的第四次浪潮将在 2020 年前后结束。

在前四次浪潮中，也不乏失败国家的例子。例如，葡萄牙因为忽视第一次和第二次技术革命而降级为发展中国家；阿根廷因为忽视第二次和第三次技术革命而降级为发展中国家。

表 4. 世界现代化浪潮与技术（产业）革命

现代化浪潮	大致时间	技术（产业）革命	大致时间
第一次	1763～1870	第一次技术（产业）革命	18 世纪的中后期
第二次	1870～1945	第二次技术（产业）革命	19 世纪的中后期
第三次	1946～1970	第三次技术（产业）革命	20 世纪的中期
第四次	1970～2020	第四次技术（产业）革命	20 世纪的中后期

注：第一次科技革命是世界现代化的前奏，为世界现代化和第一次产业革命准备了科学知识、科学方法和科学精神。技术革命和产业革命间的关系是，技术革命推动了产业革命。

表 5. 科技革命与国家兴衰

国家	大致时间	抓住或忽视科技革命的机遇	结果
英国	17～19 世纪	抓住第一次科学革命、第一次技术革命机会	世界强国、发达国家
美国	19～20 世纪	抓住第二次、第三次技术革命机会	世界强国、发达国家
德国	19～20 世纪	抓住第二次、第三次技术革命机会	世界强国、发达国家

日本	20 世纪	抓住第三次技术革命机会	升级为发达国家
芬兰	20 世纪	抓住第三次技术革命机会	升级为发达国家
爱尔兰	20 世纪	抓住第三次技术革命机会	升级为发达国家
葡萄牙	18～19 世纪	忽视第一次、第二次技术革命	降级为发展中国家
阿根廷	20 世纪	忽视第二次、第三次技术革命	降级为发展中国家

资料来源：

2. 科技革命对经济社会的影响

首先，科技革命促进了社会生产力的快速提高。科技革命能够带来生产技术、劳动者素质、组织与管理等多方面的变革，例如，生产技术的自动化和智能化，劳动者素质的专业化，组织管理的高效运作等，促进社会生产力的快速提高。

其次，科技革命带来产业结构的巨变。科技革命对产业结构的影响主要表现在两个方面：一是科技革命促进了产业部门之间结构重心的转移。历史上产业重心发生了两次转移。第一次是由农业向工业的转移。从原始社会末期到产业革命前期，农业一直是主导产业，产业革命后，工业产值和就业人口比重上升，成为主导产业部门。第二次是由工业向服务业的转移。由于战后科技革命的再次兴起，第一产业在国民经济中的比重急剧下降，第二产业的比重由停止转为逐渐下降，而第三产业的比重则迅速上升。二是科技革命促进了产业内部结构重心的转移。以工业结构为例，随着科技革命的推动，工业结构也大致发生了三次变化。第一次是以轻纺工业为主的工业化，生产的纺织品主要满足农业世界对生活用品的需求；第二次是以重化工业为主的工业化，为工业世界提供钢铁、煤炭、石油等原材料和动力等；第三次是新技术群和产业群的兴起，推动了工业产业的高科技化。总的趋势是从轻纺工业到重化工业，再到高科技工业，从劳动和资源密集型工业转入知识和技术密集型工业，科技投资和治理投入大幅度提高，整个工业结构向自动化、高科技、智能化方向发展。

第三，科技革命对世界经济全球化也有巨大影响。科技革命推动了国际分工。科技革命通过高技术含量产品向全世界扩散来推动国际分工，促进商品、人员、技术、资本和货币的跨国流动，形成国际商品市场、劳务市场、技术市场以及资本市场和货币市场。科技革命也使跨国公司的全球性运作成为可能，大大加速了

全球化的进程。

第四，科技革命带来生活结构和生活方式的变革。科技革命对于经济结构影响的同时，也带来了人们生活结构和生活方式的变革。人类的生活方式经历了从机械化、电气化、自动化到信息化，从乡村生活、城市生活到国际化生活，从实体生活到网络生活的过程。

第五，科技副作用的讨论。科学技术在推动社会进步和经济发展的同时，也引发了其对社会负面影响的争论。例如，生物技术的发展一旦失控所带来的一系列社会问题；新的生物学对恋爱、生育、抚育、家庭模式、伦理道德等带来的巨大冲击；遗传工程对农业的影响是福是祸等。但是，科学技术副作用的存在注定了科技发展的过程不是一帆风顺的，人们也必将在科技发展与应用过程中付出一定代价。只要人类对自然界的探索不停止，科技的发展也就永无止境。如何正视科技可能带来的种种问题，如何针对问题分析对策，健全评价、监督和检测机制，求得科学的更大发展和人类生活的更加美好，将是我们更需关注的。

参考文献：

[1] 孙成权, 张海华, 王振新 等. 发达国家科技规划与战略布局. 中国科学院资源环境科学信息中心情报研究报告. 2006, 02.

[2] Analytical perspectives,budget of the United States government, fiscal year 2012. Washington: Office and Managementand Budget.2011.

[3] 侯国清,姜桂兴. 英国的科技政策白皮书.中国高新区,2006，2：85—87.

[4] 中国科技部门户网站.英国出台《技术创新中心报告》. 2011-5-9. http:// www.most.gov.cn/gnwkjdt/ 201101/t20110 120 _84416.htm.

[5] 中国科技部门户网站. 德国 2020 高科技战略简介. 2011-5-9. http://www. most.cn/gnwkjdt/201008 /t201008 17_78933.htm.

[6] 金启明. 欧盟的《第七个框架研发计划》. 全球科技经济瞭望, 2005(7): 6-8.

[7] 中国科技部门户网站. 欧盟科研委员奎恩谈新的欧洲研究与创新战略. 2011-5-9. http://www.most. gov.cn /gnwkjdt/201006 /t20100629_78178.htm,2010.

[8] 曹霞, 孙成权, 吴新. 发达国家科学与技术发展的新战略新特点. 科技导报, 2006, 24(09): 88—92.

[9] 张锦芳. 韩国决定发展重点科学技术以提升综合国力.新华社,2005-8-31.

[10] 中国科技部门户网站. 韩国选定六大未来产业先进技术. 2011-5-9. http://www.most.gov.cn/ gnwkjdt/201105/ t20110504_86412.htm.

[11] 中国政府门户网. 国家中长期科学和技术发展规划纲要 2006—2020. 2011-5-9. http://www.gov.cn/jrzg/2006-02/09/content_183787.htm.

[12] 佚名.科学是解决世界性深层次问题的根本.科技与出版,2011，3：66.

[13]National Academy of Engineering.Introduction to the Grand Challenges for Engineering.2011-4-20. http://www.engineeringchallenges.org/cms/8996/9221.aspx.

[14] 中国科学院.科技革命与中国现代化.科学出版社,2009.

[15] 库恩. 科学革命的结构. 上海：上海科学技术出版社，2003.

[16] 钱时惕. 科技革命的历史、现状与未来. 北京：广东教育出版社, 2007.

[17] 何传启. 现代化科学：国家发达的科学原理. 北京: 科学出版社, 2010.

A Bibliometric Analysis of Modernization Studies (1900 – 2010)

Qing Ye, Nan Ouyang, Shuyao Wu

Abstract: The paper analyzes articles and books related to modernization study from 1900 to 2010. There are analysis variables including the amount of articles and books, the distribution of authors, types, nations, subjects and journals, and the growth rate and citation. It reveals the trends and space- time distribution of modernization study. Since 1960s, literatures about modernization study have begun to grow, which leads to a high tide in the first decade of the 21st century.

Keywords: Modernization study; Bibliometrics; Web of science; 1900- 2010

Modernization study in the world started roughly in 1950s. It has endured three stages, classical modernization study, post-modernization study and neo-modernization study and produced a series of theoretical innovation. Until December 28, 2010, during 1900~2010, there have been 7,997 articles with the key words including modernization (modernisation) in WOS of ISI and 2,259 books with the title including modernization in LOC; 47,411 Chinese papers with the key words including modernization and 1,959 Chinese books with the title including modernization. Among them, during 2000 to 2010, articles on modernization collected by SCI account for 48.5% of the total，while Chinese articles on modernization collected by CAJD account for 52.8% of the total it has collected. The peak of modernization study has appeared.

I. Data collection and analyzing method

1.Data source

The WOS articles refer to the articles in the web of science (WOS) citation index database, which was operated by Institute for Scientific Information (ISI) in USA. It is a citation index database widely used by the academic circle. The data of this Paper are from its three databases: SCI (science citation index), SSCI (social science citation index) and CPCI-S (conference proceedings citation index - science). As for the time range of the articles collected, it's 1899 up to now for SCI database, 1996 up to now for SSCI and 1990 up to now for CPCI-S.

The LOC books refer to the books in book catalog of the US Library of Congress (LOC). The literatures it collected are in 450 languages. There are 130 million books in this library.

The Chinese papers refer to the papers in China Academic Journal Network Publishing Database (referred to as CAJD). Until October 2010, CAJD has collected 7,686 varieties of domestic academic journals and there are over 30 million literatures in total.

The Chinese books refer to the books in the book catalog of National Library of China.

2.Search method

Searching of the WOS articles: by title and key words, up to 28 December 2010.

Searching of the LOC books: by book name and key words, up to 12 December 2010.

Searching of the Chinese papers: by title and key words, up to 28 December 2010.

Searching of the Chinese books: by book name and key words, up to 28 December 2010.

3.Analyzing method

Timing analysis: time range 1900~2010, focus on the time of publication, increasing rate and tendency of literatures.

Truncated analysis: time period 2001~2010, focus on the subject, periodicals, organization and regional distribution of literatures.

Section analysis: select 5 sections, focus on the country and periodicals distribution of literatures.

Analysis variables include literature quantity, increase rate, academic distribution, periodical distribution, author distribution, research institution, regional distribution and index status. It can generally reflect the development tendency and basic distribution of modernization studies.

4.System error

This study mainly takes "modernization" or "modernization (in Chinese)" as the search word. The titles or key words of some literatures include modernization, but they don't correlate with modernization study, e.g. "human resource management in modernized enterprises". However, some literatures, which titles or key words don't include modernization, but their content belongs to modernization study, e.g. during 1900~2010, there has been 4,334 articles on industrialization, 8,551 on urbanization and 2,854 on democratization in WOS, some of which correlate to modernization. The literatures are not complete in 2010 because not all the latest published articles have been collected into the database. Hence, the study can only reflect part of, not all of modernization studies and there is certain system error existed.

II. Statistical analysis

1. Quantity change tendency of WOS Articles on modernization study during 1900~2010

(1) Quantity change of related articles on modernization study during 1900~2010

In SCI, SSCI and CPCI-S databases, search by key words "modernization", or "modernisation", time range is 1900~2010, there are 7,997 articles in total. Among them, 3,226 in SCI, 3859 in SSCI and 1625 in CPCI-S (there is overlapping in literature category in the three databases); there are 108 articles in 1960s, 273 in 1970s, 459 in 1980s, 2,159 in 1990s, 4,957 during 2001~2010 (Fig.1). During 2001~2010, the articles on modernization collected by SCI account for around 48.5% in the total.

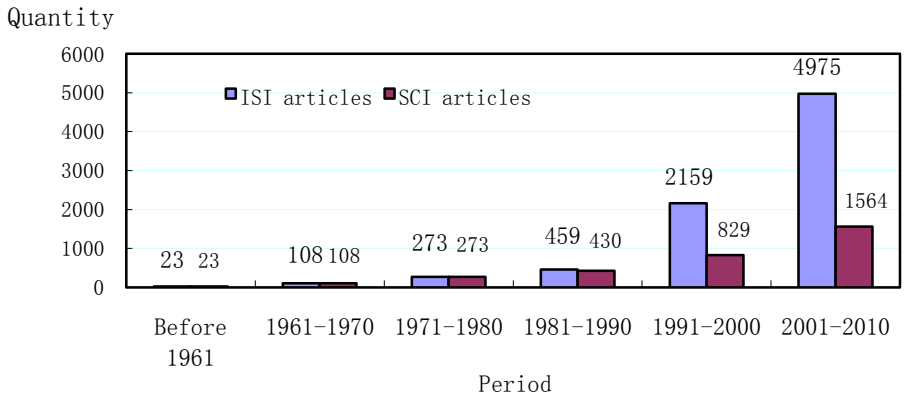

Fig. 1 Quantity change of related articles on modernization study during 1900~2010

Note: ISI articles cover those in SCI, SSCI and CPCI-S. As for time period of articles collected, SCI database is from 1899 up to now, SSCI database is from 1996 up to now and CPCI-S is from 1990 up to now. There is overlapping among the three databases. The articles in 2010 are in incomplete statistics.

The earliest two articles collected by SCI database are "A Modernisation of the Coincidence Theory" (Kranichfield, 1920) and "The Modernisation of Educational Facilities" (Grunewald, 1925). Since 1960s, articles on modernization collected by SCI have been increased (Fig.2). During 1961~2010, the annual increase rate of SCI articles on modernization study is about 5.4%.

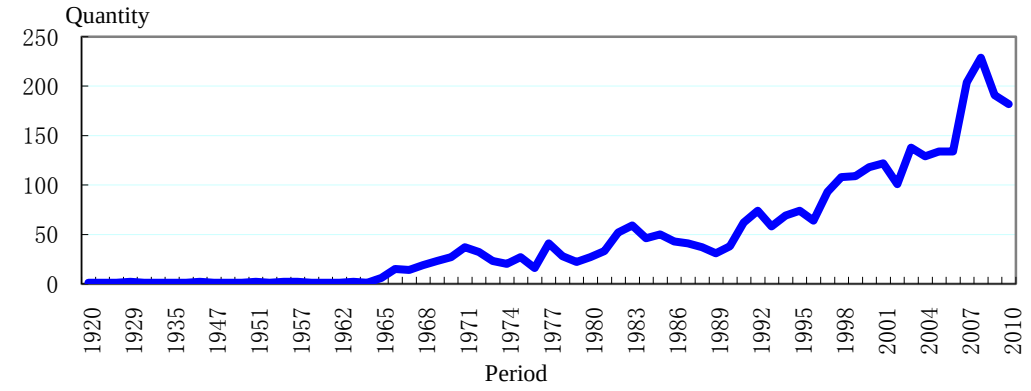

Fig. 2 Quantity change of related articles on modernization study collected by SCI during 1920~2010

Note: The articles in 2010 are in incomplete statistics.

During 1996~2010, SCI articles increased from 64 in 1996 to 181 in 2010, with the annually average increase rate of around 7.2%; SSCI articles increased from 202 in 1996 to 357 in 2010, with the annually average increase rate of around 3.9% (Fig.3).

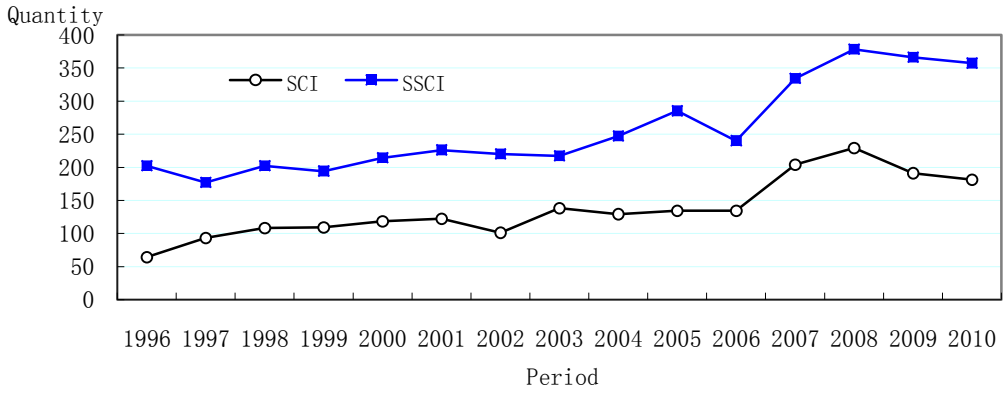

Fig. 3 Quantity change of related articles on modernization study collected by SCI and SSCI during 1996~2010

Note: The articles in 2010 are in incomplete statistics.

(2) Quantity change of the LOC books on modernization study during 1900~2010

Until Dec. 12, 2010, searched LOC books on modernization study, there are 2,259 books with the name including “modernization” and 2,598 books with the key words including “modernization”. Among them, there are 197 in 1960s (searched by name) and 224 (searched by key words), 368 and 390 in 1970s respectively, 387 and 440 in 1980s respectively, 450 and 562 in 1990s respectively, 748 and 857 during 2001~2010 respectively (Fig.4).

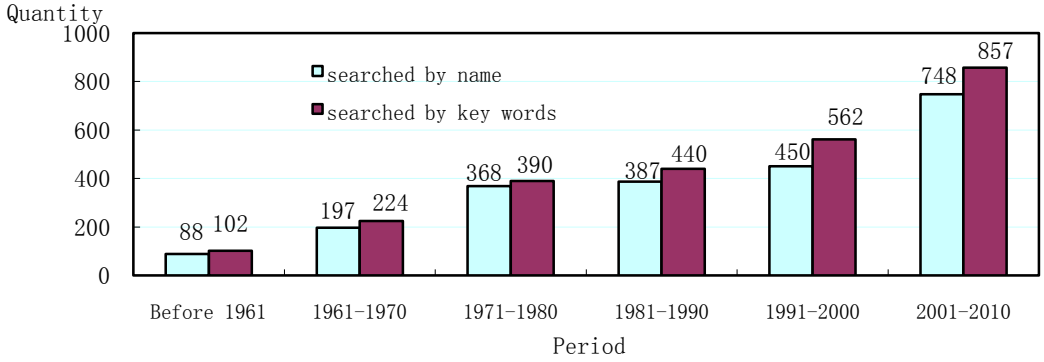

Fig. 4 Quantity change of related books on modernization study during 1900~2010

Note: The articles in 2010 are in incomplete statistics.

During 1960~2010, the annually average increase rate of LOC books on modernization study is 2.7% (searched by name) and 2.7% (searched by key words). During 2001~2010, the books on modernization study account for 33% (searched by name) and 32% (searched by key words) in the total. Books on modernization study during 2001~2010 is 3.8 times (searched by name) and 3.8 times (searched by key words) of those in 1960s.

2.Bibliometric analysis of WOS papers on modernization study during 2001~2010

2001~2010 is the peak season for modernization study outcome. Now let’s focus on analyzing the statistical features of modernization papers during the decade.

(1) Quantity of WOS papers on modernization study

Searched by key words of “modernization” or “modernisation” or “modernity” in the database of Web of Science (including SCI, SSCI and CPCI-S), with time range 2001~2010, there are 8,475 articles; among them, there are 4,760 research papers, accounting for about 56%, which are referred to as SSC papers.

(2) Subject distribution of SSC paper on modernization study

There are 4,760 SSC papers on modernization study, in five subject groups, social science, natural science, humanity, technical science and interdisciplinary science, which has reflected the comprehensiveness and multidiscipline of modernization study. Among them, papers of social science account for about 37%, papers of humanities account for about 15%, papers of natural science account for about 20%, papers of technical science account for about 14% and papers of interdisciplinary science account for about 14% (Fig. 5).

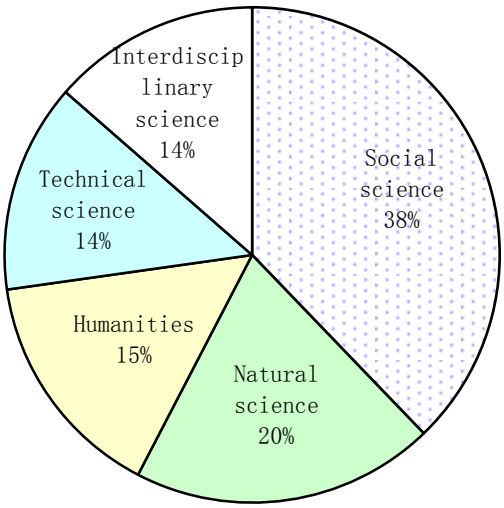

Fig. 5 Subject distribution of SSC paper on modernization study during 2001~2010

SSC papers on modernization study involves in over 100 subjects of each level, of which there are more on 12 subjects. For social science, there are more on sociology, political science and economics; for humanities, there are more on anthropology and history; for natural science, there are more on environmental science and geography; for technical science, there are more on communications and energy; for interdisciplinary science, there are more on regional study, development and management study (Table 1).

Table 1 Top five subjects of SSC paper for modernization study in five subject groups

Social science	Qty. of paper	Humanities	Qty. of paper	Natural science	Qty. of paper	Technical science	Qty. of paper	Interdisciplinary science	Qty. of paper
Sociology	715	Anthropology	365	Environmental study	262	Communication	84	Regional study	281
Political science	337	History	122	Geography	259	Energy and fuel	72	Plan and development	215
Interdisciplinary study on social science	328	History of social science	94	Public, environmental and occupational hygiene	162	Metallurgy and metallurgical engineering	66	Public management	182
Economics	194	History of science and philosophy of science	86	Environmental science	105	Water resource	59	Management	99
Education and	154	Religion	57	Hygiene and health	99	Civil engineering	42	City study	93

educational study				science and services					

(3) The international journals published SSC papers on modernization study

Based on the statistical analysis of 4,760 papers, there are over 100 journals published SSC papers on modernization study. A lot of subjects involved, which matches subject distribution. The journal which has published most papers is "Theory Culture & Society", 77 in total; there are 20 journals which have published more than 20 papers, involving humanities, environment and hygiene (Table 2).

Table 2 Some journals published SSC papers on modernization study during 2001~2010

Order	Journal	Paper (qty.)	Order	Journal	Paper (qty.)
1	Theory Culture & Society	77	**10**	Stahl Und Eisen	**28**
2	Sotsiologicheskie Issledovaniya	44	**11**	Environmental Politics	**27**
3	Local Government Studies	41	**12**	Environment And Planning A	**25**
4	Sociology-The Journal of The British Sociological Association	36	**13**	Public Administration	**24**
5	Social Compass	31	**14**	Journal of The Royal Anthropological Institute	**23**
6	Third World Quarterly	30	**15**	American Ethnologist	**22**
7	Social Science & Medicine	29	**16**	Geoforum	**22**
8	British Journal of Sociology	28	**17**	Health Affairs	**22**
9	Cultural Studies	28	**18**	Transylvanian Review	**22**
10	Stahl Und Eisen	28	**19**	Berliner Journal Fur Soziologie	**21**
11	Environmental Politics	27	**20**	Osteuropa	**21**

(4) Authors published SSC papers on modernization study

Based on the statistical analysis of 4,760 papers, the authors are scattered. The author published most is R. York from the US, 10 in total; there are 9 authors published more than 5 who are from 7 countries (Table 3).

Table 3 Authors published more than 5 SSC papers on modernization study during 2001~2010

Order	Author	Paper (qty.)	Institution of the author	Country of the author
1	York, R	10	University of Oregon	**The US**
2	Mol, APJ	9	Wageningen University and Research Center	**Holland**
3	Playan, E	9	Unknown	**Spain**
4	Beck, U	7	Muenchen University	**Germany**
5	Domingues, JM	7	University of Rio de Janeiro	**Brazil**
6	Currie, G	6	University of Nottingham	**The UK**
7	Davidson, DJ	6	University of Alberta	**Canada**
8	Newman, J	6	The Open University	**The UK**
9	Williamson, JB	6	Unknown	**The US**

(5) Institutions published SSC papers on modernization study

Based on the statistical analysis of 4,760 papers, there are over 100 institutions the authors of the papers worked for, most of which are universities. Among them, the institution published most papers is University of Manchester, 54 papers; then Harvard University and University of London; there are 23 institutions published more than 20 papers (Table 4). This matches the scattered distribution of the authors.

Table 4 Main institutions published SSC papers on modernization study during 2001~2010

Order	Institution	Paper (qty.)	Order	Institution	Paper (qty.)
1	University of Manchester	54	**13**	University of Wisconsin	26
2	Harvard University	38	**14**	Australian National University	24
3	University of London	32	**15**	National University of Singapore	24
4	University of Cambridge	31	**16**	Edinburgh University	24
5	University of Nottingham	31	**17**	University of West Scotland	24
6	University of Sheffield	31	**18**	University of California, Los Angeles	23
7	Russia Zhongshan Science	30	**19**	Lancaster University	23
8	University of Leeds	30	**20**	The Open University	21
9	University of North Carolina	30	**21**	Durham University	21
10	University of Oxford	30	**22**	University of Melbourne	21
11	University College London	29	**23**	University of Sussex	21
12	University of Toronto	28			

(6) Regional distribution of SSC papers on modernization study

Based on the statistical analysis of 4,760 papers, the authors are from more than 100 countries and regions, mainly in Europe, America and Asia. The country published most papers is the US, 1,152 paper, accounting for about 24% of the total; then the UK and Germany; the papers published by China is 146, ranking the 6 (Table 5).

Table 5 Regional distribution of SSC paper on modernization study during 2001~2010

Order	Country (region)	Paper (qty.)	Order	Country (region)	Paper (qty.)
1	The US	1,152	**11**	Scotland	91
2	The UK	832	**12**	Spain	91
3	Germany	332	**13**	Brazil	83
4	Canada	209	**14**	Turkey	74
5	Australia	204	**15**	Sweden	68
6	China	146	**16**	India	67
7	France	124	**17**	Denmark	60

8	Holland	111	**18**	Welsh	58
9	Russia	105	**19**	Italy	57
10	Poland	96	**20**	Israel	56

(7) Quotation frequency of SSC papers on modernization study

Until 28 Dec. 2010, the 4,760 papers have been quoted by 15,011 times, with annually average quotation frequency of about 1,501; there are 6,555 papers published during 1991~2010, quoted by 26,525 times, with annually average quotation frequency of about 1,326.

During 2001~2010, papers quoted mostly are on the fields of politics, agriculture and environment. During 1991~2001, papers quoted mostly are on the fields of culture, history and politics (Table 6). Hence, in different times, modernization study highlights differently.

Table 6 Top 10 SSC papers on modernization study quoted during 2001~2010 and 1991~2010

Order	2001～2010	Frequency of quotation	1991～2010	Frequency of quotation
1	Neoliberal nature and the nature of neoliberalism	119	Modernization, cultural change, and the persistence of traditional values	**418**
2	Conceptualizing agriculture: a critique of post-productivism as the new orthodoxy	84	Modernization - Theories and facts	**180**
3	The theory of reflexive modernization - Problematic, hypotheses and research programme	70	Impetus for action: A cultural analysis of justice and organizational citizenship behavior in Chinese society	**178**
4	Deforestation and the environmental Kuznets curve: A cross-national investigation of intervening mechanisms	60	Occult economies and the violence of abstraction: notes from the South African postcolony	**155**
5	The 'human revolution' in lowland tropical Southeast Asia: the antiquity and behavior of anatomically modern humans at Niah Cave (Sarawak, Borneo)	58	Neoliberal nature and the nature of neoliberalism	**119**
6	Democratic transitions	53	Modernity and hybridity: Nature, Regeneracionismo, and the production of the Spanish waterscape, 1890-1930	**119**
7	Cultures of circulation: The imaginations of modernity	52	The cosmopolitan perspective: sociology of the second age of modernity	**102**
8	Key challenges to ecological modernization theory - Institutional efficacy, case study evidence, units of analysis, and the pace of eco-efficiency		Biodiversity and The Transformation of a Tropical Agroecosystem - Ants in Coffee Plantations	**100**
9	"Being religious" or "being spiritual" in America: A zero-sum proposition?	51	Disordered eating in three communities of China: A comparative study of female high school students in Hong Kong,	**85**

			Shenzhen, and rural Hunan	
10	Uncertain identities and health-risking behaviour: the case of young people and smoking in late modernity	50	Conceptualizing agriculture: a critique of post-productivism as the new orthodoxy	**84**

3.Section analysis to WOS papers on modernization study during 1990~2010

Based on the analysis above, the period 1990~2010 is the period with fastest increase and most quantity of papers on modernization. The start dates of articles SCI and SSCI databases collected are difference, which requires searching respectively. Search papers on modernization study by key words "modernization" or "modernisation" or "modernity".

(1) Section analysis to papers on modernization study collected by SCI

Comparison among five sections

During 1990~2010, the papers on modernization study collected by SCI have increased fast. There are only 19 papers in SCI in 1990, 75 in 2000 and 162 in 2010; those in 2010 is 8.5 times of those in 1990. Meanwhile, there are more and more institutions, journals and countries published papers on modernization study (Table 7)

Table 7 Section analysis to papers on modernization study collected by SCI during 1990~2010

Item	1990	1995	200	2005	2010
Paper qty.	19	43	75	81	162
Institution qty.	18	48	96	99	99
Journal qty.	17	35	58	58	Above 100
Country qty.	10	20	28	33	51

Note: The articles in 2010 are in incomplete statistics.

Features of the papers on modernization study collected by SCI in 2010

The top four countries of papers on modernization study collected by SCI in 2010 is the US, Germany, England (the UK) and China; as for journal distribution, there are more articles on the journals with subjects of ecology and agriculture (Table 8).

Table 8 Rank of countries and journals of papers on modernization study collected by SCI in 2010

Order	Rank of country	Rank of journal
1	The US	ZKG International
2	Germany	Ecological Economics
3	The UK	Journal of Cleaner Production
4	China	Journal of Interprofessional Care
5	Spain	Metalurgia International
6	Australia	Rynek Energii
7	France	Advances in Space Research
8	India	Agricultural Economics-Zemedelska Ekonomika
9	Poland	Desalination
10	Holland	Drug Information Journal

(2) Section analysis to papers on modernization study collected by SSCI

Comparison among four sections

During 1996~2010, the papers on modernization study collected by SSCI have increased fast. There are 180 papers in 1996, 202 in 2000 and 508 in 2010; those in 2010 is 2.8 times of those in 1996 (Table 9).

Table 9 Section comparison of academic papers on modernization study collected by SSCI during 1996~2010

Item	1996	2000	2005	2010
Paper (qty.)	18	205	269	508
Institution(qty.)	99	99	99	99
Journal (qty.)	Above 100	Above 100	Above 100	Above 100
Country (qty.)	39	40	48	53

Note: The articles in 2010 are in incomplete statistics.

Features of the papers on modernization study collected by SSCI in 2010

The top five countries of papers on modernization study collected by SSCI in 2010 is the US, England (the UK), Germany, Australia and Canada; as for journal distribution, there are more articles on the journals with subjects of economics, anthropology and sociology (Table 10).

Table 10 Rank of countries, journals and institutions of papers on modernization study collected by SSCI in 2010

Order	Rank of country	Rank of journal	Rank of institution

1	The US	Sociology-The Journal Of The British Sociological Association	University College London
2	The UK	Transylvanian Review	University of Cambridge
3	Germany	British Journal Of Sociology	University of North Carolina
4	Australia	European Journal Of Social Theory	Wageningen University and Research Center
5	Canada	Journal Of The Royal Anthropological Institute	Harvard University
6	Holland	Actual Problems Of Economics	University of California, Los Angeles
7	France	American Ethnologist	University of Exeter
8	China	Environment And Planning A	Georg-August-Universität Göttingen
9	Spain	Environmental Politics	University of Melbourne
10	Turkey	Asian Journal Of Social Science	University of Nottingham

4. Quantity change tendency of Chinese literature on modernization study during 1900~2010

(1) Quantity of Chinese papers on modernization study during 1951~2010

In CAJD database, searched with title of "modernization" with time range of 1951~2010, there are 47,411 papers searched (Fig. 6). Among them, there are 4,417 papers in the 1980s, accounting for about 9.3%; 16,924 papers in the 1990s, accounting for about 35.7%; 25,025 papers in the first decade of 21c, accounting for about 52.8%. Since 1994, there are over 1,000 papers and 3,106 in 2003 (maximum), which matches basically the increase tendency of foreign literature on modernization.

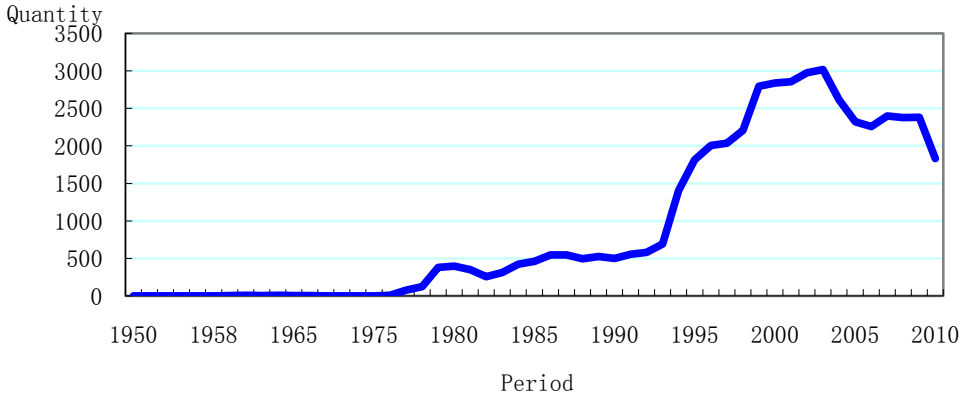

Fig. 6 Quantity change of Chinese papers on modernization study during 1951~2010

Note: The articles in 2010 are in incomplete statistics.

During 1978~2010, the annually average increase rate of papers is 8.8%; that in 1980s is 3.6%; that in 1990s is 17.7%. In the first decade of 21c, there are over 2,000 papers annually, which fluctuate at peak values. The papers on modernization study in the first decade of 21c are 25.1 times of those in 1970s; those in the first decade of 21c are 1.5 times of those in 1990s; those in 1990s are about 3.8 times of those in 1980s; those in 1980s are 4.4 times of those in 1970s.

(2) Authors of Chinese papers on modernization study during 1951~2010

In CAJD database, searched by the author of papers on modernization study, with range of the first author and time range of 1951~2010, there are 27 first authors in 1960s, 398 in 1970s, 3,225 in 1980s, 10,591 in 1990s and 19,358 in the first decade of 21c (Fig. 7). Since 1980s, the quantity of scholars engaged in modernization study has increased sharply.

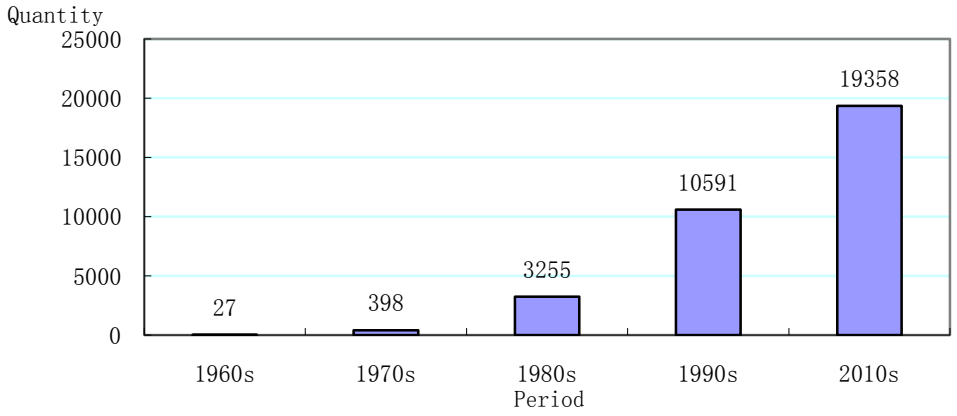

Fig. 7 Quantity distribution of authors of papers on modernization study during 1951~2010

Note: the first author includes commentator, reporter, special correspondent and xxx subject team; “editorial department” or author unknown is not counted.

(3) Chinese journals for Chinese papers on modernization study during 1980~2010

Searched the journals in CAJD, there are 210 varieties of Chinese journals published papers on modernization study in 1980; over 1,000 varieties in 1995; 1,656 varieties in 2001 (maximum) (Fig. 8).

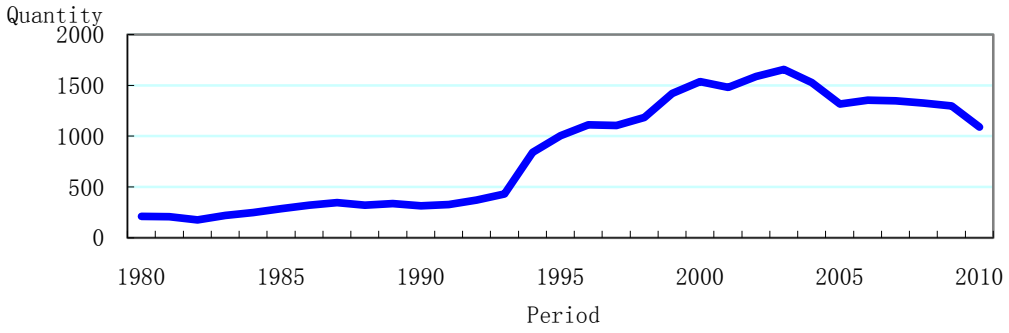

Fig. 8 Quantity distribution journals published Chinese papers on modernization study during 1980~2010

Note: The articles in 2010 are in incomplete statistics.

Among these journals, "Research of Agricultural Modernization", "Modernization of Management "and "Theory and Modernization" have published the most papers on modernization, which are 343, 180 and 175 respectively (Table 11).

Table 11 Some Chinese journals published Chinese papers on modernization study during 1980~2010

Journal	Paper qty.	Journal	Paper qty.
Research of Agricultural Modernization	343	Theory Front	83
Modernization of Management	180	Academic Monthly	57
Theory and Modernization	185	Suzhou University Journal (Philosophy and Social Science)	49
Outlook	110	Fudan University Journal (Social Science)	47
Exploration and Contending	88	Journal of Peking University (Social Science)	42

(4) Chinese books on modernization study during 1900~2010

On the website of National Library of China, searched by the name of "modernization" with time range of 1900~2010, there are 1,959 books in total (Fig. 9). Among them, there are 258 in 1980s, accounting for about 13.2%; 539 in 1990s, accounting for about 27.5%; 1,039 in the first decade of 21c, accounting for about 53%.

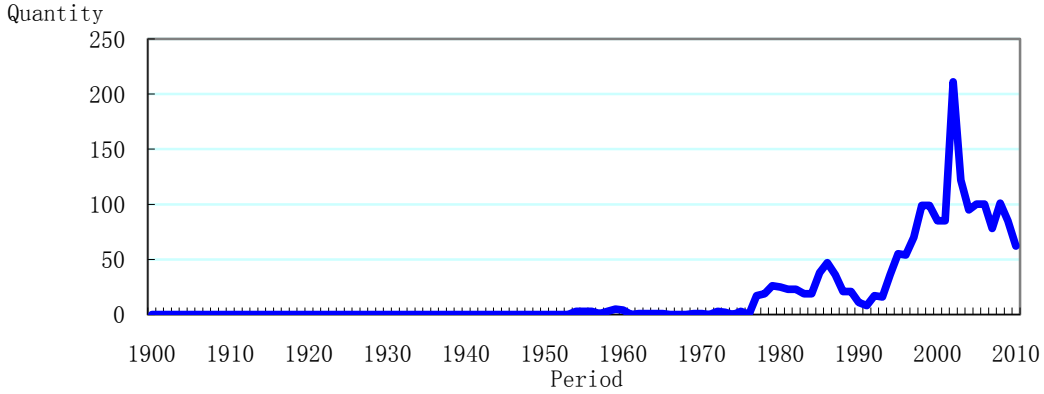

Fig. 9 Quantity change of Chinese books on modernization study during 1900~2010

III. Main results and discussion

Modernization study can be traced back to the beginning of the 20th century. Since 1960s, the quantity of literature on modernization study has increased; literatures on modernization study in the first decade of 21st century account for about 50% of the total.

Modernization study involves five large subject groups, social science, natural science, humanities, technical science and interdisciplinary science, and over 100 sub-subjects, presenting definite interdisciplinary feature. In respect of social science, there are more papers on sociology, politics and economics; as for humanities, there are more on anthropology and history; as for natural science, there are more on environmental science and geography; as for technical science, there are more communications and energy; as for interdisciplinary science, there are more on regional study, development study and management study; these are 12 major subjects on modernization study.

There are over 100 varieties of journals published papers on modernization study, which are

widely distributed in the above-mentioned subjects.

The quantity of authors published papers on modernization study increases as the paper increases. Taken China as an example, there are 27 first authors published modernization study in 1960s, which increased into 19,358 in the first decade of 21c, with over 700 times of increase.

The institutions published papers on modernization study are also widely distributed, which are mainly universities and distributed in Europe and America.

There are over 100 countries taken part in modernization study, mainly in Europe and America; which the modernization study in Australia, China and India has also been developed fast.

Chinese literatures keep the same tendency with international literatures; the change tendency of quantities of books and papers on modernization study also keep consistent.

In the first decade of 21c, the academic team of modernization study has reached certain scale and the academic result (paper and book) on modernization study has also been accumulated. Subjects and journals are widely distributed and there are many countries and research institutions involved. The peak of modernization study has already appeared. The "modernization science" already has solid academic basis.

The analysis to literature of the Paper needs some improvements, e.g. literatures obtained by searching "modernization" cannot reflect accurately the literatures on modernization study; it fails to deeply analyze the internal structure and hot issues of modernization study.

Reference

[1] Research group for China modernization strategy, et al. China Modernization Report 2010: World Modernization Outline 1700-2100. Beijing: Peking University Press, 2010

[2] Zhang C B, Shen L L, Li W L, Bibliometrical Analysis to Literature of Papers on Plant Research Based on Web of Science, Medical Information, 2009, 22, (9): 1677-1680.

[3] Tian D Q, Zheng T. Bibliometrical Analysis to Literatures of Papers on Biological Safety Collected by SCI, Chinese Journal of Medical Library and Information Science, 2009, 18, (5): 69-71.

现代化研究的文献计量学分析（1900～2010）

欧阳楠　叶　青　吴述尧
（中国科学院中国现代化研究中心，北京，100190）

摘要：本文对 1900～2010 年期间现代化研究的外文和中文相关文章和图书进行了统计分析，分析变量包括文章和图书的数量分布、增长率、文章类型、作者分布、学科分布、国家分布、期刊分布和被引频次等，揭示了现代化研究的发展趋势和时空分布。20 世纪 60 年代以来，现代化研究文献开始增长，21 世纪前 10 年现代化研究出现高潮。

关键词：现代化研究；文献计量学；web of science；20 世纪；21 世纪

世界现代化研究大致是 20 世纪 50 年代起步的。它大致历经了经典现代化研究、后现代研究及新现代化研究三个阶段，产生了一系列的理论创新。截至 2010 年 12 月 28 日，在 1900～2010 年期间，主题词包含现代化（modernization or modernisation）的外文文章 7997 篇，书名包含现代化（modernization）的外文图书 2259 部；主题词包含现代化的中文论文 47411 篇，书名包含现代化的中文图书 1959 部。其中，21 世纪前 10 年 SCI 收录的现代化文章约占其收录的全部现代化文章的 48.5%，CAJD 收录的中文现代化论文占其收录的全部现代化文章的 52.8%。现代化研究的高潮已经出现。

一、数据采集和分析方法

1. 数据来源

外文文章的数据来源：web of science 引文索引数据库。web of science 是被学术界广泛使用的引文索引数据库。本文数据来自它的三个数据库：SCI（科学引文索引）、SSCI（社会科学引文索引）和 CPCI-S（会议文献引文索引）。收录文献的时间范围，SCI 数据库为 1899 年至今，SSCI 为 1996 年至今，CPCI-S 为 1990 年至今。

外文图书的数据来源：美国国会图书馆的图书目录。美国国会图书馆被认为是世界上规模最大的图书馆，收藏文献所涉语言 450 种，馆藏文献 1.3 亿。

中文论文的数据来源：CNKI 的中国学术期刊网络出版总库（简称 CAJD）。截至 2010 年 10 月，CAJD 收录国内学术期刊 7686 种，全文文献总量 3000 多万篇。

中文图书的数据来源：中国国家图书馆的图书目录。

2. 检索方法

外文文章检索：采用题名和主题词检索，检索时间为 2010 年 12 月 28 日。

外文图书检索：采用书名和主题词检索，检索时间为 2010 年 12 月 12 日。

中文论文检索：采用题名和主题词检索，检索时间为 2010 年 12 月 28 日。

中文图书检索：采用书名和主题词检索，检索时间为 2010 年 12 月 28 日。

3. 分析方法

时序分析：时间范围为 1900～2010 年，分析文献的时间分布、发展速度和趋势等。

截段分析：时间截段为 2001～2010 年，分析文献的学科、期刊、机构和区域分布等。

截面分析：选择 2010 年等五个截面，分析文献的国家和期刊分布等。

分析变量包括文献数量、增长率、学科分布、期刊分布、作者分布、研究机构、区域分布和被引情况等。可以大体反映现代化研究的发展趋势和基本分布。

4. 系统误差

本项研究主要以“modernization”或“现代化”为检索词。有些题名或主题词包含现代化的文献，与现代化研究的相关性不大，例如，“现代化企业的人力资源管理”。有些文献的

题名或主题词不包含现代化，但研究内容属于现代化研究，例如，1900-2010 年期间，关于工业化的外文文章有 4334 篇、城市化 8551 篇、民主化 2854 篇，这些文章的一部分与现代化也有交叉。2010 年文献不全，最新发表的文献没有全部收入数据库。本项研究只能反映现代化研究的一部分内容而不是全部，而且存在一定的系统误差。

二、统计分析

（一）1900～2010 年现代化研究相关外文文献的趋势分析

1.1900～2010 年期间现代化研究的相关文章的数量变化

在 SCI、SSCI 和 CPCI-S 数据库中，以“modernization”or“modernisation”为主题词进行检索，检索的时间范围为 1900～2010 年，共检索到文章 7997 篇。其中，SCI 文章 3226 篇，SSCI 文章 3859 篇，CPCI-S 文章 1625 篇（三个数据库文献分类有交叉）；20 世纪 60 年代的文章 108 篇，70 年代 273 篇，80 年代 459 篇，90 年代 2159 篇，21 世纪前 10 年 4975 篇（图 1）。2001～2010 年期间 SCI 收录现代化文章数约占 SCI 现代化文章总数的 48.5%。

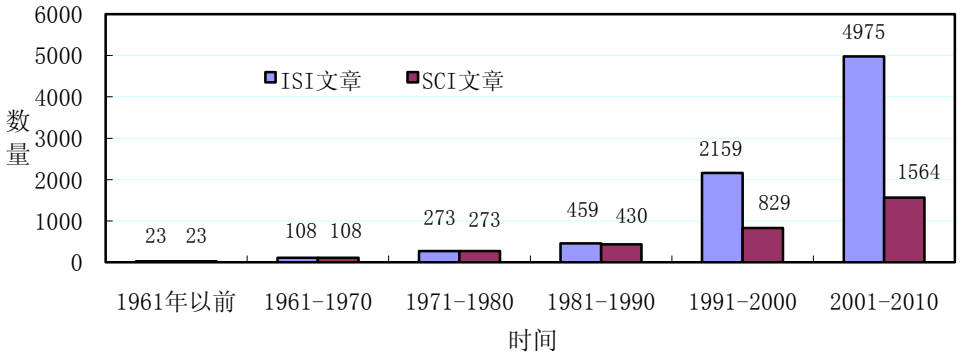

图 1　1900～2010 年现代化研究的相关文章的数量变化（单位：篇）

注: ISI 文章包括 SCI、SSCI 和 CPCI-S 收录的文章。收录文章的时间范围，SCI 数据库是从 1899 年至今，SSCI 数据库是从 1996 年至今，CPCI-S 数据库是从 1990 年至今。三个数据库文献分类有交叉。2010 年文章数为不完全统计。

SCI 数据库收录的最早两篇现代化研究的相关文章分别是“A Modernisation of the Coincidence Theory”（Kranichfeld, 1920）和“The Modernisation of Educational Facilities”（Grunewald, 1925)。20 世纪 60 年代以来，SCI 收录的现代化相关文章呈上升趋势（图 2）。在 1961～2010 年期间，现代化研究的 SCI 文章的年均增长率约为 5.4%。

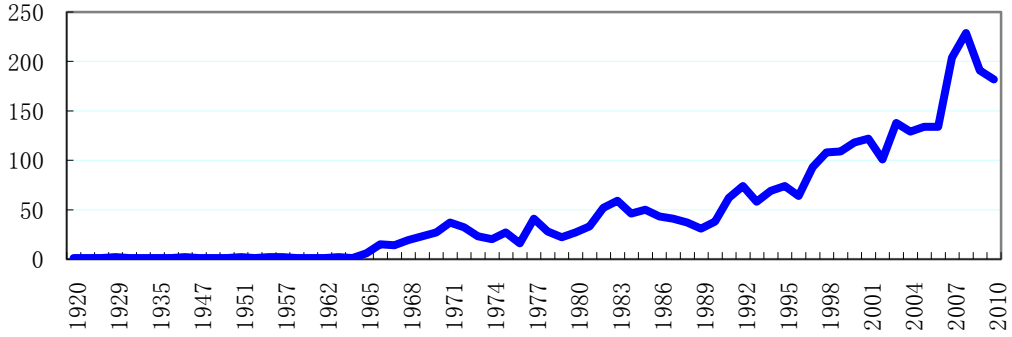

图 2　1920～2010 年 SCI 收录的现代化研究相关文章的数量变化（单位：篇）

注：2010 年文章数为不完全统计。

在 1996～2010 年期间，SCI 文章从 1996 年 64 篇上升到 2010 年 181 篇，年均增长率约为 7.2%；SSCI 文章从 1996 年 202 篇上升到 2010 年 357 篇，年均增长率约为 3.9%（图 3）。

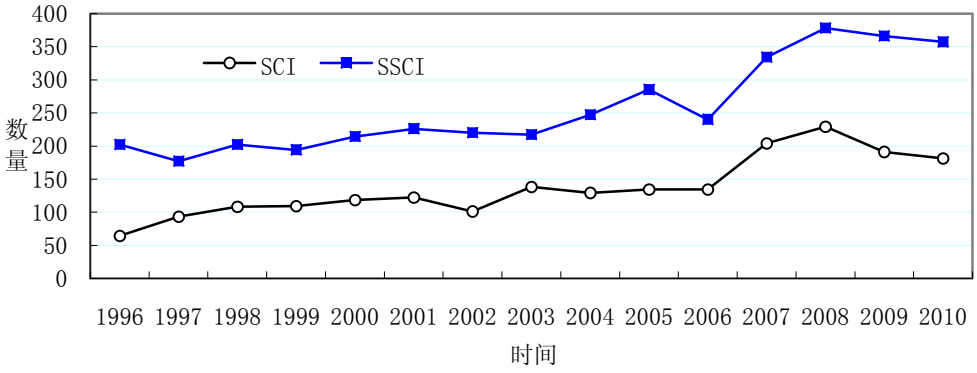

图 3　1996～2010 年 SCI、SSCI 收录的现代化研究相关文章的变化（单位：篇）

注：2010 年文章数为不完全统计。

2. 1900～2010 年期间现代化研究的相关图书的数量变化

在美国国会图书馆的网站检索现代化的相关图书，截至 2010 年 12 月 12 日，书名包含“modernization”的图书 2259 部，主题词包含“modernization”的图书 2598 部。其中，60 年代分别为 197 部（按书名检索）和 224 部（按主题词检索），70 年代分别为 368 部和 390 部，80 年代分别为 387 部和 440 部，90 年代分别为 450 部和 562 部，21 世纪前 10 年分别为 748 部和 857 部（图 4）。

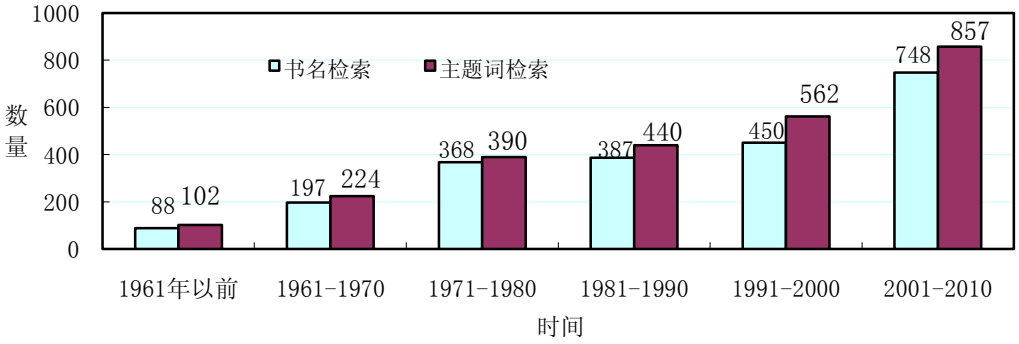

图 4　1900～2010 年期间现代化研究的相关图书的数量变化（单位：部）

注：2010 年图书数为不完全统计。

在 1961～2010 年期间，美国国会图书馆收藏的现代化图书的年均增长率为 2.7%（按书名检索）和 2.7%（按主题词检索）。21 世纪前 10 年的现代化图书占总数的 33%（按书名检索）和 32%（按主题词检索）。21 世纪前 10 年的现代化图书是 20 世纪 60 年代的 3.8 倍（按书名检索）和 3.8 倍（按书名检索）。

（二）2001～2010 年期间现代化研究外文论文的文献计量分析

2001～2010 年为现代化研究的高产期。下面重点分析这十年的现代化论文的统计特征。

1.现代化研究外文论文的数量

在 Web of Science 数据库(包括 SCI、SSCI 和 CPCI-S 三个数据库)中，以“modernization”或“modernisation”或“modernity”为主题词进行检索，年限为 2001～2010 年，共有文章 8475 篇；其中，论文（Article）4760 篇，约占 56%；这些论文简称为 SSC 论文。

2.现代化研究 SSC 论文的学科分布

现代化研究 SSC 论文 4760 篇，涉及社会科学、自然科学、人文科学、技术科学、交叉科学五大学科群，反映了现代化研究的综合性和交叉性。其中，社会科学的论文约占 37%，人文科学约占 15%，自然科学约占 20%，技术科学约占 14%，交叉科学约占 14%（图 5）。

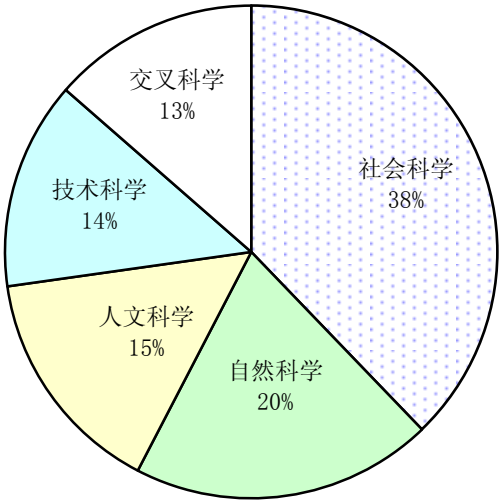

图 5　2001～2010 年现代化研究 SSC 论文的学科分布

现代化研究 SSC 论文涉及 100 多种各级学科，其中，12 个学科论文比较多。社会科学方面，社会学、政治学和经济学相关论文比较多；人文科学方面，人类学和历史学相关论文比较多；自然科学方面，环境科学和地理学相关论文较多；技术科学方面，通信和能源方面相关论文较多；交叉科学方面，区域研究、发展和管理研究的相关论文比较多（表 1）。

表 1　五大学科中现代化研究 SSC 论文排名前五的学科（单位：篇）

社会科学	论文	人文科学	论文	自然科学	论文	技术科学	论文	交叉科学	论文
社会学	715	人类学	365	环境研究	262	通信	84	区域研究	281
政治科学	337	历史学	122	地理学	259	能源和燃料	72	计划与发展	215
社会科学的交叉研究	328	社会科学史	94	公共、环境和职业卫生	162	冶金和冶金工程	66	公共管理	182
经济学	194	科学史和科学哲学	86	环境科学	105	水资源	59	管理	99
教育和教育研究	154	宗教	57	卫生保健科学和服务	99	民用工程	42	城市研究	93

3.发表现代化研究 SSC 论文的外文期刊

根据 4760 篇论文的统计分析，发表现代化研究 SSC 论文的外文期刊超过 100 种，涉及学科众多，与学科分布非常吻合。发表论文最多的期刊为“Theory Culture & Society”，为 77 篇；发表论文超过 20 篇的期刊有 20 个，涉及人文、环境、卫生等多个领域（表 2）。

表 2　2001～2010 年发表现代化研究 SSC 论文的部分外文期刊

排序	期刊	论文（篇）
1	Theory Culture & Society	77
2	Sotsiologicheskie Issledovaniya	44
3	Local Government Studies	41
4	Sociology-The Journal of The British Sociological Association	36
5	Social Compass	31
6	Third World Quarterly	30
7	Social Science & Medicine	29
8	British Journal of Sociology	28
9	Cultural Studies	28
10	Stahl Und Eisen	28
11	Environmental Politics	27
12	Environment And Planning A	25
13	Public Administration	24
14	Journal of The Royal Anthropological Institute	23
15	American Ethnologist	22
16	Geoforum	22
17	Health Affairs	22
18	Transylvanian Review	22
19	Berliner Journal Fur Soziologie	21
20	Osteuropa	21

4.发表现代化研究 SSC 论文的作者

根据 4760 篇论文的统计分析，论文作者比较分散。其中，发表论文最多的作者为美国的 R. York，为 10 篇；发表论文超过 5 篇的有 9 人，他们来自 7 个国家（表 3）。

表 3　2001～2010 年发表现代化研究 SSC 论文超过 5 篇的作者

排序	作者	论文（篇）	作者的机构	作者的国家
1	York, R	10	俄勒冈大学	美国
2	Mol, APJ	9	瓦赫宁根大学	荷兰
3	Playan, E	9	不详	西班牙
4	Beck, U	7	慕尼黑大学	德国
5	Domingues, JM	7	里约热内卢大学	巴西
6	Currie, G	6	诺丁汉大学	英国
7	Davidson, DJ	6	阿尔伯塔大学	加拿大
8	Newman, J	6	开放大学	英国
9	Williamson, JB	6	不详	美国

5.发表现代化研究 SSC 论文的机构

根据 4760 篇论文的统计分析，论文作者的所在机构超过 100 家，多数为大学。其中，发表论文最多的机构为曼彻斯特大学，为 54 篇；其次为哈佛大学和伦敦大学；发表论文数量超过 20 篇的机构有 23 个（表 4）。这与论文作者的分散式分布是一致的。

表 4　2001～2010 年发表现代化研究 SSC 论文的主要机构

排序	机构	论文（篇）	排序	机构	论文（篇）
1	曼彻斯特大学	54	13	威斯康星州大学	26
2	哈佛大学	38	14	澳大利亚国立大学	24
3	伦敦大学	32	15	新加坡国立大学	24
4	剑桥大学	31	16	爱丁堡大学	24
5	诺丁汉大学	31	17	英国西部大学	24
6	谢菲尔德大学	31	18	加州大学洛杉矶分校	23
7	俄罗斯中山科学	30	19	兰开斯特大学	23
8	利兹大学	30	20	开放大学	21
9	北卡罗来纳大学	30	21	杜伦大学	21
10	牛津大学	30	22	墨尔本大学	21
11	伦敦大学学院	29	23	苏塞克斯大学	21
12	多伦多大学	28			

6.现代化研究 SSC 论文的区域分布

根据 4760 篇论文的统计分析，论文作者来自 100 多个国家和地区，主要集中于欧洲、美洲和亚洲。其中，发表论文最多的国家是美国，为 1152 篇，约占论文总数的 24%；其次为英格兰和德国；中国的论文数量为 146 篇，排在第 6 位（表 5）。

表 5　2001～2010 年现代化研究 SSC 论文数量的区域分布（单位：篇）

排序	国家（地区）	论文（篇）	排序	国家（地区）	论文（篇）
1	美国	1,152	11	苏格兰	91
2	英格兰	832	12	西班牙	91
3	德国	332	13	巴西	83
4	加拿大	209	14	土耳其	74
5	澳大利亚	204	15	瑞典	68
6	中国	146	16	印度	67
7	法国	124	17	丹麦	60
8	荷兰	111	18	威尔士	58
9	俄罗斯	105	19	意大利	57
10	波兰	96	20	以色列	56

7.现代化研究 SSC 论文的被引频次

截至 2010 年 12 月 28 日，4760 篇论文被引用 15011 次，平均每年被引用约 1501 次；1991～2010 年期间发表的 6555 篇论文，被引用 26525 次，平均每年被引用约 1326 次。

在 2001～2010 年期间，被引用频次较高的论文是政治、农业、环境领域的文章。在 1991～2010 年期间，被引用频次较高的论文是文化、历史和政治领域的文章（表 6）。由此可见，在不同时期，现代化研究的热点问题有所不同。

表 6　2001～2010 年和 1991～2010 年被引次数排前 10 名的现代化研究 SSC 论文

序号	2001～2010 年	被引次数	1991～2010 年	被引次数
1	Neoliberal nature and the nature of neoliberalism	119	Modernization, cultural change, and the persistence of traditional values	418
2	Conceptualizing agriculture: a critique of post-productivism as the new orthodoxy	84	Modernization - Theories and facts	180
3	The theory of reflexive modernization - Problematic, hypotheses and research programme	70	Impetus for action: A cultural analysis of justice and organizational citizenship behavior in Chinese society	178
4	Deforestation and the environmental Kuznets curve: A cross-national investigation of intervening mechanisms	60	Occult economies and the violence of abstraction: notes from the South African postcolony	155
5	The 'human revolution' in lowland tropical Southeast Asia: the antiquity and behavior of anatomically modern humans at Niah Cave (Sarawak, Borneo)	58	Neoliberal nature and the nature of neoliberalism	119
6	Democratic transitions	53	Modernity and hybridity: Nature, Regeneracionismo, and the production of the Spanish waterscape, 1890-1930	119
7	Cultures of circulation: The imaginations of modernity	52	The cosmopolitan perspective: sociology of the second age of modernity	102

8	Key challenges to ecological modernization theory - Institutional efficacy, case study evidence, units of analysis, and the pace of eco-efficiency		Biodiversity and The Transformation of a Tropical Agroecosystem - Ants in Coffee Plantations	100
9	"Being religious" or "being spiritual" in America: A zero-sum proposition?	51	Disordered eating in three communities of China: A comparative study of female high school students in Hong Kong, Shenzhen, and rural Hunan	85
10	Uncertain identities and health-risking behaviour: the case of young people and smoking in late modernity	50	Conceptualizing agriculture: a critique of post-productivism as the new orthodoxy	84

（三）1990～2010 年现代化研究外文论文的截面分析

根据前面的分析，1990～2010 年期间为现代化研究相关文献增长快、数量多的时期。SCI 和 SSCI 两个数据库收录文章的起始日期不同，需要分别检索。以“modernization”或“modernisation”或“modernity”为主题词进行检索，检索现代化研究论文（article）。

1.SCI 收录的现代化研究论文的截面分析

（1）5 个截面的比较

在 1990～2010 年期间，SCI 收录的现代化研究论文的数量增长比较快。1990 年 SCI 论文仅为 19 篇，2000 年为 75 篇，2010 年为 162 篇；2010 年为 1990 年的 8.5 倍。与此同时，发表现代化研究论文的机构、期刊、国家的数量也呈上升趋势（表 7）。

表 7　1990～2010 年 SCI 收录的现代化研究论文的截面比较

项目	1990	1995	2000	2005	2010
论文数（篇）	19	43	75	81	162
机构数（个）	18	48	96	99	99
期刊数（种）	17	35	58	58	100 以上
国家数（个）	10	20	28	33	51

注：2010 年文章数为不完全统计。

（2）2010 年 SCI 收录的现代化研究论文的特征

2010 年， SCI 收录的现代化研究论文的国家排名，美国、德国、英格兰（英国）和中国分列前 4 名；在期刊分布中，生态、农业主题的期刊刊文数量较多（表 8）。

表 8　2010 年 SCI 收录的现代化研究论文的国家和期刊排名

排序	国家排名	期刊排名
1	美国	ZKG International
2	德国	Ecological Economics
3	英格兰	Journal of Cleaner Production
4	中国	Journal of Interprofessional Care
5	西班牙	Metalurgia International
6	澳大利亚	Rynek Energii
7	法国	Advances in Space Research
8	印度	Agricultural Economics-Zemedelska Ekonomika
9	波兰	Desalination
10	荷兰	Drug Information Journal

2. SSCI 收录的现代化研究论文的截面分析

（1）4 个截面的比较

在 1996～2010 年期间，SSCI 收录的现代化研究论文的数量增长比较快。1996 年为 180 篇，2000 年为 202 篇，2010 年为 508 篇；2010 年是 1996 年的 2.8 倍（表 9）。

表 9　1990～2010 年 SSCI 收录的现代化研究学术论文的截面比较

项目	1996	2000	2005	2010
论文数（篇）	180	202	269	508
机构数（个）	99	99	99	99
期刊数（种）	100 以上	100 以上	100 以上	100 以上
国家数（个）	39	40	48	53

注：2010 年文章数为不完全统计。

（2）2010 年 SSCI 收录的现代化研究论文的特征

2010 年， SSCI 收录的现代化研究论文的国家排名，美国、英格兰（英国）、德国、澳大利亚和加拿大分列前 5 名；在期刊分布中，经济、人类学、社会学等主题都有涉足，学科较为广泛（表 10）。

表 10　2010 年 SSCI 收录的现代化研究论文的国家、期刊和机构排名

排序	国家排名	期刊排名	机构排名
1	美国	Sociology-The Journal Of The British Sociological Association	伦敦大学学院
2	英格兰	Transylvanian Review	剑桥大学
3	德国	British Journal Of Sociology	北卡罗来纳大学
4	澳大利亚	European Journal Of Social Theory	瓦格宁根大学
5	加拿大	Journal Of The Royal Anthropological Institute	哈佛大学
6	荷兰	Actual Problems Of Economics	加州大学洛杉矶分校
7	法国	American Ethnologist	埃克塞特大学
8	中国	Environment And Planning A	哥廷根大学
9	西班牙	Environmental Politics	墨尔本大学
10	土耳其	Asian Journal Of Social Science	诺丁汉大学

（四）1900～2010 年现代化研究相关中文文献的趋势分析

1. 1951～2010 年现代化研究中文论文的数量

在 CAJD 数据库中，以“现代化”进行题名检索，时间范围为 1951～2010 年，共检索到 47411 篇文章（图 6）。其中，20 世纪 80 年代论文 4417 篇，约占 9.3%；90 年代论文 16924 篇，约占 35.7%；21 世纪前 10 年论文 25025 篇，约占 52.8%。从 1994 年开始，论文数量超过 1000 篇，在 2003 年达到 3106 篇（最高值），与现代化外文文献的增长趋势基本一致。

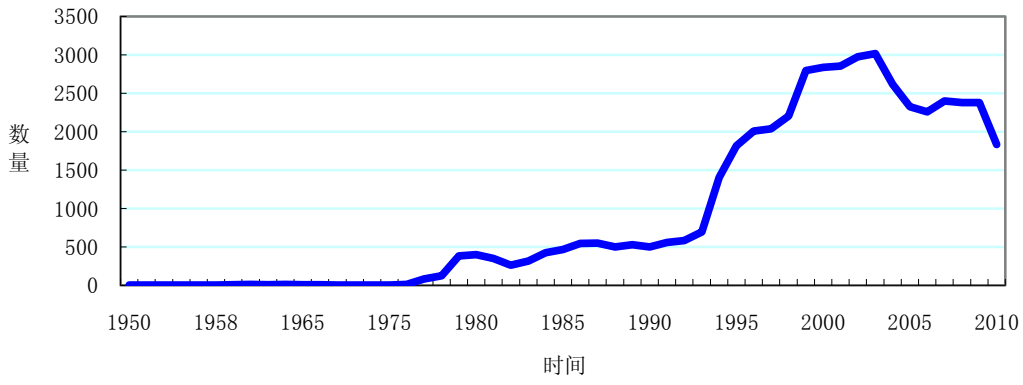

图 6　1951～2010 年现代化研究中文论文的数量变化

注：2010 年论文数为不完全统计

在 1978～2010 年期间，论文的年均增长率为 8.8%；80 年代的年均增长率 3.6%，90 年代的年均增长率 17.7%。21 世纪前十年，年论文数保持在 2000 篇以上，在高位波动。21 世纪前 10 年现代化论文数约是 20 世纪 70 年代的 25.1 倍；其中，21 世纪前 10 年约是 20 世纪 90 年代的 1.5 倍 ，90 年代约是 80 年代的 3.8 倍，80 年代约是 70 年代的 4.4 倍。

2.1951～2010 年现代化研究中文论文的作者

在 CAJD 数据库中，进行现代化论文的作者检索，检索范围为第一作者，时间范围为 1951～2010 年。1960 年代第一作者为 27 人，70 年代 398 人，80 年代 3255 人，90 年代 10591 人，21 世纪前 10 年达 19358 人（图 7）。进入 20 世纪 80 年代以来，从事现代化研究的学者

数量有较大幅度增长。

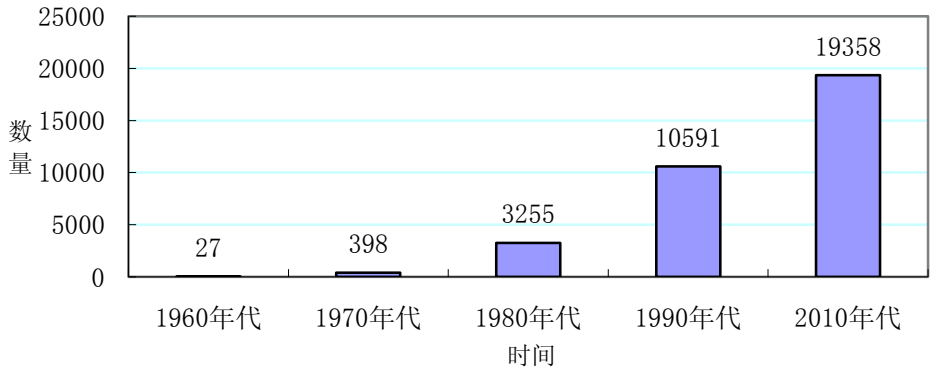

图 7　1951～2010 年现代化研究中文论文作者的数量分布

注：署名为本刊评论员、本刊记者、本刊特约记者、***课题组的以一个作者计；署名为“本刊编辑部”、作者不详的没有计入。

3. 1980～2010 年发表现代化研究中文论文的中文期刊

在 CAJD 进行期刊的相关检索，1980 年发表现代化论文的中文期刊数量为 210 种；1995 年超过 1000 种；2003 年期刊数量 1656 种（最高值）（图 8）。

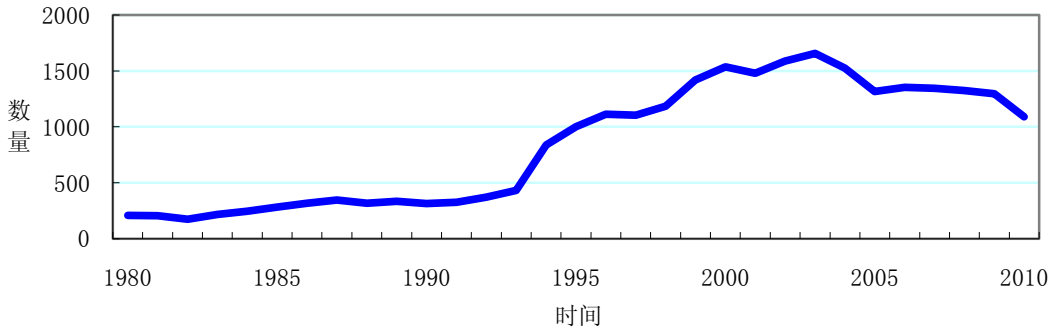

图 8　1980～2010 年发表现代化研究中文论文的期刊数量分布

注：2010 年期刊数为不完全统计。

在这些期刊中，《农业现代化研究》、《管理现代化》和《理论与现代化》刊载的现代化论文最多，分别为 343 篇、180 篇和 175 篇（表 11）。

表 11　1980～2010 年发表现代化研究中文论文的部分中文期刊

期刊	载文（篇）	期刊	载文（篇）
农业现代化研究	343	理论前沿	83
管理现代化	180	学术月刊	57
理论与现代化	175	苏州大学学报(哲学社会科学版)	49
瞭望	110	复旦学报(社会科学版)	47
探索与争鸣	88	北京大学学报(哲学社会科学版)	42

4. 1900～2010 年现代化研究的中文图书

在中国国家图书馆网站，以“现代化”进行书名检索，时间范围为 1900～2010 年，共

检索到 1959 部图书（图 9）。其中，20 世纪 80 年代 258 部，约占 13.2%；90 年代 539 部，约占 27.5%；21 世纪前 10 年 1039 部，约占 53%。

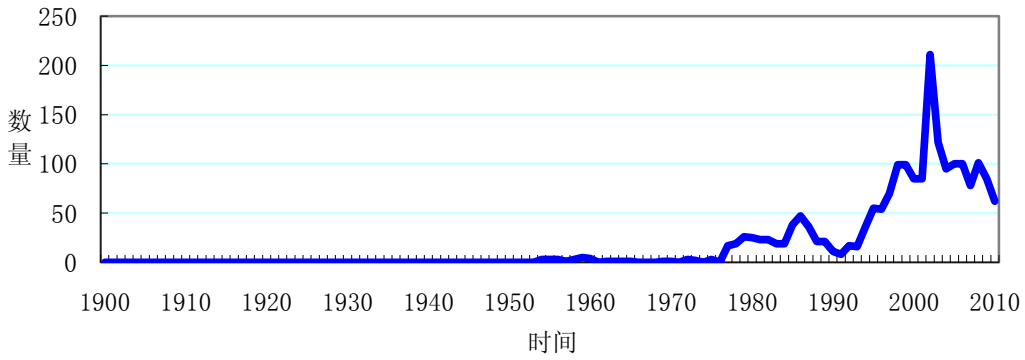

图 9　1900～2010 年现代化研究中文图书的数量变化

注：2010 年图书数为不完全统计。

三、主要结果和讨论

现代化研究可以追溯到 20 世纪初。20 世纪 60 年代以来，现代化研究文献呈上升趋势；21 世纪前 10 年的现代化研究文献占现代化研究总文献的比例为 50%左右。

现代化研究涉及社会科学、自然科学、人文科学、技术科学和交叉科学五大学科群，涉及 100 多个小学科，显示出较强的交叉性。在社会科学方面，社会学、政治学和经济学论文比较多；在人文科学方面，人类学和历史学论文比较多；在自然科学方面，环境科学和地理学论文比较多；在技术科学方面，通信和能源论文比较多；在交叉科学方面，区域研究、发展研究和管理研究论文比较多；它们是现代化研究的 12 个主要学科。

发表现代化论文的期刊超过 100 种，分布较广，相对集中在上述学科领域。

发表现代化论文的作者数量，伴随论文增长而增长。以中国为例，20 世纪 60 年代发表现代化论文的第一作者为 27 人，21 世纪前 10 年上升至 19358 人，增长 700 多倍。

发表现代化论文的机构，分布较广，主要是大学，主要分布在欧美。

参与现代化研究的国家超过 100 个，主要集中于欧洲和美洲；同时，澳大利亚、中国、印度等国现代化研究也在较快发展。

中文文献和外文文献的趋势基本一致；现代化图书和论文的趋势基本一致。

21 世纪前 10 年，现代化研究的学术队伍已经有相当规模，现代化研究的学术成果（论文和图书）已经有相当积累，学科分布和期刊分布较广，参与国家和和研究机构较多。现代化研究的高潮已经出现，“现代化科学”已经有较为坚实的学术基础。

本文存在一些需要改进的地方。例如，以“现代化”为检索词获得的文献，不能准确反映现代化文献；本文没有深入分析现代化研究的内部结构和热点问题等。

参考文献：

[1] 中国现代化战略研究课题组等.中国现代化报告 2010：世界现代化概览[M]. 北京：北京大学出版社. 2010.

[2] 张畅斌, 沈林林, 李文林. 基于 Web of Science 的植物研究论文文献计量学分析[J]. 医学信息, 2009，22(9)：1677-1680.

[3] 田德桥, 郑涛. SCI 收录生物安全相关论文的文献计量学分析[J]. 中华医学图书情报杂志, 2009，18(5)：69-71.

Regional Modernization in the World

Chuanqi He
China Center for Modernization Research, Chinese Academy of Sciences

Discovering facts and respecting laws constitute a basic norm of science. The facts today are that the world has a population of more than 6 billion, the world has more than 3,000 nationalities, the world has more than 190 countries, the world's utilizable resources are limited, the world's renewable resources are limited, and the demand of human development is unlimited. Therefore, the development of the countries and nationalities cannot ignore the pressure from international competition and resources. If a country is to win and control its own destiny in its own hands in the world competition involving many countries and nationalities, it must realize modernization. The previous three issues of the China Modernization Report discussed the facts and laws of national modernization in a fairly systematic way. This issue features regional modernization, focusing on the facts about, laws of and roads to regional modernization (Figure 1).

If regions are defined as different regions or different geographic parts of a country, regional modernization is a component part of national modernization. Without regional modernization, there will be no national modernization. If China is to realize modernization, it must simultaneously pursue national and regional modernizations. Analyzing the national and regional modernizations in other countries and understanding the theories concerning regional modernization can provide inspirations and experience for us to consider and formulate strategies for regional modernization. We have to learn the experience and lessons of other countries. Only when we know both about ourselves and about our enemy we can win the battles we will fight.

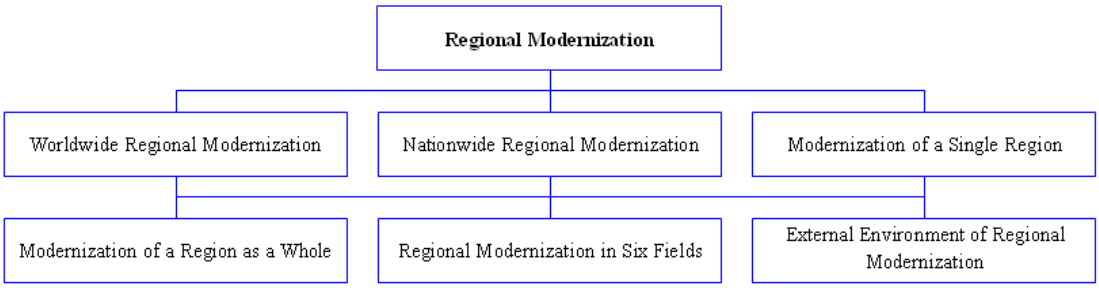

Figure 1 Analytical Structure of Regionald Modernization

I. Basic Facts and Important Inspirations of Regional Modernization in 18 Countries

The modernization process is extremely uneven among more than 190 countries in the world. The countries with different levels of modernization have different features of regional modernization. This report selects 18 countries, including the United States, the European Union countries, Mexico and India, as the samples of the developed and developing countries for case analysis [1]. First, quantitative analysis is used to briefly analyze the main facts about the economic, social and knowledge modernizations in the United States, Britain, Mexico and India in the 20th century. Then quantitative analysis and statistics are used to briefly analyze the main facts about the regional modernization in more than 170 regions of the 18 countries including the United States, the EU countries, Mexico and India and to quantitatively analyze the modernization in the eight major regions, 50 states and 195 counties of the United States. Third, 16 basic facts and nine important inspirations with regard to the regional modernization in the 18 countries are systematically summarized.

1. Sixteen Basic Facts about Regional Modernization in 18 Countries

(1) Regional modernization is an objective reality. In the course of development in the 171 regions of the 18 countries, the inter-regional economic gap narrows and widens, the levels of regional development converge and diverge, and the regional relative levels advance and retrogress. These are common phenomena. The changes in the regional relative levels include the phenomena that the advanced continues to be advanced, the backward tries to catch up with the advanced, the advanced becomes backward, and the backward continues to be backward. These are largely similar to the phenomena of national modernization.

(2) Regional modernization observes the general laws of national modernization. In the course of regional modernization in the 18 countries, the basic laws governing modernization such as the industrialization and urbanization in the period of classical modernization and the knowledgeablization and informatization in the period of second modernization have all been proved by the historical statistical data of these regions and the analyses of the scholars. Regional modernization comprises political modernization, and regional political modernization is determined by national politics. Without national political modernization, there will be no comprehensive regional modernization.

(3) Regional modernization is not a simple “miniaturization” of national modernization. Regions are the component parts of a country, and regional modernization is a component part of national modernization. The regions within a country can choose different modes and roads for

their modernization. For example, the modernization in the 50 states and 195 counties of the United States is quite different from the national modernization in the areas of industrialization and urbanization.

(4) Regions interact with each other in the course of regional modernization. The regions both compete with each other and rely on each other. Under the conditions of free competition, market forces widen regional gaps. The inter-regional flow of economy and people can promote the coordinated development between them through national intervention, for example, through the regulation by fiscal and policy leverages (such as transfer payment and preferential policies).

(5) Regional modernization is closely related to the basic capacities of the regions. Spanish scholars discover that the successful regions have the following main features. A. Their city systems play important roles in economic growth and production activities. B. They can easily acquire a steady supply of human capital and qualified labor. C. They are open and have the capacity to participate. D. They can easily acquire advanced production services, such as strategic planning, technical consulting, commercialization, export, research and development, and professional financial services. E. The regional governments and organizational systems are very efficient. F. They have the "appeal" to outside investors.

(6) The process of regional modernization is uneven. The levels of development and the phases of regional modernization in the 18 countries indicate that inter-regional gaps are all very wide. The inter-regional gaps in the developed countries are smaller than in the developing countries, and the inter-regional gaps in the countries that have entered the period of second modernization are smaller than in the countries that are still in the period of first modernization.

Regional economic modernization has the following four basic facts:

(7) The essence of regional economic modernization is to raise the level of productivity.

(8) A falling proportion of agriculture in the regional economy is common but not absolute. There is certain flexibility.

(9) Both the industrialization and de-industrialization of the regional economy are flexible but not absolute (Figure 2).

(10) Service intensify in the regional economy (higher proportion of the service industry) is inevitable.

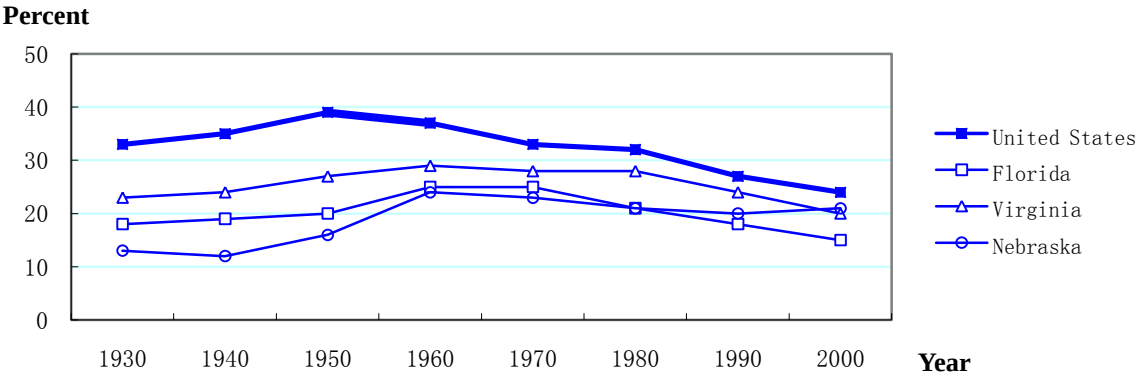

Figure 2 Percent of industrial value added in GDP of United States and three states[2]

Regional social modernization has the following three basic facts:

(11) The essence of regional social modernization is to raise the living standard of residents.

(12) Regional urbanization and sub-urbanization are somewhat flexible but not absolute (Figure 3).

(13) Regional infrastructure modernization is of vital importance.

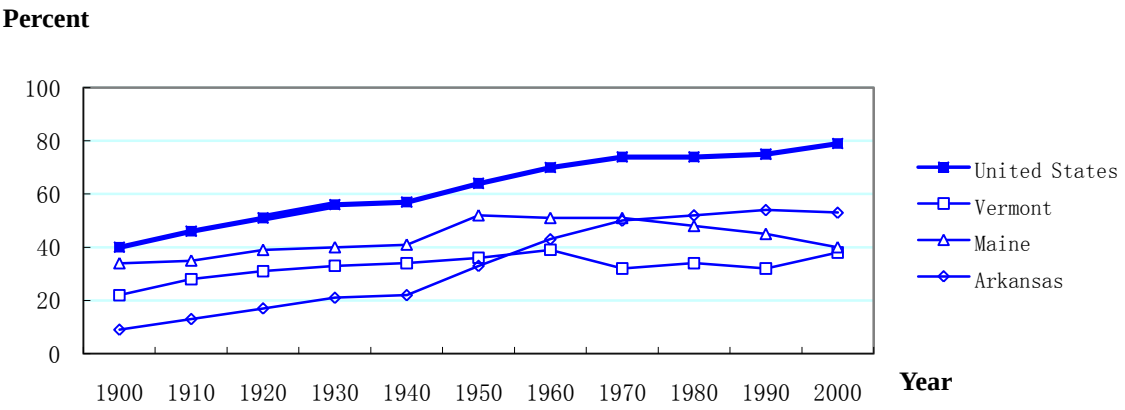

Figure 3 Urbanization rate of United States and three states [3]

Regional knowledge modernization has the following three basic facts:

(14) The essence of regional knowledge modernization is to raise the capacity and level of producing and popularizing scientific knowledge and information.

(15) Regional knowledge modernization comprises the period of “universal free compulsory education” and the period of “knowledgeablization and informatization” (universal high education).

(16) The developed and developing countries have different modes of regional knowledge

modernization.

2. Nine Important Inspirations of Regional Modernization in 18 Countries

(1) In the level-1 regions (provincial regions), regional modernization is highly consistent with national modernization.

(2) In the level-2 regions (county-level regions), the relations between regional and national modernizations are diverse.

(3) The asynchrony and unevenness of regional modernization processes are common.

(4) The widening and narrowing of the inter-regional gap are common.

(5) The fluctuation and narrowing of the urban-rural gap are common.

(6) The widening and narrowing of the income gaps are common and income distribution requires government regulation.

(7) The evolution in the distribution of population and economic activities can be divided into two periods: concentration and decentralization.

(8) The regional development process in the developed countries comprises two major periods and has diverse modes of development.

(9) The change probability in the status of the regional relative level has certain commonality.

If industrialization is regarded as a transformation from agricultural civilization to industrial civilization, regional industrialization is indispensable. If industrialization is defined as a transformation of industrial and employment structures from agriculture to industry, regional industrialization is highly flexible. Deindustrialization is a new period of economic and civilization development and is fairly flexible between different regions.

If urbanization is interpreted as a form of the transformation from agrarian civilization to urban civilization, regional urbanization is indispensable. If urbanization is defined as an increase of proportion of urban population, regional urbanization is highly flexible. Those living in the rural areas can also enjoy urban civilization. Suburbanization is both a sprawl and a new development of urban civilization. Besides, suburbanization is highly flexible.

II. Regional Modernization Theory

1. Relevant Theories of Regional Modernization

The process of regional modernization comprises the changes in the fields of regional economy, society, politics, knowledge and culture. Therefore, scientific theories in various fields and especially various development theories can all make contributions to regional modernization theories. They include, for example, the economic development theory, the economic growth theory, the political development theory, the cultural change theory, the social development theory,

the regional development theory, and the economic geographic theory. This report focuses on the economic development and growth theories and the regional development theory.

Modernization theories began appearing in the 1950s and 1960s. Since the 1950s, world modernization studies experienced three waves: classical modernization studies, post-modernization studies and new modernization studies. The CMR 2003 [4] briefly outlined the theoretical results of the three waves, including the classical modernization theory, the dependency theory, the world system theory, the post-modernization theory, the ecological modernization theory, the reflexive modernization theory and the second modernization theory. That report focused on the five elements of the classical modernization theory and the second modernization theory.

This report expounds the four basic principles of the second modernization theory for the first time, namely the principle of asynchronous process of general modernization, the principle of spatial unevenness, the principle of structural stability, and the principle of status changeability. Specifically, the process of world modernization is asynchronous, the spatial distribution of the levels and elements of modernization is uneven, and the structure of the distribution of the levels of world modernization is relatively stable. However, the relative status of the countries in the process of world modernization can change, such changes occur with regularity, and the gap between the level of national modernization and the world's advanced level can change. With regard to the relative levels, about 90 percent of the developed countries in the world will continue to be developed countries and about 90 percent of the underdeveloped countries will continue to be underdeveloped countries in 20 years. About 10 percent of the moderately and preliminarily developed countries will see a rise in their status and about 20~30 percent of them will see a decline in their status. If the process in which a developing country is elevated to a developed country is called modernization realization, about 10 percent of the developing countries will realize modernization in 20 years.

2. Regional Modernization Theory

The regional modernization theory is a systematic theoretical exposition of the basic laws and characteristics of the regional modernization process since the 18th century. He Chuanqi holds that like the classical modernization theory and the second modernization theory, the regional modernization theory should comprise five basic elements: the theoretical implications of regional modernization, the laws and features of the regional modernization process, the results of regional modernization – two types of modernity (goal of regional modernization), and the dynamics and modes of regional modernization.

(1) Theoretical implications. Regional modernization refers to the historical process and its

profound changes, in which the regions reach, maintain and catch up with the world's advanced level in the economic, social and other fields. It is both the process in which the developed regions reach and maintain the world's advanced level and also the process in which the developing countries catch up with and reach the world's advanced level. And it is both the state-function of the continuous changes in which the developed countries maintain the world's advanced level and also the objective-function of the changes in which the developing countries catch up with the world's advanced level.

(2) Laws of process. The process of regional modernization from the 18th to the 21st century can be divided into two major periods. The first period is called regional first modernization, which refers to the process of the transformations from agricultural economy to industrial economy, from agricultural society to industrial society and from agricultural civilization to industrial civilization. The second period is called regional second modernization, which refers to the process of the transformations from industrial economy to knowledge economy, from industrial society to knowledge society and from industrial civilization to knowledge civilization. Regional second modernization is not the end of regional development, and there will be new modernizations in the future. The transformation of the economic structure in the regional modernization process is flexible, instead of being absolute. The developed regions have completed the two periods of their modernization process successively, and the developing regions can complete the two periods of their modernization process either successively or simultaneously in a coordinated way. The latter is called the new road of integrated modernization.

The process of regional modernization in general observes four basic principles: the principle of process asynchrony, the principle of spatial unevenness, the principle of structural stability and the principle of status changeability. The probability of the changes in the relative status of regional modernization is not entirely identical in the countries with different levels of modernization. The experience of the European and American countries indicates that for a 20-year period, about 80 percent of the high-level regions will remain at the high level, about 70 percent of the moderate-level regions will continue to be at the moderate level, about 60 percent of the preliminary-level regions will remain at the preliminary level and about 80 percent of the low-level regions will continue to be at the low level (Figure 4). While about 20 percent of the high-level regions are likely to see their status declining, about 20 percent of the moderate-level regions are likely to see their status rising and about 10 percent of them are likely to see their status declining. About 30 percent of the preliminary-level regions are likely to see their status rising and about 10 percent of them are likely to see their status declining. The probability that the low-level regions will see their status rising is about 20 percent. The probability of status change

in regional level is bigger than that in national level.

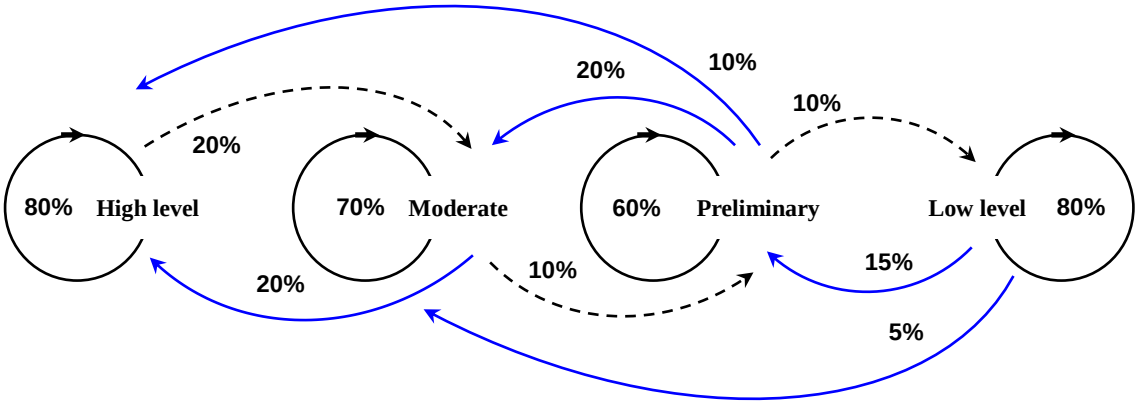

Figure 4 Probability rate of the transfer of levels of the regional modernization in 20 years [1]

(3) Result and objective. The result of regional first modernization is the realization and popularization of first modernity, and the result of regional second modernization is the realization and popularization of second modernity. The result of regional new integrated modernization is the interaction and interchange between first modernity and second modernity. The second modernization theory outlines both first modernity and second modernity. The first objective of regional modernization is to complete first modernization, its second objective is to complete second modernization, and its third objective is to reach and maintain the world's advanced level and realize integrated modernization. Comprehensive human development is the essence of regional modernization.

(4) Dynamics. The main driving forces of regional first modernization are investment, technological advance, industrialization and urbanization, and those of regional second modernization are knowledge innovation, institution innovation and human capital. The main driving forces of regional new integrated modernization are education, investment, industrialization, informatization, urbanization, suburbanization, technology innovation and institution innovation. The economic development arising from regional first modernization can be interpreted with the classical economic theory and the neo-classical economic theory. But the economic development arising from regional second modernization and new integrated modernization should be interpreted with the new growth theory and the regional new development theory.

(5) Mode. The modes of development for regional first and second modernizations can be diverse, which are subject to the impact of the geographic conditions, basic capacities and external environment of the regions. The modes of development for regional first modernization are

diverse combinations of industrialization and urbanization, those for regional second modernization are diverse combinations of knowledgeablization, informatization, globalization, suburbanization and regional innovation systems, and those for regional new integrated modernization are diverse combinations of industrialization, informatization, urbanization and suburbanization.

In addition to the above basic principles, the regional modernization theory can be divided into at least seven branches and eight schools, such as the regional economic modernization theory, the regional social modernization theory, the regional political modernization theory, the regional cultural modernization theory, the regional citizen modernization theory, the regional ecological modernization theory, the regional classical modernization theory, the regional second modernization theory and the regional new integrated modernization theory.

Currently, regional modernization studies have at least 50 major research topics in the fields of theories and cases, strategies and modes, and policies and management. The report outlines the general methods for regional modernization studies.

III. Road to China's Regional Modernization

1. Status of China's Regional Modernization

The basic features of China's regional modernization process are that the process is asynchronous, the inter-regional gap in the levels of regional modernization is tangible, the structure of the levels of regional modernization is basically stable, and the relative status of the levels of regional modernization is changeable. This indicates that China's regional modernization process conforms to the four basic principles of regional modernization, namely the principles of process asynchrony, spatial unevenness, structural stability and status changeability.

The level of China's regional modernization is uneven. The Yangtze River Delta, the Pearl River Delta and the Bohai Sea Rim have relatively high levels of regional modernization. In the regional term, the level of regional modernization is also uneven.

First, the level of modernization is uneven among China's northern area, southern area and western area. If Hong Kong, Macao and Taiwan are included in the southern area, the southern area has a higher level of modernization than the northern area and both the southern and northern areas have higher levels of modernization than the western area. If Hong Kong, Macao and Taiwan are excluded from the southern area, the northern area in China's mainland has a higher level of modernization than the southern area.

Next, the level of modernization is uneven among China's eight major regions. Among the eight major regions in China's mainland, the northern coastal region and the eastern coastal region

have the highest levels of modernization. The northeast region, the southern coastal region, the middle reaches of the Yellow River and the middle reaches of the Yangtze River have relatively higher levels of modernization, and the northwest region and the southwest region have relatively lower levels of modernization.

Third, the level of modernization is uneven among China's three major belts. The east belt has a higher level of modernization than the central belt, and the central belt has a higher level of modernization than the west belt. This pattern forms a "scissors difference" with the average elevations of the three belts.

2. Strategic Options for China's Regional Modernization

The strategic options for China's regional modernization in general comprise the selection of four elements: the basic theory for strategy formulation, the strategic goal, the strategic path (road) and the strategic mode (tool). Regional modernization can select the regional modernization theory as its theoretical basis, and at the same time take several regional development theories as reference. Together, they can form a basic theory for formulating regional modernization strategies and policies.

(1) Goal selection. China's regional modernization at the national level for the first half of the 21st century comprises two goals.

The first goal of regional modernization is to realize first modernization. The country as a whole should complete first modernization around 2020. Regionally, China's 34 regions will all complete first modernization and enter the period of second modernization around 2040. If regional political and cultural modernizations are excluded and if only regional economic, social and knowledge modernizations are included, the number of the regions that will completely realize first modernization will be eight in 2010, 18 in 2020, 28 in 2030, and 34 in 2040. The whole country will complete industrialization and urbanization by 2040.

The second goal of regional modernization is to catch up and reach the world's advanced level at the time. According to the three-step strategy designed by Mr. Deng Xiaoping, the whole country will reach the level of the moderately developed countries around 2050. Regionally, the number of those among China's 34 regions that are expected to reach the level of the developed or moderately developed countries at the time will be eight in 2010, 10 in 2020, 12 in 2030, 14 in 2040 and 17 in 2050. Conversely, the number of the regions that are expected to fail to reach the level of the moderately developed countries at the time will be 26 in 2010, 24 in 2020, 22 in 2030, 20 in 2040 and 17 in 2050.

(2) Road selection. This report holds that China's regional modernization at the national level can choose the road of new integrated modernization. While the developed regions (which have

completed first modernization) may choose the road of second modernization, the moderately developed regions, the preliminarily developed regions and the underdeveloped regions may choose the road of new integrated modernization.

From the perspective of path, China's regional modernization should select the road of new integrated modernization for three main reasons.

First, the third strategic goal for realizing national modernization requires that the road of new integrated modernization should be selected. Only when the road of new integrated modernization is chosen and the "canal strategy" is implemented to pursue new industrialization can the country catch up with the world's advanced level and basically realize modernization.

Second, China possesses the conditions to select the road of new integrated modernization. Currently, China's regional modernization is characterized by the co-existence of the two modernizations and the coastal developed regions and the metropolitan regions are having growing factors for second modernization.

Third, the general catch-up road of modernization is not suitable for China's developed and moderately developed regions. In 2000, China had six developed and moderately developed regions that had completed or basically realized first modernization. These regions must vigorously pursue second modernization and participate in the international competition for second modernization.

From the perspectives of distribution and structure, China's regional modernization should select a road of moderately balanced development for three main reasons.

First, China does not have the conditions for choosing balanced development. If a country has a very high level of modernization or not too large a scale, it is proper for such a country to choose balanced development. China is a major developing country, with the largest population and the third largest territory in the world. It is only too natural for the country to have uneven levels of regional modernization. This unevenness cannot be changed within the country's national strength.

Second, it is not appropriate for China to choose the road of uneven development. China is a multi-ethnic country. If regional gaps are too large, they will cause political risks and impede the healthy and sustained development of the national economy. Regional unevenness is an objective reality. If the country chooses the road of uneven development, this regional unevenness will continue to widen.

Third, China has the need and conditions to choose the road of moderately balanced development. The realization of the national modernization goal requires that all the regions should reach certain levels of modernization. The Chinese government is a strong government and

the Chinese economy already has certain strength to support moderately balanced development.

3. Strategic Distribution of China's Regional Modernization

If the regional modernization in the developed countries is a "natural evolution", the regional modernization in the developing countries can be a system engineering, which requires systematic design and careful organization and implementation. As China is a large developing country, its regional modernization should also be a system engineering.

(1) Distribution of regional modernization at national level. This report holds that the strategic distribution of China's regional modernization can be arranged according to "three major areas and eight major regions". The three major areas are the northern area, the southern area and the western area. The eight major regions are the northeast region, the northern coastal region, the eastern coastal region, the southern coastal region, the middle reaches of the Yellow River, the middle reaches of the Yangtze River, the southwest region and the northwest region. If modernization can succeed in the western area, a national 品-shape strategic pattern (triangle pattern) for regional modernization will be formed, in which "the southern and northern areas fly side by side, the eastern and western regions interact with each other, the eight regions race against each other and the evenness is moderate". The urban and rural distribution of regional modernization should be considered in conjunction with the three major areas, the eight major regions and the levels of regional modernization. The distribution should be human-oriented and aimed at catching up with the world's advanced level.

(2) Distribution of regional modernization at regional level. The distribution of modernization among China's 34 provincial regions requires a special study. Regional distribution should take four principles into account: the regions with different levels of modernization require different modes of distribution, regional distribution should conform to local conditions and strength, regional distribution should conform to the overall distribution of national modernization, and full consideration should be given to the impact of the international and domestic environments.

4. Strategic Measures for Promoting Regional Modernization

This report proposes six measures for promoting China's regional modernization: three national measures and three provincial measures.

(1) A national agency for regional development should be set up.

(2) Active efforts should be made to explore and promote the road of new integrated modernization and the canal strategy.

(3) Active efforts should be made to explore and promote the human-oriented strategy for

moderately balanced development.

(4) The provincial regions should study and formulate their strategies for regional modernization.

(5) The provincial regions may establish research centers for regional modernization.

(6) The provincial regions should study and publish regional modernization reports.

IV. Modernization Indexes of the World and China

The modernization indexes comprise the degree of first modernization realization, the second modernization index and the integrated modernization level index. The degree of first modernization realization can better indicate the actual levels of the developing countries and regions, the second modernization index can better indicate the actual levels of the developed countries and regions, and the integrated modernization level index can better indicate the relative gap between the developed and developing countries and regions on the one hand and the world's advanced level on the other. As different countries and regions are in different phases of modernization, a combination of the three can more truthfully indicate the levels of modernization in the world and in different countries and regions.

1. World Modernization Index 2001

(1) Overall level in 2001. Of the 131 evaluated countries, 24 or about 18 percent of all the country samples entered the period of second modernization, 27 countries comprehensively completed first modernization and 38 countries basically realized first modernization. The countries that completed or basically realized first modernization accounted for 50 percent of all the country samples.

In 2001, all the developed countries entered the period of second modernization. Some of the moderately developed countries entered the period of second modernization and some completed or basically realized first modernization. Some countries made progress in first modernization, some countries remained in traditional agricultural society, and some ethnic groups still lived in primitive society.

(2) World frontrunners in 2001. The frontrunners in world modernization reached the developing phase of second modernization. In 2001, about 12 countries were in the developing phase of second modernization, and their level of modernization basically reflected the advanced level of world modernization. They were Sweden, the United States, Denmark, Germany, the Netherlands, Australia, Britain, Belgium, Canada, Singapore, France and Austria.

(3) International gap. From 1990 to 2001, both the relative and absolute gaps in the level of

world first modernization did not change much, but the relative and absolute gaps in the level of second modernization widened somewhat. The relative and absolute gaps in the level of integrated modernization also widened somewhat.

(4) Country catch-up. Classified according to the levels of second modernization, eight countries saw their group rankings changed from 2000 to 2001. Four countries saw their group rankings rising and another four saw their group rankings declining. Based on the changes in the integrated modernization level index, 31 countries saw their levels of integrated modernization rising during the 2000~2001 period, 35 saw their levels declining and 65 saw their levels unchanged. Of the 31 countries whose levels of integrated modernization rose, 26 were the developing countries, whose gaps with the world's advanced level narrowed.

(5) The unevenness of world modernization in 2001 was manifested in roughly five areas.

A. The unevenness in the process of modernization in different countries. While some countries already entered the period of second modernization, some were yet to enter the period of first modernization and some ethnic groups still lived in primitive society.

B. The unevenness in the speed of modernization in different countries. Some countries were fairly fast while some were very slow.

C. The unevenness in the level of modernization in different countries. Some countries had very high levels while some had very low levels.

D. The unevenness in the indicators of world modernization. Some indicators had fairly small inter-country gaps and some indicators had extremely large inter-country gaps.

E. The unevenness in the geographic distribution of world modernization. The five continents had different average levels of modernization. In the relative term, the level of Europe was fairly high, the levels of America and Asia were moderate and the level of Africa was fairly low.

2. China's National and Regional Modernization Indexes

(1) National level. In 2002, China remained in the developing phase of first modernization, with its degree of first modernization realization being 79 percent or one percentage point higher than in 2001. China's ranking based on the degree of first modernization realization in 2001 was 62nd among the 108 countries. Also in 2001, China's second modernization index was 31 points, ranking 59th among the rated 108 countries.

(2) Regional level. China's Hong Kong, Macao and Taiwan already completed first modernization and Hong Kong and Macao already entered the period of second modernization. In 2002, Beijing, Tianjin and Shanghai had nine indicators reaching the standards of first modernization, Liaoning had seven indicators reaching the standards, and Jiangsu, Guangdong and Heilongjiang had six indicators reached the standards. Based on the classification standard of this

report, these seven regions basically realized first modernization but still had a long way to go before completing first modernization.

If Beijing, Tianjin, Shanghai, Hong Kong, Macao and Taiwan are excluded, the top 10 rankings based on the degree of first modernization realization in 2002 were Zhejiang, Liaoning, Jiangsu, Heilongjiang, Guangdong, Hubei, Jilin, Shanxi, Chongqing and Fujian. Their levels of first modernization were higher than the national average value.

Based on the levels of integrated modernization from 2001 to 2002, 14 regions saw their relative levels of modernization rising and their gaps with the world's advanced level narrowing. The 14 regions were respectively Beijing, Zhejiang, Liaoning, Jiangsu, Guangdong, Jilin, Heilongjiang, Sichuan, Inner Mongolia, Shanxi, Xinjiang, Hubei, Hainan and Shanghai.

Of the 31 regions in China's mainland, the largest gap between their level of regional first modernization and that of the countries that had completed classical modernization was about 40 percentage points, the smallest gap was three percentage points and the average gap was 22 percentage points. The largest gap between their level of regional second modernization and the world advanced level was 78 points, the smallest gap was 24 points, and the average gap was 69 points. The largest gap between their level of regional integrated modernization and the world's advanced level was 76 points, the smallest gap was 33 points and the average gap was 67 points.

In addition, the appendixes of this report contain the data about the economic, social and knowledge developments in the 50 states and 195 counties of the United States, 73 regions of the European Union, and 48 regions of Mexico and India, which can be used for reference when discussing China's regional modernization.

China's regional modernization cannot be exhausted in one research report. It is a system engineering. We hope the publication of this report is the beginning, instead of the ending, of this system engineering, which can stimulate thinking of people from various walks of life and experts and scholars, and discuss regional modernization.

Reference

Research Group for China Modernization Strategies. 2004. China Modernization Report 2004: Regional Modernization. Beijing: Peking University Press.

世界范围的地区现代化

何传启

中国科学院中国现代化研究中心

发现事实，尊重规律，是科学的基本准则。今天的事实是，世界人口已经超过 60 亿，世界民族约有 3000 多个，世界国家约有 190 多个；世界上可利用资源是有限的，地球上可再生资源是有限的，人类发展的需求是无止境的。所以，国家和民族的发展，不可能回避国际竞争和资源压力。要在众多国家和民族的世界竞争中，立于不败之地，掌握自己的命运，就需要实现现代化。前三期《中国现代化报告》比较系统地阐述了国家现代化的事实和规律。本期报告主题是地区现代化，重点探讨地区现代化的事实、规律和道路（图 1）。

如果把地区理解为国家内部的不同区域或不同地理部分，那么，地区现代化是国家现代化的组成部分。没有地区现代化，就没有国家现代化。中国要实现现代化，需要同步推进国家和地区现代化。分析其他国家和地区的现代化，了解与地区现代化相关的理论，可以为我们研究和制定地区现代化战略提供启示和借鉴。他山之石，可以攻玉。知己知彼，百战不殆。

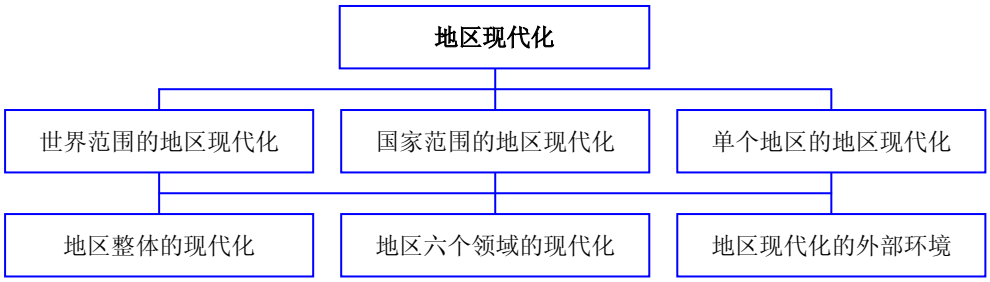

图 1　地区现代化的分析结构

注：世界范围的地区现代化指世界不同国家的地区现代化。

一、世界 18 个国家地区现代化的基本事实和重要启示

世界 190 多个国家现代化进程很不平衡。不同现代化水平的国家，国家内部地区现代化有一些不同特点。本报告选择美国、欧盟国家、墨西哥和印度等 18 个国家，作为发达国家和发展中国家案例分析的样本[1]。首先，采用定量分析方法，简要分析美国、英国、墨西哥和印度 20 世纪一百年经济、社会和知识领域现代化的主要事实。其次，采用定量分析和统计学方法，简要分析美国、欧盟国家、墨西哥和印度等 18 个国家 170 多个地区现代化的主要事实；定量分析美国 8 大地区、50 个州和 195 个县的现代化。其三，归纳总结 16 个基本事实和 9 个重要启示。

1、世界 18 个国家地区现代化的 16 个基本事实

其一，地区现代化是客观存在的。在 18 个国家 171 个地区的发展过程中，地区经济差距的缩小和扩大，地区发展水平的趋同和趋异，地区相对水平的追赶和退步等现象，普遍存在。地区相对水平的变化包括：先进保先进、后进赶先进、先进退步为后进、后进仍然为后进等现象。这些与国家现代化现象是基本一致的。

其二，地区现代化遵循国家现代化的一般规律。在 18 个国家的地区现代化过程中，经典现代化的工业化和城市化、第二次现代化的知识化和信息化等现代化的基本规律，都被地区历史统计数据和学者们的分析所验证。地区现代化包括政治现代化，地区的政治现代化是由国家政治决定的。没有国家的政治现代化，就没有全面的地区现代化。

其三，地区现代化不是国家现代化的简单“缩小”。地区是国家的组成部分，地区现代化是国家现代化的组成部分。国家内部地区现代化的模式和道路具有多样性，例如，美国 50 个州和 195 个县的现代化，在工业化和城市化等方面，与美国国家现代化有很多不同。

其四，地区现代化过程中的地区互动。地区之间既相互竞争，又相互依存。在自由竞争条件下，市场作用力将拉大地区差距。地区之间经济和人口流动，国家干预，例如通过财政和政策杠杆（如转移支付和优惠政策等）调节，可以促进地区间的协同发展。

其五，地区现代化与地区基础能力的关系紧密。西班牙学者研究发现成功地区的主要特点有：①地区城市系统在经济增长和生产活动中扮演重要角色。②容易获得人力资本，合格劳动力的供应稳定。③具有开放性和参与能力。④容易获得先进的生产服务，如战略规划、技术咨询、商业化和出口、研究与开发、专业的金融服务等。⑤地区政府和组织系统非常高效。⑥具有吸引外部投资的“吸引力”。

其六，地区现代化进程具有不平衡性。从 18 个国家地区现代化的发展水平和发展阶段看，地区之间都存在很大差异。发达国家的地区差距小于发展中国家，进入第二次现代化时期的国家的地区差距小于处于第一次现代化时期的国家。

地区经济现代化的 4 个基本事实是：

其七，地区经济现代化本质是生产力水平的提高。

其八，地区经济中农业比重减少现象普遍存在，但不是绝对的，具有一定弹性。

其九，地区经济工业化和非工业化都具有一定弹性，不是绝对的（图 2）。

其十，地区经济服务化（服务业比重增加）是必然趋势。

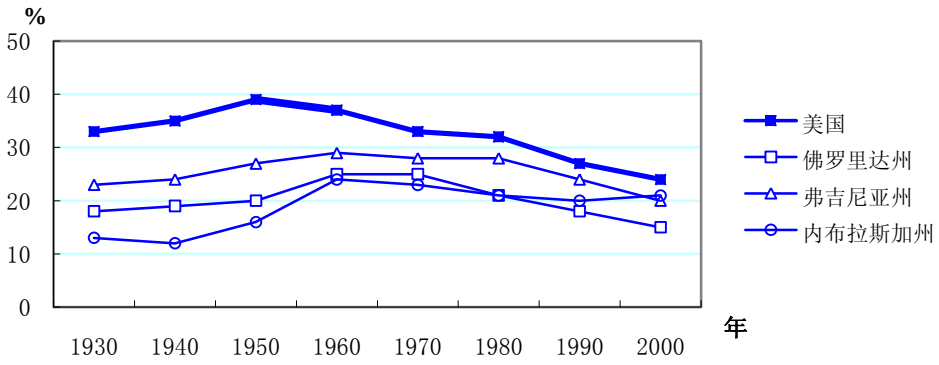

图 2　1930-2000 年美国及其 3 个州的工业增加值占 GDP 比例的变化[2]

注：工业增加值占 GDP 比例没有达到 30%的时候，就出现工业比例下降。

地区社会现代化的 3 个基本事实是：

十一，地区社会现代化本质是居民生活水平的提高。

十二，地区的城市化和郊区化都具有一定弹性，不是绝对的（图 3）。

十三，地区基础设施的现代化有重要意义。

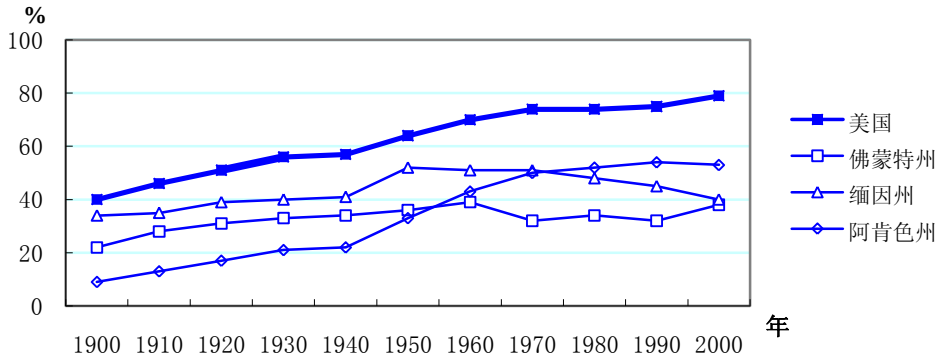

图 3　1900-2000 年美国及其 3 个州的城市化率的变化[3]

注：城市化率没有达到 60%的时候，就出现城市化率下降。

地区知识领域现代化的 3 个基本事实是：

十四，地区知识领域现代化本质是科学知识和信息生产能力和普及程度的提高；

十五，地区知识领域现代化包括“普及免费义务教育”和“知识化信息化”两个阶段；

十六，发达国家和发展中国家地区知识领域现代化模式不同。

2、世界 18 个国家地区现代化的 9 个重要启示

其一，在一级地区（省级地区），地区现代化与国家现代化具有较强一致性。

其二，在二级地区（县级地区），地区现代化与国家现代化的关系具有多样性。

其三，地区现代化进程的不同步和不平衡现象是普遍存在的。

其四，地区间差距的扩大和缩小现象是普遍存在的。

其五，城乡差距的波动和缩小现象是普遍存在的。

其六，收入差距的扩大和缩小现象是普遍存在的，收入分配需要政府调控。

其七，人口和经济活动分布的演变过程可以分为集中与分散两个阶段。

其八，发达国家的地区现代化过程具有两个大阶段和多种发展模式。

其九，地区相对水平位置的转移概率具有一定的共性。

如果把工业化看成是从农业文明向工业文明的转变，那么，地区工业化是必须的。如果把工业化定义为产业结构和就业结构从农业向工业的转变，那么，地区工业化有很大弹性。非工业化是经济和文明发展的一个新阶段，而且在地区之间有比较大的弹性。

如果把城市化理解为从农业文明向城市文明转变的形式，那么，地区城市化是必须的。如果把城市化定义为城市人口比重的增加，那么，地区城市化有很大弹性。生活在农村也可以享受城市文明。郊区化既是城市文明的扩散，又是城市文明的新发展，而且有较大弹性。

二、地区现代化理论

1、地区现代化的相关理论

地区现代化过程包括地区经济、社会、政治、知识和文化等各方面的变迁。所以，各个领域的科学理论，特别是各种发展理论，都可以为地区现代化理论做出贡献。例如经济发展理论、经济增长理论、政治发展理论、文化变迁理论、社会发展理论、区域发展理论、经济地理理论等。本报告重点介绍了经济发展和增长理论、区域发展理论等。

现代化理论诞生于 20 世纪 50～60 年代。50 年代以来，世界现代化研究出现了经典现代化研究、后现代研究和新现代化研究三次浪潮。《中国现代化报告 2003》[4]简要综述了三次浪潮的理论成果，包括经典现代化理论、依附理论、世界体系理论、后现代化理论、生态现代化理论、再现代化理论和第二次现代化理论等。本报告介绍了经典现代化理论和第二次

现代化理论。

本报告首次阐述第二次现代化理论的四个基本原理，即广义现代化的进程不同步原理、空间不均衡原理、结构稳定性原理和地位可变迁原理。具体而言，世界现代化进程是不同步的，现代化水平和要素的空间分布是不均衡的，世界现代化水平分布的结构是相对稳定的，但是，国家在世界现代化进程中的相对地位是可以变化的，而且变化是有规律的，国家现代化水平与世界先进水平的差距也是可变的。就相对水平而言，在 20 年内，世界大约 90%的发达国家仍将是发达国家，大约 90%的欠发达国家仍将是欠发达国家，中等发达和初等发达国家地位升级的概率约为 10%，降级的概率约为 20～30%。如果把发展中国家升级为发达国家称为实现现代化，那么，20 年里发展中国家实现现代化的概率约为 10%左右。

2、地区（区域）现代化理论

地区（区域）现代化理论是对 18 世纪以来地区（区域）现代化进程的基本规律和特征的系统的理论阐述。何传启认为，同经典现代化理论和第二次现代化理论一样，地区（区域）现代化理论应该包括五个基本要素：地区现代化的理论含义、地区现代化过程的规律和特点、地区现代化的结果——两种现代性（地区现代化目标）、地区现代化的动力和模式等。

首先，理论含义。地区现代化指 18 世纪工业革命以来地区经济社会等各方面达到、保持及追赶世界先进水平的历史过程及其深刻变化。它既是发达地区达到并保持世界先进水平的过程，又是发展中地区追赶和达到世界先进水平的过程；既是发达地区保持的世界先进水平的连续变化的状态函数，又是发展中地区追赶世界先进水平的变化的目标函数。

其次，过程规律。在 18～21 世纪期间，地区现代化过程可以分为两大阶段。第一阶段简称为地区第一次现代化，指从农业经济向工业经济、农业社会向工业社会、农业文明向工业文明的转变过程；第二阶段简称为地区第二次现代化，指从工业经济向知识经济、工业社会向知识社会、工业文明向知识文明的转变过程；地区第二次现代化不是地区发展的终结，将来还有新的现代化。地区现代化过程中经济结构转变是有弹性的，不是绝对的。发达地区现代化过程的两个阶段是先后进行的；发展中地区现代化过程可以两个阶段先后进行，也可以是两次现代化协调发展，走新型综合现代化道路。

地区现代化过程一般遵循四个基本原理：进程不同步原理、空间不均衡原理、结构稳定性原理和地位可变迁原理。不同水平国家地区现代化相对地位变迁的概率不完全相同。根据欧美国家经验，在 20 年里，高水平地区大约 80%左右仍然是高水平的，中等水平地区大约 70%左右仍然是中等水平，初等水平地区大约 60%仍然是初等水平，低水平地区大约 80%仍然是低水平地区；高水平地区降级的概率约为 20%左右；中等水平地区升级的概率约为 20%左右，降级的概率约为 10%左右；初等水平地区升级的概率约为 30%左右，降级的概率约为 10%左右；低水平地区升级的概率约为 20%（图 4）。地区的地位变化的概率高于国家的地位变化的概率。

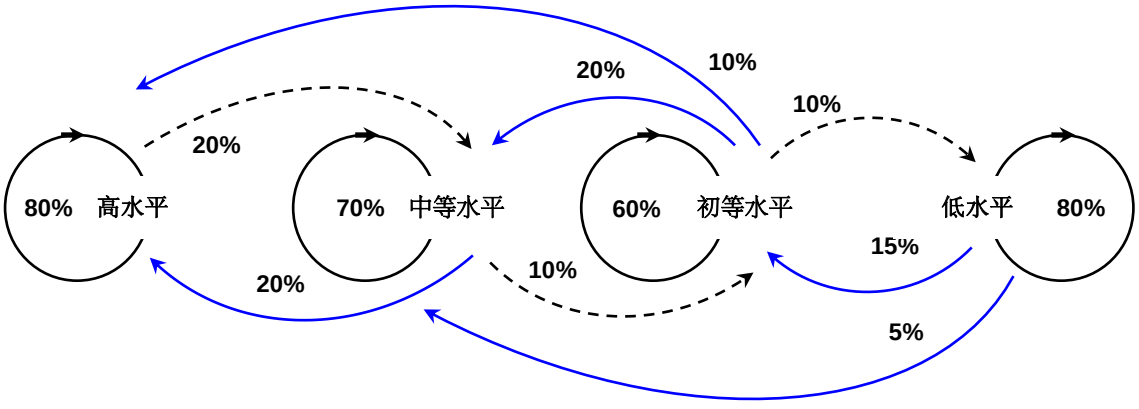

图 4　20 年里地区现代化水平的转移概率的参考值[1]

其三，结果和目标。地区第一次现代化的结果是第一现代性的实现和普及，地区第二次现代化的结果是第二现代性的发展和普及，地区新型综合现代化的结果是第一现代性和第二现代性的互动和转换。第二次现代化理论阐述了第一现代性和第二现代性。地区现代化第一个目标是完成第一次现代化；地区现代化第二个目标是完成第二次现代化，地区现代化第三个目标是达到并保持世界先进水平，实现综合现代化。人的全面发展是地区现代化的实质。

其四，动力。地区第一次现代化的主要动力是投资、技术进步、工业化和城市化等，地区第二次现代化的主要动力是知识创新、制度创新和人力资本等，地区新型综合现代化的主要动力则是教育和投资、工业化和信息化、城市化和郊区化、技术和制度创新等。地区第一次现代化的经济发展可以用古典经济理论和新古典经济理论来解释；地区第二次现代化和新型综合现代化的经济发展，更多地要用新增长理论和区域新发展理论等来解释。

其五，模式。地区两次现代化的发展模式都是多样的，受地区地理条件、基础能力和外部环境的影响。地区第一次现代化的发展模式是工业化和城市化等的多种组合，地区第二次现代化的发展模式是知识化、信息化、全球化、郊区化和地区创新体系等的多种组合，地区新型综合现代化的发展模式是工业化、信息化、城市化和郊区化等的多种组合。

地区（区域）现代化理论，除上述基础理论外，还至少可以分为 7 个分支和 8 个流派，例如，地区经济现代化理论、地区社会现代化理论、地区政治现代化理论、地区文化现代化理论、地区人的现代化理论、地区生态现代化理论、地区经典现代化理论、地区第二次现代化理论、地区新型综合现代化理论等。地区现代化研究，目前在理论与案例、战略与模式、政策与管理等方面，至少有 50 个重大课题需要研究。报告提出了地区现代化研究的一般方法。

三、中国地区现代化之路

1、中国地区现代化的现状

中国地区现代化进程的基本特点是：地区现代化进程是不同步的，地区现代化水平的地区差距是明显的，地区现代化水平的结构是基本稳定的，地区现代化水平的相对地位是可以变化的。这表明中国地区现代化进程，符合地区现代化的四个基本原理，即进程不同步原理、空间不均衡原理、结构稳定性原理和地位可变迁原理。

中国地区现代化水平不平衡。长江三角洲、珠江三角洲和环渤海地区现代化水平比较高。就分区而言，也是不平衡的。首先，中国北方片、南方片和西部片的现代化水平不平衡。如果把港澳台计算在南方片内，那么，中国南方片现代化平均水平高于北方片，南方片和北方片现代化水平都高于西部片。如果把港澳台单列，不计算在南方片内，那么，大陆内地北方片现代化平均水平高于南方片。其次，中国八大区域的现代化水平不平衡。在中国大陆内地八大区域中，华北沿海和华东沿海是现代化水平最高的地区，东北地区、华南沿海、黄河中游和长江中游地区是现代化水平比较高的地区，西北地区和西南地区是现代化水平比较低的地区。其三，中国三大地带的现代化水平不平衡。东部地区现代化水平高于中部地区，中部地区现代化水平高于西部地区。这与中国三大地带的平均海拔高度形成一个“剪刀差”。

2、中国地区现代化的战略选择

中国地区现代化战略选择一般包括对四个要素的选择：制定战略的基础理论、战略目标、战略路径（道路）、战略模式（手段）等。地区现代化，可以选择地区现代化理论为基础理论，同时参考几种区域发展理论。它们可以作为制定地区现代化战略和政策的一种基础理论。

其一，目标选择。21 世纪前 50 年中国国家层面的地区现代化目标包括两个目标。

地区现代化第一个目标是完成第一次现代化。全国平均大约在 2020 年前后完成第一次现代化。就地区而言，中国 34 个地区将在 2040 年前后全部完成第一次现代化，全部进入第二次现代化。如果不包括地区政治和文化现代化，只考虑地区经济、社会和知识领域现代化，那么，地区第一次现代化实现程度达到 100%的地区，2010 年约有 8 个，2020 年约有 18 个，2030 年约有 28 个，2040 年约有 34 个。2040 年全国全部完成工业化和城市化等。

地区现代化第二个目标是追赶和达到当年世界先进水平。根据邓小平同志的三步走战略，全国在 2050 年前后达到世界中等发达国家水平。就地区而言，中国 34 个地区中，达到当年世界发达国家或中等发达国家水平的地区个数，2010 年约为 8 个，2020 年约为 10 个，2030 年约为 12 个，2040 年约为 14 个，2050 年约为 17 个左右；没有达到当年世界中等发达国家水平的地区个数依次约为 26 个、24 个、22 个、20 个和 17 个左右。

其二，道路选择。本报告认为，中国国家层面的地区现代化可以选择新型综合现代化道路；中国发达地区（已经完成第一次现代化的地区）可以选择第二次现代化道路，中等发达地区、初等发达地区和欠发达地区可以选择新型综合现代化道路。

中国地区现代化，从路径角度考虑，应该选择新型综合现代化道路。主要理由有三个：其一，实现国家现代化第三步战略目标要求选择新型综合现代化道路。通过走新型综合现代化道路，实施“运河战略”，推进新型工业化，才有可能赶上世界先进水平，基本实现现代化。其二，中国具备选择新型综合现代化道路的条件。目前中国地区现代化是两次现代化并存，沿海发达地区和大城市地区第二次现代化的因素日益集聚。其三，一般追赶现代化道路不适合于我国发达和中等发达地区。2000 年我国有 6 个发达和中等发达地区，它们已经完成或基本实现第一次现代化，必须大力推进第二次现代化，参与第二次现代化的国际竞争。

中国地区现代化，从布局和结构角度考虑，应该选择适度均衡发展道路。主要理由有三个：其一，中国不具备选择均衡发展的条件。当国家现代化水平很高或国家规模不太大时，选择均衡发展是比较合适的。中国是一个发展中大国，人口总数排世界第一，国土面积排世界第三，地区现代化水平不均衡是自然的，也是国力所不能改变的。其二，中国不适合选择不均衡发展道路。中国是一个多民族国家。地区差距过大，一方面会产生政治风险，另一方面会制约国民经济的健康持续发展。地区不均衡是客观存在的，如果国家选择不均衡发展道路，将不断扩大地区不均衡。其三，中国具备选择适度均衡发展的需求和条件。国家现代化目标的实现，要求各个地区现代化达到一定水平。中国政府是一个强有力的政府，中国经济已经有一定实力，可以支持适度均衡发展。

3、中国地区现代化的战略布局

如果说，发达国家的地区现代化是一种“自然演化”，那么，发展中国家的地区现代化就可以是一项系统工程，需要系统设计，精心组织与实施。中国地区现代化也是一项系统工程。

其一，国家层面的地区现代化布局。本报告认为，中国地区现代化的战略布局可以按“三大片、八大区”来考虑。三大片是北方片、南方片和西部片，八大区是东北地区、华北沿海地区、华东沿海地区、华南沿海地区、黄河中游地区、长江中游地区、西南地区和西北地区。如果西部片现代化获得成功，终将形成国家层面地区现代化的“南北比翼、东西互动、八区竞赛、适度均衡”的“品”字型战略布局。城市和农村的地区现代化布局，可以和三大片、八大区、地区现代化水平分类结合起来考虑。以人为本，迎头赶上世界先进水平。

其二，地区层面的地区现代化布局。中国 34 个省级地区的现代化布局需要专门研究。地区布局要考虑四个原则：不同水平的地区需要不同的布局，地区布局要因地制宜、量力而行，地区布局要服从于国家现代化的整体布局，要充分考虑国际和国内环境的影响。

4、促进地区现代化的战略措施

本报告提出了促进中国地区现代化的六条措施。其中三条是关于国家层面的，三条是

关于省级地区现代化的。（1）成立国家地区开发署；（2）积极探索和促进新型综合现代化道路和运河战略；（3）积极探索和推进以人为本、适度均衡发展战略；（4）省级地区研究制定地区现代化战略；（5）省级地区可以成立地区现代化研究中心；（6）省级地区研究出版地区现代化报告。

参考文献

1.中国现代化战略研究课题组等(2004)*中国现代化报告 2004——地区现代化之路*. 北京：北京大学出版社

2.US BEA (2002) State and Local Personal Income [EB/OL]. http://www.bea.doc.gov

3.US Census Bureau (various years) *Statistical Abstract of the United States*. Washington DC: DOC

4.中国现代化战略研究课题组等(2003)*中国现代化报告 2003——现代化理论与展望*. 北京：北京大学出版社

World Modernization outline: 1700-2100

Chuanqi He
China Center for Modernization Research, Chinese Academy of Sciences

The human history is a history of innovation in some content. The revolution of tool manufacturing differentiated human from animals, so that human beings entered the time of primitive culture development. Agricultural revolution turned the human from food gatherer to food producer, so that human beings entered the period of agricultural civilization development. Industrial revolution turned the human from manual producer to mechanized producer, thus human beings went into the age of industrial civilization. Knowledge revolution changed the human from pursuer of material consumption into the pursuer of spiritual consumption, so that human beings entered the period of knowledge-based civilization development. The change from agricultural to industrial civilization formed the first modernization, while the change from industrial to knowledge-based civilization was the second modernization. The nature of world modernization is a radical change of human civilization, and historic change from traditional civilization to neo-civilization, thus making human civilization march toward another era.

Starting from the Industrial Revolution in 1760s, the world modernization has developed for about 250 years. If we set the end at late 21st century, the world modernization will have lasted 340 years. In the past two and a half centuries, the formation, development, transformation and interaction of modern civilization and countries create the history and current situation of the world modernization; in the 21st century, the world modernization will continue its improvement and become diversified. The past 9 China Modernization Reports (CMRs) respectively talked about theories of modernization, economic modernization, social modernization, cultural modernization, ecological modernization, international modernization, regional modernization and so on, and this time, our report will have a special discussion about world modernization[1,2]. An overall analysis of world modernization requires great space, because in the course of world modernization, different periods embody different contents, different countries show different performances, and different fields bear different features. This report will be themed at “An Outline of World Modernization”, intended to depict a digital panorama sketch of world modernization by briefly analyzing the historical course, basic principles and outlook of world modernization (Figure 1), while probing into the facts and tomorrow of China’s modernization[3].

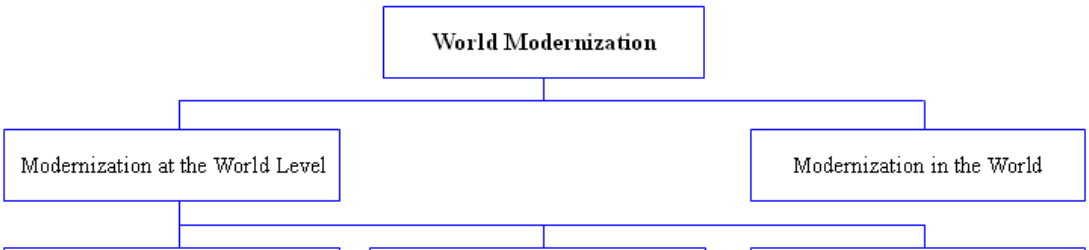

Figure 1　Analytical Structure of World Modernization

Ⅰ Facts and Outlook of World Modernization

Generally, modernization is an in-depth change of human civilization that has taken place since the 18th century; it's the formation, development, transformation and international interaction of modern civilization, as well as an international competition where different countries purse, attain and keep a world advanced level. World Modernization is a manifestation of modernization, with basically two implications: modernization at the world level and modernization within the world. The target of research in this edition of report includes both the two above; the research methods are: process analysis, time series analysis, cross-section analysis and scenario analysis; the contents of the research concern the overall modernization in the world, modernization in 6 fields around the world, modernization in 131 countries, and 100 indexes for analysis; the factors for analysis includes modernization in human life, structure, system and thought; the research theme is mainly the process, result, dynamic and model of world modernization; the time span is about 4 centuries (from 1700 to 2100). It must be noted that the 131 countries herein refer to those with a population of over 1million and complete statistics in 2000. After systematic analysis and summarization, we obtained basic information about world modernization, including 20 facts, 20 prospects and 10 inspirations.

1. Basic facts of world modernization

So far, world modernization concerns nearly 300 years of history and more than 100 countries. Analysis of facts about world modernization cannot be very comprehensive but concentrating on main points. Here 20 basic facts will be listed, but surely, these facts are just a tiny part of the full basic facts of world modernization.

No. 1 The start of world modernization is about 1760s (Industrial Revolution in Britain).

No. 2 The end of world modernization is: modernization is dynamic, and its end cannot be determined so far.

No. 3 The phases of world modernization: from 1760s till today, world modernization can be roughly divided into two phases, the first modernization and the second modernization, involving four tides, namely, mechanization in the 18th century, electrification in the 19th century, the automatization in 1950s, and informatization of 1980s. Among them, the first modernization is classical modernization with features of industrialization, urbanization and democratization; the second modernization is neo-modernization with characteristics of knowledge orientation, informatization and globalization.

No. 4 Types of world modernization: anticipatory, catching-up, endogenous, exogenous and so on.

No. 5 International structure of world modernization: advanced countries taking up 12% to 15%, others developing countries. Among the 131 sampled countries, between 1700 and 2006, the number of advanced countries being 12 to 20.

No. 6 Geographical distribution of world modernization: The Europe with higher level and Africa lower level, others being intermediate.

No. 7 The starting time of modernization in developing countries: 60 to 200 years later than countries with anticipatory modernization.

No. 8 Time for advanced countries to finish the first modernization: about 160 years on average.

No. 9 Number of countries finished the first modernization: about 35 in 2006, like Poland.

No. 10 Number of countries staying in the first modernization: about 90 in 2006, like India.

No. 11 Number of countries staying in traditional agricultural society: about 12 in 2006, like Burundi.

No. 12 Number of countries entering the second modernization: about 29 in 2006, like the USA.

No. 13 Population that achieves the first modernization: about 1.13 billion in 2006, covering about 18% of the world population.

No. 14 Population that enters the second modernization: about 970 million in 2006, covering about 15% of the world population.

No. 15 Population of advanced countries: around 820 million in 2006, taking up about 13% of the world population.

No. 16 Population that enjoys modernized life: 850 to 1000 million in 2006, taking up 13% to 16% of the world population.

No. 17 Probability of advanced countries degrading into developing countries: 8% to 23% within a century.

No. 18 Probability of developing countries upgrading into advanced countries: 1% to 5% within a century.

No. 19 International catch-up during 1960 to 2006: status upgrade of 12 countries like Japan.

No. 20 Countries that became advanced countries from developing one in the 20th century: Finland and Japan included.

According to the grouping of nations for indexes of the second modernization and integrated modernization indexes, advanced countries in 2006 included the USA, Sweden, Japan, Denmark, Finland, Norway, Australia, Switzerland, South Korea, Canada, the Netherlands, Germany, France, Belgium, New Zealand, Britain, Austria and Ireland.

2. Prospects of world modernization

The prospect of world modernization concerns more than 190 countries and over 6 billion people. Prospect analysis of world modernization cannot be comprehensive but will be brief. Listed below are 20 future scenarios that may take place.

No.1 The three paths to world modernization: the paths of the first and second modernization and the path of integrated modernization.

No. 2 The world advanced level in 2100: The second modernization indexes will be about five times of that in 2005.

No. 3 The world average level in 2100: lagging 50 years behind the world advanced level.

No. 4 International structure of world modernization: The proportion among developed countries, moderately-developed countries, primarily-developed countries and underdeveloped countries will be 15:20:28:37. There'll be about 20 developed countries, representing the world advanced level of modernization; about 25 moderately-developed countries, at the front rank of developing countries.

No. 5 Geographical distribution of world modernization: Africa with lower level, those of other regions yet to be determined.

No. 6 Number of countries finished the first modernization: 99 to 107 in 2100.

No. 7 Number of countries entering the second modernization: 84 to 89 in 2100 (Table 1).

Table 1 The prospects of world modernization in 21st century

	2005	2010	2020	2030	2040	2050	2080	2100
	Number of countries entering the second modernization							
Prospect one	28	33	37	54	59	64	81	84
Prospect two	28	36	44	58	65	74	83	89
	Number of countries finished the first modernization							

Prospect one	34	38	60	69	79	86	104	107
Prospect two	34	39	61	69	80	86	97	99

Note: The analysis sample is 131 countries. Prospect one is based on the average annual growth rate in the 1990-2005, Prospect two is based on the average annual growth rate in the 1980-2005.

No. 8 Population achieving the first modernization: 7.2 to 7.8 billion in 2100.

No. 9 Population entering the second modernization: 6.4 to 6.7 billion in 2100.

No. 10 Population in developed countries: 820 to 1500 million in the 21st century.

No. 11 Population enjoying modernized life: 850 to 1700 million in the 21st century.

No. 12 Additional population enjoying modernized life (I): about 200 million from developed countries.

No. 13 Additional population enjoying modernized life (II): about 500 million from developing countries.

No. 14 Population enjoying modernized life in developed countries: taking up 90% to 95% of nationwide populations.

No. 15 Population enjoying modernized life in developing countries: taking up 5% of nationwide populations.

No. 16 Number of developed countries degrading into developing countries in the 21st century: possibly 2 to 4.

No. 17 Number of developing countries upgrading into developed countries in the 21st century: possibly 1 to 5.

No. 18 Gap enlargement in the 21st century: the gap for about 44% life and structure indexes may be enlarged.

No. 19 Gap narrowing in the 21st century: the gap for about 42% life and structure indexes may be narrowed.

No. 20 The 21st century will not be the end of modernization, and new changes will take place in the 22nd century.

The total number of countries involved in the analysis above is 131, with a total population taking up about 97% of the world population. Many indexes for prospect analysis are estimates based on the average annual growth rate in the past 15 or 25 years, coming from linear analysis. The 21st century showed many uncertainties and was impacted by many factors, with the changes of some of them being non-linear. The linear analysis of the future revealed some possibility of the future, thus possibly serving as a good reference.

3. Inspirations from world modernization

The nearly 3 centuries of development of world modernization not only provided basic facts and materials for research, but included rich experience and lessons that greatly inspired human beings. Important inspirations from it are discussed as follows.

(1) World modernization is both a world trend and a social choice

As to human civilization, modernization is a trend; and for different countries and communities, modernization is a choice. Those countries that chose modernization will promote it, but surely, the process will not be at the same pace in different countries. And those countries and communities that didn't choose modernization may try hard to keep their current lifestyles. Although social changes may take place in them, they will lag farther and farther behind the advanced material life standard in human civilization.

(2) World modernization is cultural progress, yet bearing negative effects.

Modernization is a process with negative effects, varying at different stages. The negative effects of the first modernization include environmental pollution, ecological degradation, gap of wealth, and periodic economic crisis and so on. The negative effects of the second modernization include information gap, Internet crime and international risk, etc. Negative effects of the previous stage should become the focus job of the following stage; solving negative effects of the previous stage will point out a new direction for civilization progress at the following stage. In the course of modernization, we need to inhibit and reduce the negative effects of modernization and curtail the social costs of modernization.

(3) World modernization is based on nations and played around the world

Generally, national modernization is the fundamental unit of world modernization, and the international system of world modernization provides a competition environment for national modernization. National and world modernization combined determine the structure and change of international system, and the international system and nations' efforts combined fix on the effect and international position of national modernization. World modernization is a great chorus among national modernization, international competition and international system change. There's no locked-in modernization or modernization neglecting national interests. International interaction is an important aspect of modernization.

(4) World modernization bears both universals and diversity

At all layers and from all aspects of world modernization, we can easily find out a lot of universals, either in human life, structure, system or thought; similarly, at each field and phase of world modernization, we can see lots of diversities, residing in national standard, pace, mode and form. The generalities and diversities of world modernization don't repulse each other; they're just the two forms of an objective law.

(5) World modernization shows both international differentiation and convergence

Generally, the international gap of economic efficiency will be broadened, and the international gap of economic structure will be narrowed, including industrial and employment structure. The international gap of per capita income will be broadened, and the international gap of social structure will be narrowed, including the international convergence of urbanization and educational structure. The diversity of political behavior and international convergence of governmental structure will show. The diversity of cultural thoughts and the international convergence of cultural industrial and facilities will show. Differentiation and convergence usually take place in different aspects.

(6) World modernization requires both vertical and horizontal comparisons

The vertical comparison of world modernization can reflect the progress of human civilization and can be used to analyze the improvement of national absolute level. The horizontal comparison of world modernization can reflect the international gap and geographical distribution of civilization development and can be used to analyze the change of national relative level and international ranks. When a nation's growth rate of absolute level is slower than other countries, its relative level and international position must decrease; if not, they will rise. International comparison for world modernization should be scientific and rational, and some indexes, like the language, are not suitable for international comparison of development level.

International comparison for world modernization can help dig out many important facts. For instance, the cross-section structure of world modernization is a miniature of its historical structure, and the cross-section structure of human civilization is a miniature of its historical structure. Then, the cross-section structure of human civilization in 2000 was a miniature of human history ranging from human's origination till 2000, and the cross-section structure of world modernization in 2000 was a miniature of the history of world modernization ranging from the start of world modernization till 2000. Developing countries may refer to developed countries for

a miniature of their future civilization structure and living quality, but different countries must have different lifestyles and cultures. Catching-up countries can learn from the experience of the forerunner.

(7) The Matthew Effect shows its influence in world modernization, and the international gap of per capita income is growing

In the international system, most countries would witness growing per capita income, but still, wealthy countries become wealthier and wealthier while poor countries poorer and poorer. Low-income countries become more and more relative underprivileged. When we made the per capita GDP calculated based on prices in 2000 as an index for analysis, we found that from 1960 to 2000, the absolute gap between high-income and low-income countries rose from 8584 USD to 25767 USD, and the relative gap grew from 42 times to 66 times. When we made the per capita GDP (PPP) calculated based on prices in 1990 as an index for analysis, from 1960 to 2000, the absolute gap between high-income and low-income countries rose from 6577 USD to 21163 USD, and the relative gap grew from 6 times to 21 times. World modernization needs immediate effective measures so that the Matthew Effect can be curbed, and the international gaps can be under control.

(8) There's no optimal mode of world modernization, but only rational choice

In the past 300 years, some countries retained their status as developed countries, some others were newly included in the list, and still some others saw degradation. After comparing their developing modes, we didn't find any result with any obvious tendency. Those countries with elevated status adopted modes giving priorities to industrialization, democratization and urbanization respectively during the first modernization, or those giving priorities to economy, education and harmonious development. During the second modernization, there were the modes giving priorities to knowledge, informatization and environmental protection, and those to harmonious development. Therefore, different countries shall study and seek out modes matching their situations most, as it's risky to simply imitate other countries.

(9) World modernization holds a stable international system, and the international position of countries can be changed

In the past 3 centuries, among 131 countries with relatively complete statistics (countries that have populations exceeding 1 million in 2000), there were 12 to 20 developed countries, taking up

about 12% to 15%; 89 to 113 developing countries, covering 85% to 88%. In this new century, the probability for a developed country to degrade into a developing country will be 8% to 23%; and that for a developing country to upgrade into a developed country will be 1% to 5%. Modernization will not be once and for all: leading countries need to maintain their leadership, while catching-up countries need to move faster. The world will thus be more colorful.

(10) In the 21st century, developing countries still embrace opportunities for success, but see less probability of becoming developed countries

Modernization includes civilization development and transformation and international competition. As for civilization development and transformation, all countries will achieve success, only in different paces; and as for international competition, not all countries can become leaders of the world. According to the experience in the last 3 centuries, in the 21st century, there would be about 20 developed countries, more than 100 developing countries, with 1 to 5 possibly becoming developed ones. So over 100 developing countries will vie over the 5 seats in the circle of developed countries. In the 21st century, the additional population enjoying modernized life may reach about 700 million, with 500 million possibly from developing countries; and in the 21st century, the total population in developing countries may reach 8 to 10 billion. So about 10 billion people in developing countries will vie for 500 million accesses to modernized life. It can thus be forecasted that international competition for world modernization in the 21st century will be harsh yet reasonable.

Ⅱ Scientific Principles of World Modernization

Generally, modernization is an in-depth change of human civilization, and world modernization is a manifestation of modernization. The world modernization theory is a macro-theory about modernization at the world level, as well as a sub-layer one of modernization theory. Scientific principles of world modernization not only include theories of world modernization but concern the general theory, phase-focused theory, layer-focused theory, field-focused theory and so on. World modernization started in 1760s, and modernization theory was formed during 1950s to 1960s, with almost 200-year gap between them. By now, modernization theory has not been a single theory, but a collection of many thoughts. Briefed below will be 20 basic facts and 10 theories of modernization research, and 20 basic concepts of the principle of modernization.

1. Basic facts of modernization study

Counting from 1950s, the research of world modernization has had a history of nearly 60 years. After 60 years of development, modernization study and modernization theory are gradually becoming mature, an emerging integrated interdiscipline is thus being formed. Briefed herein will be 20 basic facts about modernization research and theory.

No. 1 The origination of the word “modernization”: about middle 18th century (from 1748 to 1770)

No. 2 The basic definition of “modernization”: becoming modern and fitting modern needs; new features and changes that have emerged since 1500.

No. 3 Theoretical implication of modernization: referring to the transformation from the traditional to the modern, but different schools offer different explanations.

No. 4 Policy orientation of modernization: policy application of modernization theory should advance with the time. Policies are different in different countries and different periods, like industrialization and pursuing world advanced level.

No. 5 Two usages of modernization: indicating a process or a state (goal).

No. 6 Conventional usage of modernization: the latest, the best and the most advanced is modernized.

No. 7 Evolution of the concept of modernization: before 1950s, modernization was a common word; between 1950s and 1960s, modernization gradually turned into a terminology in social science.

No. 8 Emergence of modernization research: taking place in about 1950s. Modernization research roughly went through three phases of conception, exploration and maturity.

No. 9 Development of modernization research: in the last 5 decades of the 20th century, modernization research saw three tides.

No. 10 The first tide was the classical modernization research between 1950s and 1960s.

No. 11 The second tide was the post-modernization research between 1970s and 1980s.

No. 12 The third tide was the neo-modernization research between 1980s and 1990s.

No. 13 The three tides of modernization research were overlapping. Since 1970s, the classical modernization theory has been criticized and revised continuingly, with new modernization thoughts emerging and different schools formed.

No. 14 Origin of modernization theory: The western modernization thoughts can be dated back to the Enlightenment Movement in the 18th century, or Renaissance even earlier.

No. 15 Evolution of modernization theory: Classical modernization theory was formed between 1950s and 1960s, which can be dated back to the Classical Social Evolutionism in the 19th century[4]; since 1970s, Dependency Theory and the Theory of World System have emerged,

posing challenges to classical modernization theory; between 1970s and 1980s, post-modernism and post modernization theory aroused public attention; from 1980s to 1990s, many new theories of modernization sprang up, including Reflexive Modernization Theory and the second modernization theory.

No. 16 Major schools of modernization theory: the 6 mainstream theories are Classical Modernization Theory, Post-modernization Theory, Ecological Modernization Theory, Reflexive Modernization Theory, Multiple Modernities Theory and the Second Modernization Theory. The 4 influential theories are Dependency Theory, Theory of World System, Globalization Theory and Continued Modernization Theory.

No. 17 Modernization research by Chinese scholars: mainly of 3 tides: exploration of modernization in 1930s, research of classical modernization between 1970s and 1990s, and interdisciplinary studies since late 1990s, including the Second Modernization Theory proposed by Chinese scholars in 1998.

No. 18 Logic of modernization research: positivism, interpretivism and realism.

No. 19 Methods of modernization study: interdisciplinary research and qualitative, quantitative and case analysis.

No. 20 Application of modernization theory: strategy, planning and policy establishment for national and regional modernization.

2. 10 theories of modernization research

Since 1950s, World Modernization Research has witnessed the emergence of many theories. Herein briefed are 10 theories.

(1) Classical Modernization Theory

Classical Modernization Theory was created during 1950s and 1960s. It's a theoretical explanation of the world modernization process since the Industrial Revolution took place in the 18th century. According to it, modernization is a historical process turning from a traditional agricultural society to a modern industrial one; the modernity is a theoretical summarization of the result of modernization; and the modernization process boasts 9 features and several modes. Marx pointed out that what industrially-developed countries showed to industrially-undeveloped countries was just the future of the latter[5]. Classical Modernization took place in pioneer countries and catching-up ones, with typical characteristics like industrialization, urbanization, democratization, rationalization, marketization, welfare dissemination, mass communication and popularization of compulsory education.

Classical Modernization Theory lacks uniform and systematic expressions. Classical Modernization Theory roughly contained 6 sub-theories and 6 academic schools. The 6 sub-theories are economic modernization, social modernization, political modernization, cultural modernization, individual modernization and comparative modernization. The 6 academic schools are respectively structural functionalism, process school, behavioral school, positive school, integrated historical school and futurism.

(2) Post-modernization Theory

Post-modernization theory emerged mainly in 1970s or 1980s. Post-modernization theory is not a complete theoretical system, but a congregation of ideas about post-industrial society, post-modernism and post modernization research.

US scholar Bell is a representative of the theory of post-industrial society. He divided the development of human society into three phases: pre-industrial society, industrial society and post-industrial society[6]. French scholar Lyotard is a representative of post-modernism. He believed that with the society entering the post-industrial era and the culture entering the post-modern era, the knowledge would change the status[7]. British scholar Crook and his colleagues thought that developed countries were experiencing a long-term and multi-dimensional post-modernization process[8].

US scholar Inglehart believed that historical development was not a linear one. The transformation from a traditional to a modern society is modernization, and the transformation from a modern to post-modern society is post-modernization. Since 1970, the changes taking place in industrialized countries have been post-modernization, and the changes in developing countries have been modernization. The transformation from modernization to post-modernization includes in-depth changes in politics, economy, sex and family, and religious ideas, like the change from materialism to post-materialism, from modern value to post-modern value, from survival value to happy value and so on[9].

(3) Theory of Ecological Modernization

The Theory of Ecological Modernization was created in 1980s, which has become a major theory for the Environmental Sociology in developed countries. It was proposed by German scholar Huber[10]. “China Modernization Report 2007: Research of Ecological Modernization” has a systematic elaboration of the basic principles of ecological modernization in a broad sense.

Ecological modernization is the ecological transformation of world modernization caused by

modern awareness of ecology and environment, a mutually-beneficial coupling between modernization and natural environment. It includes the changes from material economy to ecological economy, material society to ecological society, and material civilization to ecological civilization; the improvement of natural environment and ecological system; the continuing enhancement of ecological efficiency and living quality; the in-depth change of ecological structure, system and thought; and evident changes in international competition and standings. Its basic principles include: prevention, innovation, efficiency, non-equivalence, non-materialization, greenization, ecologization, democratic participation, polluter pays, and economic and environmental win-win.

(4) Reflexive Modernization Theory

Reflexive Modernization Theory was proposed by German scholar Beck[11] in 1980s. He believed that in the 19th century, simple modernization breaks down the structure of an agricultural society and establishes an industrial society; similarly, today's reflexive modernization is breaking down the industrial society and giving rise to another modernity. Such newly-emerged modernity is a risk society[11].

According to Reflexive Modernization Theory, the world modernization consists of two phases, namely, simple modernization and reflexive modernization; simple modernization is a change from a traditional to an industrial society, while reflexive modernization is one from an industrial to a risk one, thus a modernization of modernization. The modernity of an industrial society is an simple one, while the modernity of a risk society is reflexive modernity; simple modernity is the first modernity, and reflexive modernity is the second one, and so on[12].

(5) Multiple Modernities Theory

Since 1990s, cultural diversity has drawn broad attention. The Multiple Modernities Theory is a theoretical elaboration of modern cultural variety and multi-linearity of cultural change.

Israeli scholar Eisenstadt thought: firstly, modernity should be viewed as a unique civilization, with unique system and cultural features; secondly, the history of modernity should be viewed as a story of multiple modernities, a story of the incessant development, formation, structuring and restructuring of the multicultural scheme of modernity, the unique mode of modern system and the different self-conceptions in modern society; thirdly, the different cultural plans and system modes of modernity are formed via continuing interaction among several factor; fourthly, the key to the cultural scheme of modernity concerns people's activity and autonomy, stressing the ceaseless

enlargement of the domains of personal freedom and systematic freedom, and the continuing expansion of human activity, creativity and domain of autonomy; fifthly, the analysis of cultural variety doesn't deny that the early theories about the convergence between modernization and industrial society include highly authentic factors[13].

(6) The Second Modernization Theory

The Second Modernization Theory was advanced by Chinese scholar He Chuanqi[14,15,16]. The theory is not just a theory about modernization in a broad sense, but one about human civilization, which combines modernization theory with human civilization theory to form a dynamic whole. Basic principles about it will be specially discussed below.

The Second Modernization Theory holds that from human's origination till late 21st century, the process of human civilization consisted of 4 eras and 16 phases. The 4 eras were respectively for tools, agriculture, industry and knowledge; each era included the starting, developing, maturing and transition periods. Modernization refers to an in-depth change that has taken place in human civilization since Industrial Revolution took place in the 18th century, found in different countries and fields. Between the 18th and 21st centuries, the world modernization process could be divided into the first and second modernization. The first modernization means the profound change from an agricultural era to an industrial one, an agricultural economy to an industrial one, an agricultural society to an industrial one, and an agricultural civilization to an industrial one; while the second modernization refers to the profound change from an industrial era to a knowledge-based one, from an industrial economy to a knowledge-based one, from an industrial society to a knowledge-based one, from an industrial civilization to a knowledge-based one, and from a material civilization to an ecological one. There will still be new changes in the 22nd century[17].

If the 6 theories above represent the major schools of modernization theory, the last 4 must be of broad influence. However, there're still disputes about the relationship between the last several theories and modernization theory.

(7) Dependence Theory

Dependence Theory is an international political and economy theory emerging in 1960s. It attempted to explain the underdevelopment of peripheral states through the dependence relationship between core and peripheral states, and attributed such underdevelopment to external reasons. There're rich literatures and branches of this theory, but there's still no systematic

theoretical elaboration and complete theoretical structure for it. In the pedigree of modernization theories, the position and function of this theory are quite disputable. The history tells people that it's unlikely for different countries to step forward at the same pace, so the world modernization must be accompanied by developed and underdeveloped at the same time. Developed countries are modernized countries, and underdeveloped countries are non-modernized ones. Since underdevelopment is an objective phenomenon of modernization, theoretical explanation about underdevelopment, as a sub-theory of classical modernization theory, should be tenable. But surely, they develop separately.

(8) Theory of World System

The Theory of World System is a widely influential theory that emerged in 1970s. It attempted to analyze the historical evolution of the world system via variables like the dependence relationship of core states—semi-peripheral states—peripheral states, world division of labor and conflicts between classes, so as to explain the world development history since the 16th century. Representatives of this theory include Wallerstein and Hopkins. There's no unified understanding about the relationship between the theory of world system and modernization theory. Both modernization theory and the theory of world system attempts to explain the world history in the past 3 centuries. Classical modernization theory tries this at the level of nation, while the latter at the level of world system. Modernization is a world movement, which will inevitably cause the change of the world system, subsequently impacting the modernization of nations. However, classical modernization theory lacks the analysis at the world system level. In view of the fact that the modernization process will surely lead to the change of the world system, it's understandable to establish a theoretical explanation of the world system in the modernization process and make it a sub-theory of the classical modernization theory. But still, they develop separately.

(9) Globalization Theory

Globalization Theory is one arousing broad public attention in 1990s. So far, there has been no unified definition about globalization. In a narrow sense, globalization refers to the global connections of economic activities and the expansion of mutual reliance; in a broad sense, globalization is an international process carried out in fields like economy, politics, culture, society and environment. When internationalization achieves a certain level, for example, when more than 50% states take part in the process of internationalization, the true globalization has come. Globalization is a historical process with expanding international connections.

Globalization theory is an aggregation of theoretical explanations about this phenomenon. With an eye to the fact that modernization process is a global process, and globalization is an accompanying phenomenon of modernization, it's acceptable to regard the globalization theory as a special theory of modernization. But surely, there's no necessary relationship between the two theories; they develop separately.

(10) Theory of Continued Modernization

The Theory of Continued Modernization is an academic idea proposed by a German sociologist in 1990s. German scholar Zapf thought, none of the concepts like post-materialized society, post-industrial society, post-modern society, information society, risk society and sensible society can survive a longer time than "modern society" in definition. Modernization Theory, after tempered by Conflict Theory and Innovation Theory, is a suitable theoretical mode for explaining the current and future development of the world; the continued modernization of the modern society includes technological and social innovations, the social change mechanism of accommodation, value popularization, differentiation and status elevation, and the dual implications of constant direction and improved structure[18].

3. Basic principles of modernization theory

In the community of Modernization Theory, different theories embody different principles. Here we take the Second Modernization Theory for example and introduce the basic principles of modernization theory. Since 1998, the second modernization theory has achieved certain results after research, with 16 academic publications released, including 7 lying in the "Series of the Second Modernization", and 9 China Modernization Reports. The Second Modernization Theory includes general theory, multi-phase theory, multi-layer theory and multi-field theory. Briefed below are 20 basic concepts about the second modernization theory.

No. 1 Nature of modernization: Modernization refers to a change of human civilization since Industrial Revolution took place in the 18the century.

No. 2 Implication of modernization: Modernization is a complex process involving the formation, development, transformation and international interaction of modern civilization, a complex process with the innovation, selection, diffusion and recession of civilization elements, and an international competition for different countries to purse, achieve and keep world advanced level.

No. 3 Extension of modernization: Modernization lies in human life, structure, system and

thought since the 18th century, including the modernization in different phases, layers, fields and aspects since the 18th century.

No. 4 Standard of modernization: Generally, modernization is an intersection among civilization development, civilization transformation and international interaction, but not all civilization changes reside in modernization. Only those meeting the standard of modernization can be counted as one. There're mainly 3 criterions for modernization: favorable for the liberation and enhancement of productivity, for social fairness and progress, and for human liberation and all-round development; during the second modernization, the three criterions should be slightly adjusted: favorable for the liberation and enhancement of productivity while not doing harm to natural environment, favorable for social fairness and progress while not affecting economic development, and favorable for human liberation and all-round development while not impairing social harmony.

No. 5 Background of modernization: Modernization is the latest chapter of human civilization; the periodic table, coordinate system and road map of human civilization progress can be used to analyze the historical background of world and national modernization.

No. 6 Phases of modernization: Between the 18th and 21st centuries, modernization consisted of two phases. The first modernization is a transformation from agricultural to industrial civilization, including changes from agricultural to industrial economy, from agricultural to industrial society, from agricultural to industrial politics, and from agricultural to industrial culture. The second modernization is a transformation from industrial to knowledge-based civilization, including changes from industrial to knowledge-based economy, from industrial to knowledge-based society, from industrial to knowledge-based politics, from industrial to knowledge-based culture, and from material to ecological culture.

No. 7 Features of modernization: Modernization bears both universals and individualities, showing both general laws and varieties. The process of modernization features 20 generalities: long-term, phased, non-synchronized, unbalanced, predictable, multi-pathing, path-reliant, non-linear, interactive, systematic, competitive, revolutionary, diversified, complicated, globalized, progressive, adaptive, reversible, negative-effect-with and cost-required.

No. 8 Principles of modernization: Modernization mainly follows 10 general principles. They are: asynchronous progress, unbalanced distribution, stable structure, changeable standing, predictable behavior, increasing demand, diminishing utility, optional path, nonrepetitive state and principle of axis shifting.

No. 9 Result of modernization: The result at the country's level is mainly the formation of modernity, uniqueness and diversity, including the improvement of labor productivity and living

standard, social progress, political democracy, cultural diversity, environmental changes, all-round personal development, and the national level reaching and keeping world advanced level. The result at the level of international system is the change of the international system and national standings, including a relatively stable international structure, a largely changed national standing, international differentiation and national hierarchy, and relative poverty of underdeveloped countries.

No. 10 Result of the first modernization: the formation and popularization of the first modernities feature as follows: industrialization, urbanization, democratization, bureaucratization, systematization, rationalization, secularization, marketization, standardization, professionalization, centralization, division and integration, fluidization, welfare dissemination, high efficiency guarantee, de-agriculturalization (with lower proportion of agriculture), modern science and energy, and mass communication and popularization of compulsory education; negative effects include environment pollution, polarization and periodic economic crisis; some traditional values persist to exert their functions, like the function of cultural heritage.

No. 11 Result of the second modernization: The formation and popularization of the second modernities currently feature the following: knowledge-based, informatization, service intensive, networking, digitalization, intelligentization, globalization, innovation, individualization, diversification, decentralization, greening, ecologicalization, non-materialization (lower density of material and energy), de-industrialization (lower proportion of industry), suburbanization, urban-rural-balance, lifetime study, popularization of higher education and so on; negative effects include information gap, Internet crime, international risk and broadening international inequality; some traditional values persist to show their effects.

No. 12 National objective of modernization: from the perspective of policies, the first objective is for national progress, to raise labor productivity and living standard, promote social fairness and progress, and support human liberation and all-round development; the second objective is about international standing, to pursue, reach or keep a world advanced level. The policy objective of developed countries must be maintaining their world advanced level, while that of developing countries is to pursue and achieve a world advanced level.

No. 13 Dynamic factors of modernization: innovation, competition, adaptation, communication, national interest and market demand.

No. 14 Dynamic model of modernization: the hyper-cycle of innovation-selection-promotion-recession, innovation drive model, dual-innovation drive model (as in Figure 1), dual-wheel drive model, joint function, complex interaction, diffusion of innovations, innovation spillover, competition drive, production function and so on.

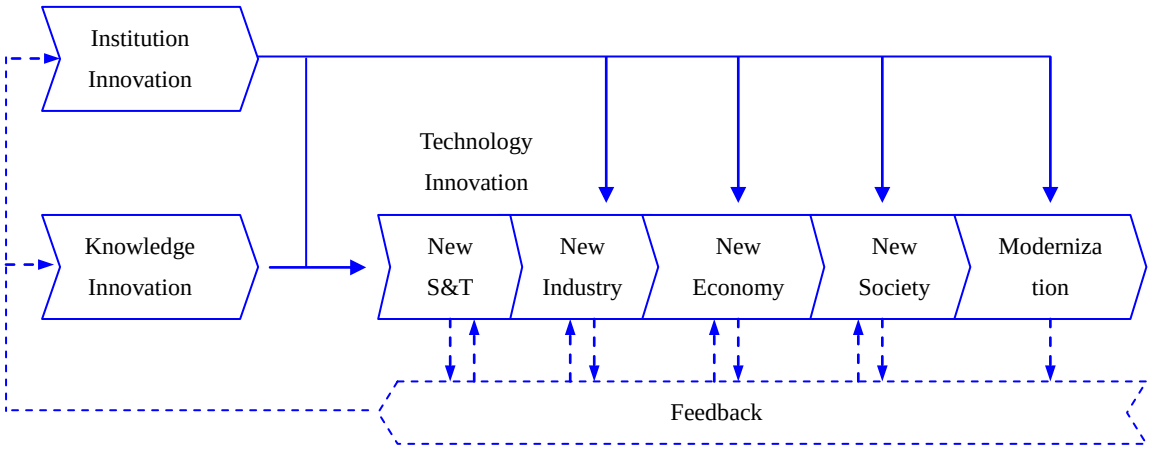

Figure 1 Dual-innovation Drive Model for Modernization

Note: Knowledge innovation includes scientific findings, technical inventions, knowledge creation and the ever-first application of new knowledge; institution innovation is to set up a new institution, which take place in every step of the model; technology innovation refers to the ever-first commercial application of technical inventions, mainly the process turning from a new science and technology to a new industry.

No. 15 Path to modernization: Modernization is path-reliant. The three basic paths in the 21st century are: the path of the second modernization, the path of pursuing modernization and the path of integrated modernization. There're still many sub-paths. The path to integrated modernization is the harmonious development between two kind of modernization, as well as the achievement of the world advanced level for the second modernization.

No. 16 Mode of modernization: Modernization features mode diversity, and there're at least 56 modes of factor combination. The combinations modes for the first modernization, the second modernization, and the integrated modernization are different. For example, priority to industrialization, priority to democratization, priority to knowledge orientation, priority to informatization, pursuit of industrialization and new mode of industrialization.

No. 17 Multi-phase theory of modernization: the first modernization, the second modernization and integrated modernization.

No. 18 Multi-layer theory of modernization: world, international, national, regional, organizational and individual modernization.

No. 19 Multi-field theory of modernization: economic, social, political, cultural, individual and ecological modernization.

No. 20 Sectors study of modernization: modernization in agriculture, industry, education, science & technology, finance and national defense, and so on.

Briefed in this report are also policy implications of different theories of modernization.

III Evaluation of World Modernization

The world modernization index reflects the average modernization level of 131 countries, countries in different groups, and the world, including the level of the first modernization, the index of the second modernization and the index of integrated modernization. It indicated the integrated level of world modernization in fields like economy, society, culture and environment.

In 2007, 29 countries like the US entered the second modernization, taking up about 22% of the sampled countries; 35 countries like Poland achieved the first all-round modernization, and 27 countries like Brazil achieved the first basic modernization. The countries that achieved the first modernization, both in and all-round way and basically, took up about 50% of the sampled countries.

In 2007, 21 countries like Sweden were developed countries, 25 countries including Greece were moderately developed ones, 36 countries like China were primarily developed ones, and 49 countries including India were underdeveloped.

In 2007, countries ranking top 10 in the second modernization index were: the US, Sweden, Denmark, Finland, Japan, Norway, South Korea, Switzerland, Germany and Belgium.

References

1. China Modernization Report Research Group, 2001. China Modernization Report 2001. Beijing: Peking University Press.

2. China Modernization Strategy Research Group et al., 2002-2009. China Modernization Report 2002-2009. Beijing: Peking University Press.

3. China Modernization Strategy Research Group et al., 2010. China Modernization Report 2010: An Outline of World Modernization. Beijing: Peking University Press.

4. Harrison D, 1988. The Sociology of Modernization and Development. London: Unwin Hyman.

5. Marx K, 1975 [1867]. Capital (Volume 1). Beijing: People Press.

6. Bell D, 1973. The Coming of Postindustrial Society. New York: Penguin.

7. Lyotard Jean-Francois, 1984 [1979]. The Postmodern Condition: A Report on Knowledge. Minneapolis: University of Minnesota.

8. Crook S, Pakulski J, Waters M, 1992. Post-Modernization: Change in Advanced Society. London: Sage.

9. Inglehart R, 1997. Modernization and Postmodernization: Cultural, Economic and Political

Change in 43 Societies. Princeton: Princeton University Press.
10. Huber J, 1985. Die Regenbogengesellschaft: Okologie und Sozialpolitik (The Rainbow Society: Ecology and Social Politics). Frankfurt am Main: Fisher Verlag.
11. Beck U, 1992 [1986]. Risk Society: Toward a New Modernity. London: Sage.
12. Beck U, Giddens A, Lash S, 1994. Reflexive Modernization. Stanford, California: Stanford University Press.
13. Eisenstadt S N, 2006. Reflexive Modernity. Translated by Kuang Xinnian and Wang Aisong. Beijing: Sdxjoint Publishing Company
14. He Chuanqi, 1998a. Knowledge-based Economy and China's Modernization. Guangming Daily. Apr. 7th, 1998
15. He Chuanqi, 1998b. Knowledge-based Economy and the Second Modernization. Science & Technology Review, 6:3-4.
16. He Chuanqi, 1999. The Second Modernization—Inspiration from Human Civilization Progress. Beijing: China Higher Education Press.
17. He Chuanqi, 2003. Oriental Revival—Three Paths to Modernization. Beijing: Commercial Press
18. Wolfgang Zapf, 2000. Modernization and Social Transformation (Edition 2). Translated by Chen Li and Lu Chenghong. Beijing: Social Sciences Academic Press.
19. Deng Xiaoping, 1993. Selected Works of Deng Xiaoping (Volume 3). Beijing: People Press.
20. UNDP, (various years). Human Development Report. New York: Oxford University Press.

世界现代化概览：1700-2100

何传启

中国科学院中国现代化研究中心

人类历史是一部创新史。工具制造革命使人区别于动物，人类进入原始文化发展时期。农业革命使人从食物采集者变为食物生产者，人类进入农业文明发展时期。工业革命使人从手工生产者变为机械化生产者，人类进入工业文明发展时期。知识革命使人从物质消费追求者变为精神消费追求者，人类进入知识文明发展时期。从农业文明向工业文明的转变是第一次现代化，从工业文明向知识文明的转变是第二次现代化。世界现代化的本质是人类文明的一种革命性变化，是不断从传统文明向新型文明的历史性转变，人类文明从一个纪元迈向又一个纪元。

如果从 18 世纪 60 年代开始的工业革命算起，世界现代化已约有 250 年历史；如果把时间定格在 21 世纪末，世界现代化进程将持续 340 年。在过去的两个半世纪里，现代文明和国家的形成、发展、转型和互动，塑造了世界现代化的历史和现状；在 21 世纪里，世界现代化将继续演进并丰富多彩。前九期《中国现代化报告》分别讨论了现代化理论、经济现代

化、社会现代化、文化现代化、生态现代化、国际现代化和地区现代化等，本期报告专题讨论世界现代化[1,2]。全面分析世界现代化需要非常大的篇幅。因为在世界现代化进程中，不同时期有不同内涵，不同国家有不同表现，不同领域有不同特点。本期报告的主题为“世界现代化概览”，旨在通过概要分析世界现代化的历史进程、基本原理和未来前景（图 1），为大家勾画一幅世界现代化的数字化全景素描，同时探讨中国现代化的事实和前景[3]。

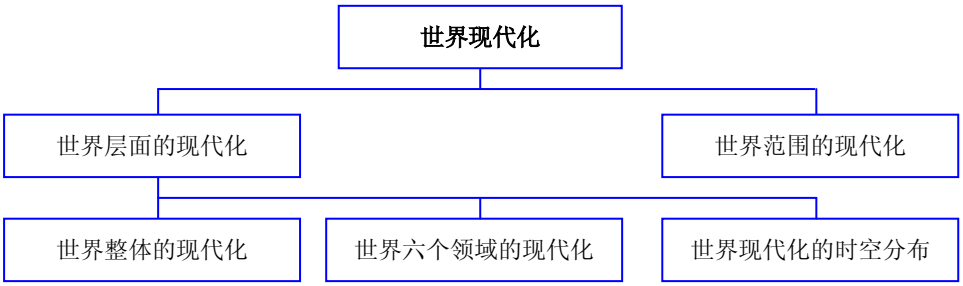

图 1　世界现代化的分析结构

注：世界现代化有多种解释。世界范围的现代化包括世界范围的国家现代化和地区现代化等。世界范围的国家现代化将在本章第三节讨论，世界范围的地区现代化将在本章第四节讨论。

一、世界现代化的事实和前景

一般而言，现代化是 18 世纪以来人类文明的一种深刻变化，是现代文明的形成、发展、转型和国际互动的复合过程，是不同国家追赶、达到和保持世界先进水平的国际竞争。世界现代化是现代化的一种表现形式，它大致有两种含义：世界层面的现代化和世界范围的现代化。本期报告的研究对象包括世界层面的现代化和世界范围的国家现代化；研究方法包括过程分析、时序分析、截面分析和情景分析等；研究内容涉及世界整体的现代化、世界六个领域的现代化、世界 131 个国家的现代化和 100 个分析指标等；分析要素包括人类生活、结构、制度和观念的现代化等；研究主题包括世界现代化的过程、结果、动力和模式等；时间跨度约为 400 年（1700～2100 年）。其中，131 个国家为 2000 年国家人口超过 100 万的、统计数据比较齐全的国家。通过系统分析和归纳整理，获得了世界现代化的基本信息，包括 20 个事实、20 个前景和 10 个启示等。

1、世界现代化的基本事实

迄今为止，世界现代化进程涉及近 300 年历史和 100 多个国家。关于世界现代化的事实分析，不可能全面铺开，只能是提纲挈领。这里简要介绍 20 个基本事实。显然，这些事实只是世界现代化的基本事实的冰山一角。

其一，世界现代化的起点：大约为 18 世纪 60 年代（英国工业革命）。

其二，世界现代化的终点：现代化是动态的，目前尚不能确定它的终点。

其三，世界现代化的阶段：从 18 世纪 60 年代到现在，世界现代化大致可以分为第一次现代化和第二次现代化两个阶段，涉及 18 世纪机械化、19 世纪电气化、20 世纪 50 年代的自动化和 80 年代的信息化四次浪潮。其中，第一次现代化是以工业化、城市化和民主化为典型特征的经典现代化，第二次现代化是以知识化、信息化和全球化为典型特征的新型现代化。

其四，世界现代化的类型：先发型、后发型、内源型、外源型现代化等。

其五，世界现代化的国际结构：发达国家约占 12%～15%，其它为发展中国家。在 131 个样本国家中，在 1700～2006 年期间，发达国家的个数约为 12～20 个。

其六，世界现代化的地理分布：欧洲水平比较高，非洲水平比较低，其他居中。

其七，发展中国家现代化的起步时间：比先行国家大约晚 60～200 年。

其八，发达国家完成第一次现代化的时间：平均约为 160 年。

其九，完成第一次现代化的国家：2006 年约为 35 个，如波兰等。

其十，处于第一次现代化的国家：2006 年约为 90 个，如印度等。

十一，处于传统农业社会的国家：2006 年约为 12 个，如布隆迪等。

十二，进入第二次现代化的国家：2006 年约为 29 个，如美国等。

十三，完成第一次现代化的人口：2006 年约为 11.3 亿，约占世界的 18%。

十四，进入第二次现代化的人口：2006 年约为 9.7 亿，约占世界的 15%。

十五，发达国家的人口：2006 年约 8.2 亿，约占世界的 13%。

十六，享受现代化生活的人口：2006 年约 8.5～10 亿，约占世界的 13%～16%。

十七，发达国家降级成发展中国家的概率：100 年内约为 8%～23%。

十八，发展中国家晋级成发达国家的概率：100 年内约为 1%～5%。

十九，1960～2006 年期间的国际追赶：日本等 12 个国家地位上升。

二十，20 世纪成功晋级发达国家的国家：包括芬兰和日本等。

根据第二次现代化指数和综合现代化指数的国家分组，2006 年的发达国家包括美国、瑞典、日本、丹麦、芬兰、挪威、澳大利亚、瑞士、韩国、加拿大、荷兰、德国、法国、比利时、新西兰、英国、奥地利和爱尔兰等。

2、世界现代化的前景素描

世界现代化的前景涉及 190 多个国家和 60 多亿人口。关于世界现代化的前景分析，只能是一种概略，不可能面面俱到。这里简介 20 个有可能发生的未来情景。

其一，世界现代化的三条路径：第一次、第二次现代化和综合现代化路径。

其二，2100 年的世界先进水平：第二次现代化指数是 2005 年的 5 倍左右。

其三，2100 年的世界平均水平：世界平均水平比世界先进水平约落后 50 年。

其四，世界现代化的国际结构：发达国家、中等发达国家、初等发达国家和欠发达国家比例大约为 15：20：28：37。发达国家大约为 20 个左右，代表现代化的世界先进水平；中

等发达国家大约为 25 个左右，它们处于发展中国家的前列。

其五，世界现代化的地理分布：非洲水平比较低，其它地区水平待定。

其六，完成第一次现代化的国家：2100 年大约为 99～107 个。

其七，进入第二次现代化的国家：2100 年大约为 84～89 个（表 1）。

表 1　21 世纪世界现代化的前景分析

	2005	2010	2020	2030	2040	2050	2080	2100
	进入第二次现代化的国家个数							
预测一	28	33	37	54	59	64	81	84
预测二	28	36	44	58	65	74	83	89
	完成第一次现代化的国家个数							
预测一	34	38	60	69	79	86	104	107
预测二	34	39	61	69	80	86	97	99

注: 分析样本为 131 个国家. 预测一是按照 1990～2005 年的年均增长率的预测结果。预测二是按照 1980～2005 年的年均增长率的预测结果。

其八，完成第一次现代化的人口：2100 年大约为 72～78 亿。

其九，进入第二次现代化的人口：2100 年大约为 64～67 亿。

其十，发达国家的人口：21 世纪大约为 8.2～15 亿。

十一，享受现代化生活的人口：21 世纪大约为 8.5～17 亿。

十二，享受现代化生活的新增人口（I）：大约 2 亿人可能来自发达国家。

十三，享受现代化生活的新增人口（II）：大约 5 亿人可能来自发展中国家。

十四，发达国家享受现代化生活的人口：大约为全国人口的 90%～95%。

十五，发展中国家享受现代化生活的人口：大约平均为全国人口的 5%。

十六，21 世纪发达国家降级为发展中国家的个数：可能为 2～4 个。

十七，21 世纪发展中国家晋级发达国家的个数：可能为 1～5 个。

十八，21 世纪的差距扩大：大约 44%的生活和结构指标的差距可能扩大。

十九，21 世纪的差距缩小：大约 42%的生活和结构指标的差距可能缩小。

二十，21 世纪不是现代化的终结，22 世纪还会有新变化。

上述分析的国家总数为 131 个，它们的总人口约占世界人口的 97%；前景分析的许多指标是基于过去 25 年或 15 年的年均增长率的一种估算，是一种线性分析。21 世纪具有很大的不确定性，受很多因素的影响，有些因素的变化是非线性的。关于未来前景的线性分析，揭示了未来的某种可能性，可能有一定参考意义。

3、世界现代化的重要启示

世界现代化的近 300 年历史，不仅提供了基本事实和研究素材，而且包含丰富的经验和教训，可以提供历史启示。这里重点讨论借鉴意义比较大的启示。

（1）世界现代化既是一种世界潮流，也是一种社会选择

相对于人类文明，现代化是一种趋势。相对于不同国家和社会，现代化是一种选择。选择现代化的国家就会推进现代化，但不同国家的进程是不同步的。没有采取现代化的国家和社会，可能会努力保持原有（现存）生活方式；虽然它们的社会变迁也会发生，但它们与人类文明前沿的物质生活差距会逐步扩大。

（2）世界现代化既是一种文明进步，也存在不少副作用

现代化是一个有副作用的过程，不同阶段的副作用不同。第一次现代化的副作用包括环境污染、生态退化、贫富差距和周期性经济危机等。第二次现代化的副作用包括信息鸿沟、网络犯罪和国际风险等。上一个阶段的副作用，可以成为下一个阶段的工作重点；解决上一个阶段的副作用，可以成为下一个阶段文明进步的新方向。在现代化进程中，需要抑制和减少现代化的副作用，降低现代化的社会成本。

（3）世界现代化以国家为基础，以世界为舞台

一般而言，国家现代化是世界现代化的基本单位，世界现代化的国际体系是国家现代化的竞争环境。国家现代化和国际竞争共同决定了国际体系的结构和变化，国际体系和国家自身努力共同决定了国家现代化的成效和国际地位。世界现代化是国家现代化、国际竞争和国际体系变化的一曲大合唱。既没有关起门来的现代化，也没有无视国家利益的现代化，国际互动是现代化的重要方面。

（4）世界现代化既有普遍的基本共性，也有广泛的多样性

在世界现代化的每一个层次和每一个方面，都可以发现大量的共性，从人类生活、结构、制度到观念都有一些共性；同样，在世界现代化的每一个领域和每一个阶段，都可以发现大量的多样性，包括国家水平、速度、模式和形式的多样性等。世界现代化的共性和多样性，并不相互排斥，而是客观规律的两种形态。

（5）世界现代化既有国际分化，也有国际趋同

一般而言，经济效率的国际差距扩大，经济结构的国际差距缩小，如产业结构和就业结构的国际趋同；人均收入的国际差距扩大，社会结构的国际差距缩小，如城市化和教育结构的国际趋同；政治行为的多样化，政府结构的国际趋同；文化观念的多样化，文化产业和文化设施的国际趋同等。分化和趋同发生在不同方面。

（6）世界现代化既需要纵向比较，也需要横向比较

世界现代化的纵向比较可以反映人类文明的进步，可以分析国家绝对水平的提高。世界现代化的横向比较可以反映文明发展的国际差距和地理分布，可以分析国家相对水平和国际地位的变化。如果国家绝对水平提高的速度慢于其他国家，那么，它的相对水平和国际地位就会下降；反之则上升。世界现代化的国际比较必须是科学合理的，有些指标不宜进行发展水平的国际比较，如语言等。

世界现代化的国际比较可以发现很多重要事实。例如，世界现代化的截面结构是它的

历史结构的一个缩影，人类文明的截面结构是它的历史结构的一个缩影；2000 年人类文明的截面结构是从人类诞生到 2000 年的人类历史进程的一个缩影，2000 年世界现代化的截面结构是从世界现代化起步到 2000 年的世界现代化历史进程的一个缩影。发展中国家可以在发达国家看到自己未来的文明结构和生活质量的缩影，但不同国家的生活方式和文化会有差别。后发型国家可以借鉴先行者的经验。

（7）世界现代化存在“马太效应”，人均收入的国际差距不断扩大

在国际体系中，虽然多数国家人均收入都会提高，但富国越来越富，穷国越来越穷，低收入国家相对贫困化。如果以按 2000 年价格计算的人均 GDP 为分析指标，从 1960 年到 2000 年，高收入国家与低收入国家的绝对差距从约 8584 美元扩大到 25767 美元，相对差距从 42 倍扩大到 66 倍。如果以按 1990 年价格计算的人均 GDP（PPP）为分析指标，从 1960 年到 2000 年，高收入国家与低收入国家的绝对差距从约 6577 国际美元扩大到 21163 国际美元，相对差距从 6 倍扩大到 21 倍。世界现代化需要采取有效措施，防止“马太效应”的扩大化，控制和缩小国际差距。

（8）世界现代化没有最佳模式，只有理性选择

在过去 300 年里，有些国家保持发达国家的地位，有些国家成功晋级，有些国家地位下降；比较它们的发展模式，没有得到具有明显倾向的结果。地位上升的国家，在第一次现代化过程中，既有工业化优先、民主化优先和城市化优先模式，也有经济优先、教育优先和协调发展模式等；在第二次现代化过程中，既有知识化优先、信息化优先和生态化优先模式，也有协调发展模式等。所以，不同国家需要研究和寻求自己的合适模式，简单模仿其他国家的做法是有风险的。

（9）世界现代化的国际体系基本稳定，国家的国际地位可以变迁

在过去 300 年里，在 131 个统计数据比较齐全的国家中（2000 年人口超过 100 万的国家），发达国家的数量约为 12～20 个，比例约为 12%～15%；发展中国家的数量约为 89～113 个，比例约为 85%～88%。在 100 年里，发达国家降级为发展中国家的概率约为 8%～23%；发展中国家升级为发达国家的概率约为 1%～5%。现代化不是一劳永逸的，先进需要保先进，后进需要赶先进，世界将会丰富多彩。

（10）21 世纪发展中国家仍然有成功机会，但晋升发达国家的概率比较小

现代化包括文明发展、文明转型和国际竞争。从文明发展和文明转型角度看，每一个国家都会取得成功，但成功有先后。从国际竞争的角度看，并非每一个国家都能进入世界前列。依据过去 300 年的历史经验，21 世纪发达国家将有 20 个左右，发展中国家有 100 多个，大约 1～5 个发展中国家有可能晋级发达国家；100 多个发展中国家将争夺 5 张晋级发达国家的门票。21 世纪享受现代化生活的新增人口可能达到 7 亿左右，其中，大约 5 亿有可能来自发展中国家；21 世纪发展中国家的人口有可能达到 80～100 亿；大约 100 亿发展中国家人口将争夺 5 亿张享受现代化生活的门票。可以预计，21 世纪世界现代化的国际竞争仍

将激烈而富有理性。

二、世界现代化的科学原理

一般而言，现代化是人类文明的一种深刻变化，世界现代化是现代化的一种表现形式。世界现代化理论既是关于世界层次的现代化的一种宏观理论，也是现代化理论的一个分层次理论。世界现代化的科学原理，不仅包括世界现代化理论，而且涉及现代化的一般理论、分阶段理论、分层次理论和分领域理论等。世界现代化起步于 18 世纪 60 年代，现代化理论形成于 20 世纪 50～60 年代，两者相差近 200 年。迄今为止，现代化理论并不是单一理论，而是多种思想的一个集合。下面简要介绍现代化研究的 20 个基本知识、10 种理论和现代化原理的 20 个基本概念。

1、现代化研究的基本知识

如果从 20 世纪 50 年代算起，世界现代化研究已经有近 60 年历史。经过 60 年的发展，现代化研究和现代化理论已经逐步走向成熟，一门新兴交叉综合学科正在形成。这里简要介绍现代化研究和理论的 20 个基本知识和事实。

其一，现代化单词的诞生：大约为 18 世纪中叶（1748～1770 年）。

其二，现代化的基本词义：成为现代的，适合现代需要的；大约公元 1500 年以来出现的新特点和新变化。

其三，现代化的理论含义：指从传统向现代的转变。不同学派有不同解释。

其四，现代化的政策含义：指现代化理论的政策应用，需要与时俱进。不同国家不同时期政策不同，如工业化和追赶世界先进水平等。

其五，现代化的两种用法：可以表示一个过程，或表示一种状态（目标）。

其六，现代化的习惯用法：最新的、最好的、最先进的就是现代化的。

其七，现代化概念的演变：20 世纪 50 年代以前，现代化是一个普通词；20 世纪 50～60 年代，现代化逐步成为一个社会科学的专业词。

其八，现代化研究的诞生：大约发生在 20 世纪 50 年代。现代化研究的出现，大致经历孕育期、探索期和成熟期三个阶段。

其九，现代化研究的发展：在 20 世纪后 50 年里，现代化研究出现三次浪潮。

其十，第一次浪潮是 20 世纪 50～60 年代的经典现代化研究。

十一，第二次浪潮是 20 世纪 70～80 年代的后现代化研究。

十二，第三次浪潮是 20 世纪 80～90 年代的新型现代化研究。

十三，现代化研究的三次浪潮是交叉的。20 世纪 70 年代以来，经典现代化理论受到批评，并不断被修正；同时新的现代化思想不断涌现，形成不同理论流派。

十四，现代化理论的起源：西方的现代化思想可以追溯到 18 世纪启蒙运动，甚至更早的文艺复兴。

十五，现代化理论的演变：经典现代化理论是 20 世纪 50～60 年代形成的，它的起源可

以大致追溯到19世纪的古典社会进化论[4]；20世纪70年代以来，依附理论和世界体系理论兴起，它们对经典现代化理论提出挑战；20世纪70～80年代，后现代主义和后现代化理论引起社会关注；20世纪80～90年代，涌现多种新型现代化理论，如反思现代化理论和第二次现代化理论等。

十六，现代化理论的主要流派：6个主流理论是：经典现代化理论、后现代化理论、生态现代化理论、反思现代化理论、多元现代性理论和第二次现代化理论；4个有影响力的理论是：依附理论、世界体系理论、全球化理论和继续现代化理论等。

十七，中国学者的现代化研究：大致有三次浪潮：20世纪30年代的现代化探索，20世纪70～90年代的经典现代化研究，20世纪90年代末以来的多学科研究，包括1998年中国学者提出第二次现代化理论等。

十八，现代化研究的逻辑：实证主义、阐释主义、现实主义等。

十九，现代化研究的方法：多学科研究、定性、定量、案例分析等。

二十，现代化理论的应用：国家和地区现代化的战略、规划和政策研制等。

2、现代化研究的十种理论

20世纪50年代以来，世界现代化研究涌现了众多理论。这里简介十种理论。

（1）经典现代化理论

经典现代化理论诞生于20世纪50～60年代。它是对18世纪工业革命以来世界现代化进程的一种理论阐述。它认为现代化是一个从传统农业社会向现代工业社会转变的历史过程，现代性是对现代化结果的一种理论概括，现代化过程具有9个特点和多种模式。马克思指出：工业较发达的国家向工业较不发达国家所显示的，只是后者未来的景象[5]。经典现代化发生在先行国家和后发国家，典型特征包括工业化、城市化、民主化、理性化、市场化、福利化、大众传播和普及义务教育等。

经典现代化理论缺少统一的系统表述。经典现代化理论大致包括六个分支理论和六个学术流派。六个分支理论分别是经济现代化、社会现代化、政治现代化、文化现代化、人的现代化和比较现代化等。六个学术流派分别是结构功能学派、过程学派、行为学派、实证学派、综合历史学派和未来学派等。

（2）后现代化理论

后现代化理论出现于20世纪70～80年代。后现代化理论并不是一个完整的理论体系，而是关于后工业社会、后现代主义和后现代化研究的一个思想集合。

美国学者贝尔是后工业社会理论的代表人物，他把人类社会发展分为三个阶段：前工业社会、工业社会和后工业社会[6]。法国学者利奥塔是后现代主义的一个代表人物，他认为随着社会进入被称为后工业的年代以及文化进入被称为后现代的年代，知识改变了地位[7]。英国学者柯鲁克等认为：发达国家正在经历一个长期的、多维度的后现代化过程[8]。

美国学者殷格哈特认为，历史发展不是线性的，从传统社会向现代社会的转变是现代化，

从现代社会向后现代社会的转变是后现代化。1970 年以来工业化国家发生的变化是后现代化，发展中国家发生的变化是现代化。从现代化向后现代化的转变包括政治、经济、性和家庭、宗教观念等的深刻变化，如从物质主义到后物质主义、从现代价值到后现代价值、从生存价值到幸福价值等[9]。

（3）生态现代化理论

生态现代化理论诞生于 20 世纪 80 年代，它已经成为发达国家的环境社会学的一个主要理论。德国学者胡伯是这个理论的提出者[10]。《中国现代化报告 2007：生态现代化研究》系统阐述了广义生态现代化理论的基本原理。

生态现代化是现代生态和环境意识引发的世界现代化的生态转型，是现代化与自然环境的一种互利耦合；它包括从物质经济向生态经济、物质社会向生态社会、物质文明向生态文明的转变，自然环境和生态系统的改善，生态效率和生活质量的持续提高，生态结构、生态制度和生态观念的深刻变化，以及国际竞争和国际地位的明显变化等。它的基本原则包括：预防原则、创新原则、效率原则、不等价原则、非物化原则、绿色化原则、生态化原则、民主参与原则、污染付费原则、经济和环境双赢原则等。

（4）反思现代化理论（再现代化理论）

反思现代化理论出现于 20 世纪 80 年代。德国学者贝克是这个理论的提出者[11]。他认为：在 19 世纪，普通现代化分解了农业社会的结构，建立了工业社会；与此相似，今天的反思现代化正在分解工业社会，并产生另一种现代性。这种新出现的现代性就是风险社会[11]。

反思现代化理论认为：世界现代化包括两个阶段，即普通现代化和反思现代化；普通现代化是从传统社会向工业社会的转变，反思现代化是从工业社会向风险社会的转变，反思现代化是现代化的现代化——“再现代化”；工业社会的现代性是普通现代性，风险社会的现代性是反思现代性；普通现代性是第一现代性，反思现代性是第二现代性等[12]。

（5）多元现代性理论

20 世纪 90 年代以来，文化多样性和文化多元化引起广泛关注。多元现代性理论是关于现代文化多样性和文化变迁多线性的一种理论阐述。

以色列学者艾森斯塔特认为：首先，现代性应当被视为一种独特文明，具有独特的制度和文化特征。其次，现代性的历史，最好看作是现代性的多元文化方案、独特的现代制度模式以及现代社会的不同自我构想不断发展、形成、构造和重构的一个故事——多元现代性的故事。其三，现代性的这些不同文化方案和制度模式，是通过几种因素之间的持续互动构成的。其四，现代性文化方案的关键核心，涉及人的能动性和自主性，强调个人自由与制度自由领域的不断扩大，人的活动、创造性、自主性领域的不断扩展。其五，文化多样性的分析，并不否认现代化和工业社会趋同的早期理论包含着高度真实的因素[13]。

（6）第二次现代化理论

第二次现代化理论是中国学者何传启提出来的[14,15,16]。第二次现代化理论不仅是一个广

义现代化理论，也是一种人类文明理论，它使现代化理论与人类文明理论形成一个有机的整体。关于它的基本原理将在后面专题讨论。

第二次现代化理论认为，从人类诞生到 21 世纪末，人类文明进程包括四个时代和十六个阶段。四个时代分别是工具时代、农业时代、工业时代和知识时代，每一个时代都包括起步期、发展期、成熟期和过渡期四个阶段。现代化指 18 世纪工业革命以来人类文明所发生的一种深刻变化，它发生在不同国家和不同领域。在 18～21 世纪期间，世界现代化进程可以分为第一次现代化和第二次现代化两个阶段。第一次现代化指从农业时代向工业时代、农业经济向工业经济、农业社会向工业社会、农业文明向工业文明的转变过程和深刻变化，第二次现代化指从工业时代向知识时代、工业经济向知识经济、工业社会向知识社会、工业文明向知识文明、物质文明向生态文明的转变过程和深刻变化。22 世纪还有新变化[17]。

如果说，上述 6 种理论代表了现代化理论的主要流派，那么，后面的 4 种理论是有广泛影响的理论。后面的几种理论与现代化理论的关系，仍然存在一些争议。

（7）依附理论

依附理论是 20 世纪 60 年代兴起的一种国际政治经济理论。它试图用核心国家和边缘国家的依附关系，来解释边缘国家的欠发达现象，并把欠发达归咎于外部原因。依附理论文献丰富，支派众多，但尚没有系统的理论表述和完整的理论结构。在现代化理论谱系中，依附理论的地位和作用是有争议的。历史经验表明，不同国家不太可能齐步走，世界现代化过程必然伴随发达和欠发达现象。发达国家是现代化国家，欠发达国家是非现代化国家。既然欠发达现象是现代化的一个客观事实，那么，关于欠发达现象的理论解释，作为经典现代化理论的一个分支理论，应该说是可以成立的。当然，它们是分别发展的。

（8）世界体系理论

世界体系理论是 20 世纪 70 年代兴起的一种有广泛影响的理论。它试图用中心—半边缘—边缘地区的依附关系、世界劳动分工和阶级冲突等变量来分析世界体系的历史演变，从而解释 16 世纪以来的世界发展史。世界体系理论的代表人物包括沃勒斯坦和霍普金斯等。关于世界体系理论与现代化理论的关系，没有统一认识。现代化理论和世界体系理论都试图解释过去 300 年的世界史，经典现代化理论是从国家层次上解释的，世界体系理论是从世界体系层次解释的。现代化是一个世界运动，必然导致世界体系的变化，世界体系的变化必然影响国家的现代化，但是，经典现代化理论本身缺乏世界体系层次的分析。考虑到现代化过程必然导致世界体系的变化，建立关于现代化过程的世界体系的理论解释，作为经典现代化理论的一个分支理论是可以理解的。当然，它们是独立发展的。

（9）全球化理论

全球化理论是 20 世纪 90 年代引起广泛关注的一种理论。迄今为止，关于全球化没有统一定义。狭义理解，全球化是经济活动的全球联系和相互依赖的扩展。广义理解，全球化是经济、政治、文化、社会和环境等领域进行的、复杂的国际化过程。当国际化达到一定程度

时，比如说超过 50%的国家介入国际化过程的时候，这就是真正的全球化。全球化是一个国际联系日益扩展的历史过程。全球化理论是关于全球化现象的理论解释的一个集合。考虑到现代化过程是一个全球过程，全球化是现代化的一个伴生现象，把全球化理论理解成现代化理论的一个专题理论是可以接受的。当然，它们之间没有硬性关系，而是各自发展的理论。

（10）继续现代化理论

继续现代化理论是 20 世纪 90 年代德国社会学家提出的一种学术思想。德国学者查普夫认为，后物质主义社会、后工业社会、后现代社会、信息社会、风险社会、感性社会等概念在语义上都没有像“现代社会”这个概念更具有生命力，经过冲突论和创新论“淬火”的现代化理论是解释世界现在和未来发展的合适的理论模式；现代社会的继续现代化包括技术和社会创新，包括容纳、价值普遍化、分化和地位提高的社会变迁机制，包括方向恒定和结构改善这两重含义[18]。

3、现代化理论的基本原理

在现代化理论的大家庭里，不同理论所包含的原理有所不同。这里以第二次现代化理论为例，介绍现代化理论的基本原理。1998 年以来，第二次现代化理论研究取得一批研究成果，出版学术著作 16 部，包括《第二次现代化丛书》7 本、《中国现代化报告》9 本等。第二次现代化理论包括一般理论、分阶段理论、分层次理论和分领域理论等。下面简介第二次现代化理论的 20 个基本概念。

其一，现代化的实质：现代化指 18 世纪工业革命以来人类文明的一种变化。

其二，现代化的内涵：现代化是现代文明的形成、发展、转型和国际互动的复合过程，是文明要素的创新、选择、传播和退出交互进行的复合过程，是不同国家追赶、达到和保持世界先进水平的国际竞争。

其三，现代化的外延：现代化包括 18 世纪以来人类生活、结构、制度和观念的现代化，包括 18 世纪以来不同阶段、不同层次、不同领域和方面的现代化。

其四，现代化的标准：一般而言，现代化是文明发展、文明转型和国际互动的交集，但并非所有的文明变化都属于现代化，只有满足现代化标准的变化才属于现代化。现代化大致有三个判断依据：有利于生产力的解放和提高，有利于社会的公平和进步，有利于人的自由解放和全面发展；在第二次现代化过程中，三个标准需要略有调整：有利于生产力的解放和提高又不破坏自然环境，有利于社会的公平和进步又不妨碍经济发展，有利于人的自由解放和全面发展又不损害社会和谐。

其五，现代化的背景：现代化是人类文明的最新篇章；人类文明进程的周期表、坐标系和路线图等，可以用来分析世界和国家现代化的历史背景。

其六，现代化的阶段：在 18～21 世纪期间，现代化分为两大阶段。第一次现代化是从农业文明向工业文明的转变，包括从农业经济向工业经济、农业社会向工业社会、农业政治向工业政治、农业文化向工业文化的转变等。第二次现代化是从工业文明向知识文明的转变，

包括从工业经济向知识经济、工业社会向知识社会、工业政治向知识政治、工业文化向知识文化、物质文化向生态文化的转变等。

其七，现代化的特点：现代化既有共性也有个性，既有一般规律又有多样性。现代化过程的 20 个共性特点是：长期性、阶段性、不同步性、不均衡性、可预期性、多路径、路径依赖性、非线性、互动性、系统性、竞争性、革命性、多样性、复杂性、全球性、进步性、适应性、可逆性、副作用和成本性等。

其八，现代化的原理：现代化遵循 10 个一般原理，它们分别是：进程不同步、分布不均衡、结构稳定性、地位可变迁、行为可预期、需求递进、效用递减、路径可选择、状态不重复和中轴转变原理等。

其九，现代化的结果：国家层次的结果主要是现代性、特色性和多样性的形成，包括劳动生产率和生活质量提高，社会进步，政治民主，文化多元，环境变化，个人全面发展，国家水平达到和保持世界先进水平等。国际体系层次的结果是国际体系和国家地位的变化，包括国际结构相对稳定，国家地位变化较大，国际分化和国家分层，欠发达国家相对贫困化等。

其十，第一次现代化的结果：第一现代性的形成和普及，特点包括：工业化、城市化、民主化、科层化、制度化、理性化、世俗化、市场化、标准化、专业化、集中化、分化与整合、流动化、福利化、高效化、非农业化（农业比例下降）、现代科学和能源、大众传播和普及义务教育等；副作用包括环境污染、贫富分化和周期性经济危机等；部分传统价值持续存在并发挥作用，如文化遗产的作用等。

十一，第二次现代化的结果：第二现代性的形成和普及，目前特点包括：知识化、信息化、服务化、网络化、数字化、智能化、全球化、创新化、个性化、多元化、分散化、绿色化、生态化、非物质化（物质和能源密度下降）、非工业化（工业比例下降）、郊区化、城乡平衡、终身学习和普及高等教育等；副作用包括信息鸿沟、网络犯罪、国际风险和国际不平等扩大等；部分传统价值持续存在并发挥作用。

十二，现代化的国家目标：从政策角度看，第一个目标是国家进步目标：提高劳动生产力和生活质量、促进社会的公平和进步、促进人的自由解放和全面发展；第二个目标是国际地位目标：追赶、达到或保持世界先进水平。发达国家的政策目标是保持世界先进水平。发展中国家的政策目标是追赶和达到世界先进水平。

十三，现代化的动力要素：创新、竞争、适应、交流、国家利益和市场需求等。

十四，现代化的动力模型：创新－选择－传播－退出的超循环、创新驱动、双新驱动（图 2）、双轮驱动、联合作用、复合互动、创新扩散、创新溢出、竞争驱动和生产力函数等。

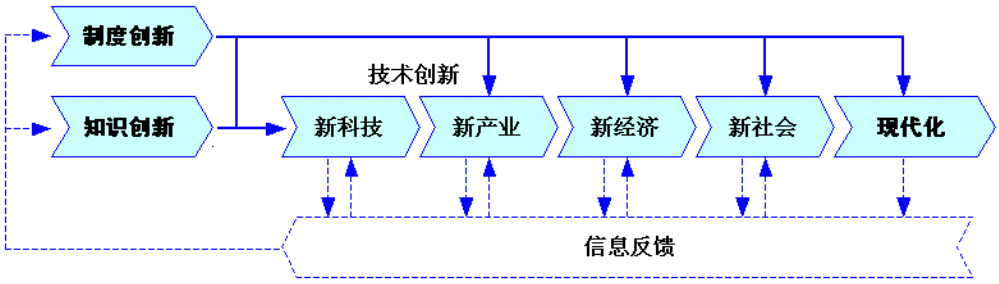

图 2　现代化过程的双新驱动模型

注：知识创新包括科学发现、技术发明、知识创造和新知识首次应用，制度创新是创立一种新制度，它们发生在模型的每一步。技术创新指技术发明的首次成功商业应用，主要是从新科技到新产业的过程。

十五，现代化的路径：现代化具有路径依赖性。21 世纪的三条基本路径分别是第二次现代化路径、追赶现代化路径和综合现代化路径。还有多种细分路径。综合现代化路径是两次现代化的协调发展，并迎头赶上第二次现代化的世界先进水平。

十六，现代化的模式：现代化具有模式多样性，要素组合至少有 56 种模式。第一次现代化、第二次现代化和综合现代化的组合模式各有不同。例如，工业化优先、民主化优先、知识化优化、信息化优先、追赶工业化和新型工业化模式等。

十七，现代化的分阶段理论：第一次现代化、第二次现代化和综合现代化。

十八，现代化的分层次理论：世界、国际、国家、地区、机构、个体现代化。

十九，现代化的分领域理论：经济、社会、政治、文化、个人、生态现代化。

二十，现代化的分部门研究：农业、工业、教育、科技、金融、国防现代化等。

三、世界现代化评价

世界现代化指数反映世界 131 个国家、不同组国家和世界平均的现代化水平，包括世界第一次现代化程度、第二次现代化指数和综合现代化指数。它体现世界现代化在经济、社会、文化和环境等领域的综合水平。

2007 年，美国等 29 个国家已经进入第二次现代化，约占国家样本数的 22%；波兰等 35 个国家全面完成第一次现代化，巴西等 27 个国家基本实现第一次现代化，全面完成和基本实现第一次现代化的国家约占国家样本的 50%。

2007 年，瑞典等 21 个国家属于发达国家，希腊等 25 个国家属于中等发达国家，中国等 36 个国家属于初等发达国家，印度等 49 个国家属于欠发达国家。

2007 年，第二次现代化指数排世界前 10 名的国家是：美国、瑞典、丹麦、芬兰、日本、挪威、韩国、瑞士、德国、比利时。

参考文献

1. 中国现代化报告课题组, 2001. 中国现代化报告 2001. 北京：北京大学出版社.

2. 中国现代化战略研究课题组, 等, 2002- 2009. 中国现代化报告 2002-2009. 北京：北京大学出版社.

3. 中国现代化战略研究课题组, 等, 1010. 中国现代化报告 2010：世界现代化概览. 北京：北京大学出版社.

4. Harrison D, 1988. The Sociology of Modernization and Development. London: Unwin Hyman.

5. [德]马克思, 1975 [1867]. 资本论（第一卷）. 北京：人民出版社.

6. Bell D, 1973. The Coming of Postindustrial Society. New York: Penguin.

7. Lyotard Jean-Francois, 1984 [1979]. The Postmodern Condition: A Report on Knowledge. Minneapolis: University of Minnesota.

8. Crook S, Pakulski J, Waters M, 1992. Post-Modernization: Change in Advanced Society. London: Sage.

9. Inglehart R, 1997. Modernization and Postmodernization: Cultural, Economic and Political Change in 43 Societies. Princeton: Princeton University Press.

10. Huber J, 1985. Die Regenbogengesellschaft: Okologie und Sozialpolitik (The Rainbow Society: Ecology and Social Politics). Frankfurt am Main: Fisher Verlag.

11. Beck U, 1992 [1986]. Risk Society: Toward a New Modernity. London: Sage.

12. Beck U, Giddens A, Lash S, 1994. Reflexive Modernization. Stanford, California: Stanford University Press.

13. [以]S.N. 艾森斯塔特, 2006. 反思现代性. 旷新年，王爱松，译. 北京：生活 •读书 •新知三联书店.

14. 何传启, 1998a. 知识经济与中国现代化. 光明日报. 1998 年 4 月 7 日.

15. 何传启, 1998b. 知识经济与第二次现代化. 科技导报，6：3～4.

16. 何传启, 1999. 第二次现代化——人类文明进程的启示. 北京：高等教育出版社.

17. 何传启, 2003. 东方复兴——现代化的三条道路. 北京：商务印书馆.

18. [德]沃尔夫冈 •查普夫，2000. 现代化与社会转型（第二版）. 陈黎，陆成宏，译. 北京：社会科学文献出版社.

19. 邓小平, 1993. 邓小平文选（第三集）. 北京：人民出版社.

20. UNDP, (various years). Human Development Report. New York: Oxford University Press.

Principles and Methods of Modernization Science

Chuanqi He
China Center for Modernization Research, Chinese Academy of Sciences

In October of 2010, *Modernization Science: Principles of National Advance* (He, 2010) was published by Science Press, in January of 2011, *China Modernization Report 2011: Introduction to Modernization Science* (He, 2011) was published by Peking University Press in China, and in March of 2012, *Modernization Science: The Principles and Methods of National Advancement* (He 2012) was published by Springer in Germany. This paper includes the three parts that come from the overview of CMR 2011.

Modernization Science: Principles of National Advance.

CMR 2011: Introduction to Modernization Sciences.

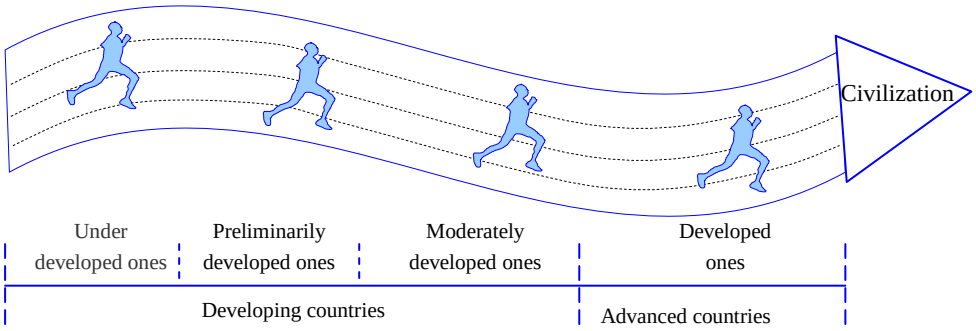

Fig. 1 Modernization movement is just like an international marathon figuratively

Note: Modernization is just like an international marathon from the perspective of the national level and international competition figuratively. In which the countries running ahead become advanced or developed ones, while the rest become developing ones; and developing ones include three groups: moderately, preliminarily and under developed ones. There is some mobility among them.

I. Basic Concepts of the Modernization Science

The modernization science is an emergent interdisciplinary one deals with modernization, an objective phenomenon including the frontier changes of modern civilization and international competition, progress of civilization and international differentiation as well as improved quality of life and some side effects. It covers the modernization phenomenon, modernization study and theories as well as the world frontier of modern civilization and the principles of national advancement.

1. What is Modernization?

The English word "modernization" appeared approximately in the 18th century (1748~1770), and was translated into Chinese in early 20th century. Modernization was widely used as a general word between the 18th century and the 19th century, and gradually became an academic term in the 20th century. The modernization science emerges in the 21st century.

Currently, there is no standard definition but mainly three explanations and six theoretical meanings of modernization at present.

First, the basic meaning of modernization refers to the explanations of modernization in different dictionaries. According to the Merriam-Webster's English Dictionary, modernization has two basic meanings: for one thing, it is an action to be modern or adapt to the modern needs, namely the action of realizing modernization; for another, it is a state which has modern features or meets the modern needs, namely the state after realizing modernization. To articulate the phenomenon, there are the verb "modernize", the noun "modernization" and the adjective "modernized". The modernized refers to the latest, the best and the most advanced in short word.

Second, the theoretical explanation of modernization refers to the explanations of modernization in different theories. Modernization theories are the systematic descriptions about the characteristics of and laws governing modernization. Different schools of theories explain modernization differently. No consensus has been reached yet on the understanding and explanation of modernization.

Third, the policy implication of modernization refers to the explanations of modernization in relevant national policies, including the various strategies and measures to promote modernization. Generally, policy implications differ in different modernization theories; the national policies for advancing modernization are different at different historical periods; the explanations of modernization in policies advance with the times.

Fourth, the Second Modernization Theory holds that modernization has six theoretical meanings. It is a change of civilization, a type of international competition, a state of civilization, an action of civilization, a historical process, and a transformation of civilization.

In modernization science, modernization has specified connotation, denotation and nature.

First, in connotative terms, modernization, a worldwide phenomenon since the Industrial Revolution in the 18th century, is the frontier change of modern civilization and the international competition including the formation, development, transformation and international interaction of modern civilization, the innovation, selection, diffusion and withdrawal of civilization elements as well as the international competition to catch up with, reach and maintain the world's advanced level and the international differentiation. The countries which have reached and maintained the world's advanced level are advanced countries while the rest fall into the category of developing ones; there is status mobility between the two types of countries.

Second, in denotative terms, modernization happens in different periods, at different levels, and in different fields, sectors and aspects, covering behavior and life, content and structure, organization and institution as well as knowledge and ideas.

Third, modernization has its duality. From the perspective of civilization change, every country is making progress and may succeed in the modernization. But the pace of progressing and the level of development differ from country to country, so not all the countries succeed simultaneously. From the perspective of international competition, only a few countries are able to reach and maintain the world's advanced level. In the past 300 years, advanced countries have accounted for less than 20% of the world total number of countries while the proportion of developing countries exceeded 80%. In a span of about 50 years, about 5% of the developing countries are probably upgraded to advanced ones and the probability that an advanced country keep its status is about 90%.

2. What is Modernization Science?

The modernization science is an interdisciplinary science deals with the modernization phenomenon and can be understood from roughly three dimensions.

First, it is a knowledge system on the facts, features and principles of the modernization.

Second, it is the scientific research about the modernization phenomenon.

Third, it is the rational thinking and methods to do modernization research.

Generally, the modernization science refers to the knowledge system and scientific researches about the modernization phenomenon.

To put it in an accessible way, the modernization science is a discipline of science about the world frontier and national advance since the 18th century, about the frontier changes of modern civilization and the international competition.

3. Structure of the Modernization Science

The modernization science includes the knowledge of modernization and research on

modernization (Fig. 2). The knowledge of modernization covers the experience in and theories about modernization. Modernization theories include general, stage-specific, level-specific, field-specific, sector-specific and topic-specific theories. The general theory of modernization is the abstraction of other theories while other theories represent the embodiment of the general theory in different stages, levels, fields, sectors and topics. Modernization study, a type of scientific research on the modernization phenomenon, can be classified into basic research, applied research and development research (policy research).

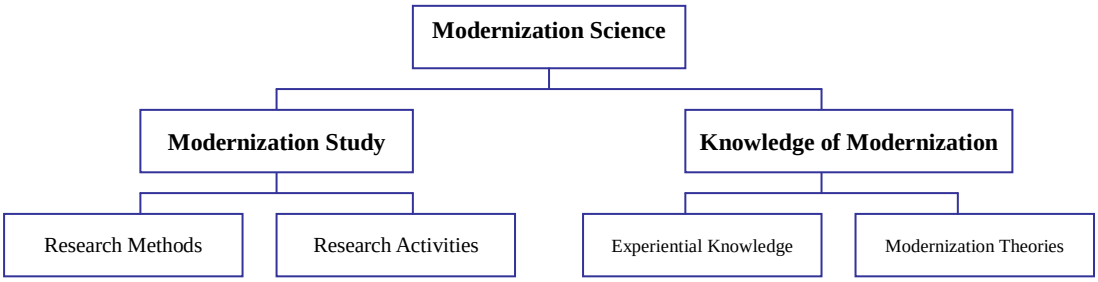

Fig. 2 Basic Structure of the Modernization Science

Generally, the modernization science consists of seven parts, i.e., general theory (general principles), history of modernization, stage-specific modernization, level-specific modernization, field-specific modernization, sector-specific modernization and modernization policies.

4. Characteristics of the Modernization Science

The modernization science is a new member of the big family of sciences.

It is an interdisciplinary, applied and also integrated science.

It does not only cross with other sciences, but also involves their integrated applications.

It has 16 major features including being cross-disciplinary, highly integrated, large-scaled and strategically grand, and so on.

If development study is an interdisciplinary science about developing countries, then the modernization science is one about national advance. Modernization science focuses on the world frontier and international differentiation, and explains the world frontier of modern civilization, the process to reach the frontier, and the principles and methods concerning national advance.

5. Methodologies of the Modernization Science

The methodologies of modernization research include positivism, interpretivism and realism. Generally, positivist research provides us with the facts about and principles of modernization; interpretivist research provides us with the significance and relevance of modernization; realist research provides us with the methods and recommendations for realizing modernization. Besides, Modernization research is also greatly influenced by critical theory and futurology.

Coordinate analysis, an integrated method in modernization research, includes the coordinate

system of modernization, analysis of variables and description of results. The coordinate system of modernization includes the timetable, the periodic table, the coordinates, and the roadmap of civilization and modernization; the analysis of variables includes paradigm analysis, quantitative analysis, time series analysis, and cross-sectional analysis; the description of results is to mark the results of the quantitative evaluation, time series analysis, cross-sectional analysis, paradigm analysis and process analysis of modernization in the coordinates of modernization, so as to form the coordinate map and roadmap of modernization, and so on.

In selecting analysis variables in modernization research, three factors should be taken into account: 1) the variables should be of academic or policy significance; 2) they should be easy to be compared and analyzed internationally; 3) sufficient data or information about them should be available. There are many types of variables such as qualitative and quantitative indicators, common and individual indicators, increasing and decreasing variables, transitional, long-term fluctuating and random variables, regional, stable variables, and saturation variables.

Modernization: a phenomenon including civilization change, international competition and differentiation.

Modernization science: an interdisciplinary one deals with modernization phenomena.

II. Basic Principles of the Modernization Science

The modernization science is a new science but the modernization phenomenon been there for a long time. In addition, modernization research has developed for more than 50 years and there are many schools of modernization theories. Currently, the main contents of the modernization science are based on the modernization phenomenon over the past 300 years and the modernization research over the past 50 years. In the 21st century, modernization will continue, modernization research will further and the modernization science will grow. The future prospects for the science are bound to be bright.

1. Main Contents of the Modernization Science

From the perspective of disciplinary structure, they are currently composed of seven parts.

(1) General Theory

The general theory of the modernization science refers to the systematic descriptions about the main characteristics and basic principles of the modernization phenomenon including the definition, process, outcomes, driving forces and models of modernization. Currently, there are many different schools of modernization theories which have different understandings of the features and laws of modernization. The general theory of the second modernization theory represents a concentrated description of such features and laws which will be addressed latter.

(2) History of Modernization

The history of modernization includes the modernization process, the history of modernization research and the history of modernization thought.

The modernization process has its generality but also differs from country to country and from field to field. Generally, the British Industrial Revolution in the 1760s marked the start of world modernization and it is not certain yet whether there is an end. Between the 18th century and the 21st century, the frontier trajectory of the modernization process can be divided into two major stages and six waves.

Generally, modernization research in the West started in the 1950s. Over the past 60 years, modernization research has experienced three waves, namely classical modernization research, post-modernization research and new modernization research. Chinese scholars' research on modernization has witnessed three climaxes, namely the discussions on China's modernization in the 1930s, the classical modernization research in the 80s and 90s, and the multi-disciplinary research on modernization since the end of the 90s.

The Classical Modernization Theory was established around the 1950s~60s. Since the 1960s, some 10 modernization and relevant theories have emerged including the classical modernization theory, the dependency theory, the world systems theory, the post-modernization theory, the ecological modernization theory, the reflexive modernization theory, the continuous modernization theory, the globalization theory, the multiple modernities theory and second modernization theory.

(3) Stage-specific Modernization

Between the 18th and the 21st centuries, the modernization process consists of two stages, on each of which there are different theories.

As the world frontier of human civilization, the first stage of modernization (approx.1763~1970), or the first modernization for short, is the transition from agricultural to industrial civilization and from traditional to modern society. Relevant theories about this stage

include Classical Modernization Theory, Dependency Theory, World-Systems Theory, etc.

The second stage of modernization (approx.1970~2100), or the second modernization for short, is the transition from industrial to knowledge civilization and from material to ecological civilization. Relevant theories about this stage include Second Modernization Theory, Reflexive Modernization Theory, Post-modernization Theory, Continuous Modernization Theory, etc.

In the late 20th and the 21st centuries, developing countries are faced with the double challenges of the first and second modernization. Some of them may choose to achieve the coordinated development of two modernizations, which can be called the integrated modernization path for short. Relevant theories about this path include Integrated Modernization Theory, Multiple Modernities Theory and Globalization Theory.

(4) Level-specific Modernization

Modernization takes place at different levels of human civilization including the world, international, national, regional, organizational and individual levels. There are both similarities and differences between modernizations at different levels. Modernization at every level is closely related to national modernization. The theoretical descriptions about the features and laws of modernization at different levels can be called level-specific theories for short.

(5) Field-specific Modernization

Modernization occurs in all fields of human civilization including the economic, social, political, cultural, ecological, and human development fields. There are both similarities and differences between modernizations in different fields and the applicability of the general theory on modernization varies from field to field. The theoretical descriptions about the features and laws of modernization in different fields can be called field-specific theories for short.

(6) Sector-specific Modernization

Modernization happens in all sectors of human civilization. There are both similarities and differences between modernizations in different sectors and the applicability of the general theory on modernization varies from sector to sector. The theoretical descriptions about the features and laws of modernization in different sectors can be called sector-specific theories for short.

(7) Modernization Policies

Modernization policies represent the practical application of modernization theories. Advanced and developing countries differ greatly in modernization policies. Modernization policies cover modernization evaluation, modernization strategies and modernization measures.

Modernization strategies are based on modernization theories, and development strategies are based on development theories. The former apply to all countries, while the latter are commonly seen in developing countries. They are both related to and different from each other.

The outstanding features of modernization policies and measures are their pertinence and timeliness. Policy innovation and measure selection should follow modernization laws and comply with the basic national conditions and international environment. Advanced and developing countries have different policy innovations and measure options. The modernization science has many theories whose policy implications vary from one to another.

2. General Theory of the Modernization Science

Modernization is a change of civilization which follows certain laws. Currently, there is no standard theory of modernization. What's discussed here is the general theory of the second modernization theory which can reflect the core theory of the modernization science (Fig. 3).

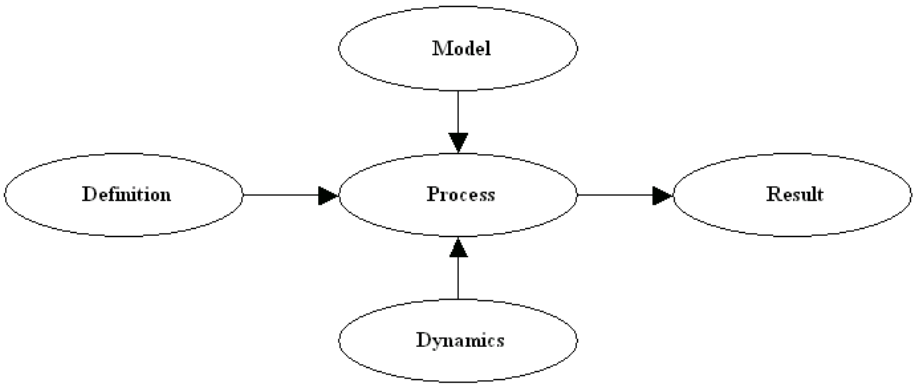

Fig. 3 General Theory of Second Modernization

(1) Operational Definitions

In the modernization science, there is no standard definition of modernization, but there are a variety of operational definitions which can be raised according to the theoretical meanings of modernization and the needs of modernization research.

Definition 1: Modernization is a type of frontier change of human civilization and international competition since the Industrial Revolution in the 18th century. It is the frontier process of the formation, development and transition of and international interaction between modern civilizations, the composite process of alternate innovation, selection, diffusion and withdrawal of modernization elements, and the international competition for catching up with, reaching and maintaining the world's advanced level and the international differentiation thereof. Countries which have reached and maintained the world's advanced level are advanced countries, and others are developing countries; there is a certain probability of transferring status between the two types of countries.

Definition 2: Modernization is the intersection of civilization development, civilization transition and international interaction since the 18th century.

Definition 3: Modernization is the world frontier of modern civilization, and the process and

action of reaching the world frontier.

The first definition applies to theoretical analysis; the second and third definitions are applicable to policy analysis and quantitative evaluation.

Modernization is the frontier change of modern civilization; only the frontier change that satisfies three criteria can be defined as modernization. In the 21st century, the criteria of modernization are as follows.

First, the criterion of productivity, i.e., it is conducive to the emancipation and improvement of productivity, without damaging the natural environment. Second, the criterion of social progress, i.e., it is conducive to social equity and progress, without hindering economic development. Third, the criterion of human development, i.e., it is conducive to the liberation and all-round development of human beings, without undermining social harmony.

Modernization has a multifaceted nature. For example, it is not only a world trend but also a social option; it gives rise to not only civilization progress but also side effects; it has not only generality and modernity but also individuality and diversity; it involves not only international convergence but also international differentiation; it cannot be done once and for all and not to advance is to go back.

From the perspective of civilization development and transition, modernization is "a matter of time". Every country is making progress and may succeed in modernization but when the success will be achieved is uncertain. From the perspective of world frontier and international competition, modernization is "a matter of percentage and probability".

Over the past 300 years, the percentage of countries that have reached and maintained the world's advanced level has been less than 20%; in a span of about 50 years, the probability that an advanced country is downgraded to a developing one is about 10% and the probability that a developing country reaches the world's advanced level is about 5%.

(2) Process

Generally, there are roughly two types of modernization processes, namely frontier process and catch-up process, which are related to, different from and interact with each other. The two processes may promote each other in the context of fair trade but may conflict with or even restrain each other in the case of unfair trade.

According to the modernization in the past 300 years, the frontier process has more than 20 features such as being long-term, stage-specific, global, competitive and risky and so on; they represent the general characteristics of the modernization process. The catch-up process has about 12 features like being goal-oriented, diversified, contradictory, integrative and challenging and so on. Generally, historical stages cannot be skipped but some technological stages can be skipped.

The catch-up process can reduce the cost of time.

Between the 18th and 21st centuries, the frontier process of modernization can be divided into two major stages: the first and second modernization. The first modernization is the transition from agricultural to industrial civilization and the involved international competition, including the shift from agricultural to industrial economy, from agricultural to industrial society, from agricultural to industrial politics, and from agricultural to industrial culture. Its main features include industrialization, urbanization, democratization, rationalization, marketization and welfare; different fields have different features. The second modernization is the transition from industrial to knowledge civilization and the involved international competition, including the shift from industrial to knowledge economy, from industrial to knowledge society, from industrial to knowledge politics, from industrial to knowledge culture and from material to ecological culture. Currently its main features include knowledgeablization, informatization, greening, globalization, individuation and diversification; different fields have different features.

The first modernization is the foundation of the second modernization. The second modernization is the continuity and development of the first modernization in some aspects such as democratization, rationalization and scientific and technological advancement; in some aspects, it is the "reversion" or transition of the first modernization, for example, from industrialization to de-industrialization, from urbanization to suburbanization, from centralization to decentralization and from ecological destruction to environmental protection; and in some aspects it is innovation, for example, knowledgeablization, informatization and networking, and so on. The coordinated development of the first and second modernization and the transition towards the second modernization mark the integrated modernization.

Modernization follows 10 basic principles: asynchronous process, unbalanced distribution, structural stability, changeable status, predictable behavior, optional path, increasing needs, decreasing return, unrepeatable state and changing axis.

If we say that modern civilization can be divided into two stages, namely primary civilization and advanced civilization, then industrial civilization is the primary modern civilization, and knowledge civilization and ecological civilization are the advanced modern civilizations. If we say that the first modernization is the transition from traditional to primary modern civilization, then the second modernization is the transition from primary modern to advanced modern civilization; the integrated modernization is the coordinated development of the first and second modernization and the continuous transition towards advanced modern civilization.

(3) Result

Generally, the outcomes of modernization include the formation of

modernity, particularity and diversity; the improvement of labor productivity and quality of life, social progress, political democracy, cultural diversity, ecological changes and all-round human development; international differentiation, national stratification and side effects; and changes in world frontier, international system and national state.

The main outcome of the first modernization process is the formation of first modernity, particularity, diversity and side effects. The main features of the first modernity include industrialization, urbanization, democracy, rule of law, rationality, secularity, mobility, marketization, social welfare, high efficiency, liberty, equality, modern science and energy, mass communication and universal compulsory education etc.. The side effects of the first modernization include, among other things, environmental pollution, gap between the rich and poor, economic crisis cycle and weakening human relationship. Some traditional values continue to exist and play a certain role.

The main outcome of the second modernization process is the formation of second modernity, particularity, diversity and side effects. The main features of the second modernity in 2005 included knowledge intensiveness, information intensiveness, networking, intellectualization, globalization, innovation, individuation, diversification, greening, ecological awareness, risk, urban-rural balance, environmental-friendliness, lifelong learning and universal higher education etc.. Currently the side effects of the second modernization include cyber crime, information divide, international risk, and widening inequality. Some traditional values continue to exist and play a certain role.

From the theoretical perspective, national modernization has three main objectives: 1) completing the first modernization, effecting the transition from agricultural to industrial civilization; 2) completing the second modernization, effecting the transition from industrial to knowledge civilization; and 3) catching up with, reaching or maintaining the world's advanced level. The realization of the first two objectives is a matter of time, and all countries may attain them early or late; as for the third objective, only a portion of countries could reach and maintain the world's advanced level of development. Advanced countries represent the minority; developing countries are the majority.

From the policy perspective, national modernization has two main objectives. The first one, which concerns national progress, is to improve productivity and the quality of life, promote social equity and progress, facilitate all-round human development and enhance the symbiosis of man and nature. The second one, which concerns international status, is to catch up with, reach or maintain the world's advanced level of development. Advanced countries' policy objective is to

maintain the world's advanced level, while developing countries' policy objective is to catch up with and reach the world's advanced level.

Before 1950, there were no modernization theories and objectives; the process of national modernization was a kind of "natural development" which brought about "natural outcomes". From 1960 onwards, the Classical modernization Theory exerted a major influence on the development policies and national objectives of developing countries. Since 1970, many new modernization theories have emerged such as the ecological modernization theory and the second modernization theory, which have influenced the national objectives of both advanced and developing countries to some degree; the outcomes and objectives of national modernization have become increasingly related to each other.

(4) Dynamics

The analysis of driving forces behind modernization can be conducted at micro and macro levels, involving the driving factors and mechanisms.

Driving factors include individual psychological and social factors at the micro level as well as domestic and international factors at the macro level. Generally, the driving factors of modernization include innovation, competition, adaptation, exchange, national interests and market demand etc.. Innovation is the fundamental source of modernization; competition stimulates modernization; adaptation is the self-adjusting mechanism of modernization; exchange promotes modernization; national interests drive international competition; and market demand drives product innovation.

At the micro level, modernization has mainly five dynamic models. The first one is the innovation-drive model. Innovation gives rise to new ideas, new institutions, new knowledge and new products, which forms a cycle of positive feedback from innovation to modernization. The second one is the triple-innovation-drive model. Knowledge, institutional and technological innovations work together to push forward modernization. The third one is the two-wheel-drive model. National interests and market demand co-drives modernization. The fourth one is the associative action model. Innovation, competition, adaptation and exchange works together to advance modernization. The fifth one is the four-step hyper-cycle model. The hyper-cycle of civilization elements, innovation – selection – diffusion – withdrawal, advances the process of modernization.

At the macro level, modernization has mainly four dynamic models. The first one is the model of innovation diffusion: domestic and international diffusion of major innovations. The second one is the model of innovation spillover: external effects of major innovations (effects on other fields). The third one is the competition-drive model: the roles of international competition,

market competition and democratic election. The fourth one is the composite interaction model: the composite interaction of new civilization, actual civilization and civilization heritage.

According to the productivity function of modernization, productivity is in direct proportion to technological advancement, per capita skill and per capita capital.

(5) Models

Modernization features path dependency as well as the diversity of paths and models. In the 21st century, there are mainly three basic paths of modernization and over 50 element mix models. Different countries and regions can choose different paths and development models.

The second modernization path is to achieve the transition from industrial to knowledge civilization and from material to ecological civilization. The priorities are knowledgeablization, informatization, greening, individuation, diversification, and globalization etc..

The integrated modernization path is to achieve the coordinated development of the first and second modernization and the continuous advancement towards knowledge civilization. The priorities are new industrialization, new urbanization, new welfare, knowledgeablization, informatization, greening and democratization and so on.

The catch-up modernization path is to finish the first modernization by achieving the transition from agricultural to industrial civilization firstly and then promote the second modernization based on the historical experience of advanced countries. This path suits developing countries and regions.

There are no standard or best modernization models. Countries may choose different mix models of modernization elements in different stages of modernization. There are more than 10 mix models for the first modernization such as industrialization priority, democratization priority, urbanization priority, economy priority or education priority. There are over 20 mix models for the second modernization including knowledgeablization priority, informatization priority, ecologicalization priority, or coordinated development. In addition, there are more than 20 mix models for the integrated modernization like industrialization priority, ecologicalization priority, knowledgeablization priority, informatization priority or coordinated development and so on.

The core theory of modernization science includes the fife parts, and they are the interpretations on the definition, process, result, dynamics and models of modernization.

III. Practical Application of the Modernization Science

The modernization science is about modern civilization and national advance. Its two tasks are to describe the world frontier and the pattern of changes in modern civilization and to explain the principles and methods on national advance. To put it simple, the former is its theoretical significance; the latter is its practical application; modernization strategies and policies are where the two meet.

1. Modernization and National Advance

Countries are the basic units of modernization research and drive. In the process of modernization, the classification and stratification of countries and the international differentiation exist as objective phenomena. There are many classifications of countries. One of them is to classify countries into advanced and developing ones based on the national level of development.

First, national advance is a worldwide phenomenon. At national level, it is the development process of a country through which it reaches and maintains the world's advanced level of development (the level of advanced countries) with the change of its status in the international system. At the level of the international system, it is the process of international differentiation through which some become advanced countries while others become developing countries.

Second, the criteria of advanced countries in 2005 included the level of national modernization and the level of modernization in major fields standing at the world's top 20, and the second modernization index, integrated modernization index and modernization indexes in major fields reaching or exceeding 80 (80% of the average level of high-income countries). Advanced countries' performance is not advanced in all fields or by all indicators; developing countries may also have reached the world's advanced level in some fields or in terms of some indicators. Generally, advanced countries are probably advanced by more than 80% of indicators.

Third, national advance is a complex phenomenon. From the perspective of national classification, advanced countries are defined according to the national level. From the perspective of national stratification, advanced countries are those which reach the world's advanced level. From the perspective of international differentiation, advanced countries are those which are at the high end of international divisions. But such classification is made in relative terms.

2. Theoretical Explanation on National Advance

National advance is a complex phenomenon, which can and do need to be analyzed from different perspectives. According to the discussion above, it is also an attendant phenomenon to the modernization process, so it can be interpreted based on the modernization theories.

First, national advance is a historical phenomenon; it is the outcome of national modernization, international competition and differentiation. In the process of modernization,

advanced countries are those that have reached and maintained the world's advanced level, and others are developing ones; the percentage of advanced countries is generally below 20%, and that of developing countries is above 80%; there is mobility between the two types of countries.

Second, national advance is in positive correlation with the national level of development. In general, the development level of a country is in direct proportion to its percentages of innovation value, material-embodied labor, effective labor, effective investment, advanced assets and advanced technologies, and in inverse proportion to its percentages of labor value, living labor, ineffective labor, ineffective investment, primary assets and backward technologies and so on.

Third, national advance has a double nature. First, it has relative stability. For example, in a span of 50 years, the probability that an advanced country maintains its advanced level is about 90%. Second, it has mobility. For example, advanced countries may be downgraded to developing ones with a probability of about 10%, and developing countries may also be upgraded to advanced ones with a probability of about 5% in a span of 50 years (Fig. 4).

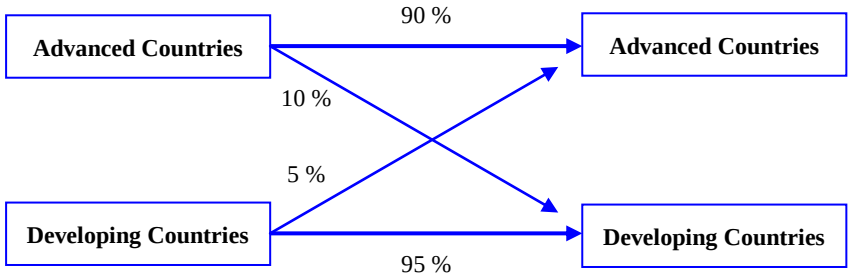

Fig. 4 Probability of Transition between Advanced and Developing Countries in 50 Years

Fourth, there are three criteria of national advancement including advanced productivity, social progress and all-round human development. National advancement is first manifested as having advanced productivity; only those with the world's advanced levels of productivity, social progress and human development are advanced countries. Generally, productivity means the value created by labor in a unit time. The aggregate value created by aggregate social labor mainly includes four types of value, namely labor value, innovation value, resource value and environmental value. Labor value is created by common labor; innovation value is created by creative labor, both of them take up a dominate share. In the aggregate social value, advanced countries hold a higher percentage of innovation value, while developing countries have a bigger share of labor value. The fourth criterion is environmental friendliness, the win-win game of both the economy and the environment as well as the mutualism of man and nature.

Fifth, national advance involves three driving forces, namely innovation, learning and competition. On technological aspect, advanced countries emphasize both innovation and learning while developing countries focus more on the latter. On institutional aspect, advanced countries

stress both fair competition and rational regulation of market competition and income distribution, while developing countries highlight moderate and progressive regulation of market competition and income distribution.

Sixth, the general method of national advance is to follow the basic principles of modernization and national advance and choose the right modernization path, model, strategies and measures based on national conditions and the international environment. The methods that advanced and developing countries choose have both similarities and differences. Generally, the focus should be on four aspects: everyone doing his best and fair competition, distribution according to contribution and adjustment as needed, promotion according to performance and selection according to public opinion as well as equality and mutual benefit.

3. Optional Strategies for National Advance

In the 21st century, advanced countries need to maintain the world's advanced level while developing countries need to catch up with the world's advanced level; they do need to choose one strategy after another. In many cases, the choices they make determine whether they will succeed or fail. Generally, national advance entails the achievement of reaching the world's advanced levels in economic, social, political, cultural, ecological and human modernization, particularly in terms of productivity, social progress and all-round human development.

(1) Optional Strategies for Advanced Countries

Currently, there are about more than 20 advanced countries in the world, and their population is over 1 million, all of which have entered the stage of the second modernization.

Optional objectives: reaching and maintaining the position in the world frontier and ranking among the world's top 10 in terms of modernization indexes.

Optional paths: the second modernization path. Different paths may be taken in different fields or regions. Optional models: choosing a certain element mix model for the second modernization path based on national conditions.

Optional priorities: priorities may be different in different countries, fields or regions. According to the three dimensions of productivity, social progress and human development, the options are 80% of innovation and 20% of learning as well as 80% of competition and 20% of regulation (the percentage of regulation may be around 30% in some Europe countries); the focus should be on four aspects: everyone doing his best and fair competition, distribution according to contribution and adjustment as needed, promotion according to performance and selection according to public opinion as well as making money expertly, equality and mutual benefit.

(2) Optional Strategies for Developing Countries

Currently, there are about over 100 developing countries, whose levels differ greatly.

Optional objectives: the objective of moderately developed countries is to reach the world's advanced level of development and rank among the world's top 20; preliminarily developed countries have a two-step objective, the first step of which is to reach the level of moderately developed countries and rank among the world's top 40; underdeveloped countries have a three-step objective, the first step of which is to reach the level of preliminarily developed countries and rank among the world's top 80.

Optional paths: countries at different development levels may choose the second modernization path, the integrated modernization path or the catch-up modernization path based on their specific national conditions. Optional models: choosing a certain element mix model for one of three paths based on national conditions.

Optional priorities: priorities may be different in different countries, fields or regions. According to the three dimensions of productivity, social progress and human development, the priorities are different for moderately developed, preliminarily developed and underdeveloped countries. For moderately developed countries, the options are 40% of innovation and 60% of learning as well as 85% of competition and 15% of regulation; for preliminarily developed countries, they are 20% of innovation and 80% of learning as well as 90% of competition and 10% of regulation; for underdeveloped countries, they are 10% of innovation and 90% of learning as well as 95% of competition and 5% of regulation. The focus should be on increasing innovation efficiency, investment efficiency and the proportion of effective labor, promoting fair competition and rational distribution, introducing promotion according to performance and selection according to public opinion, popularizing compulsory education and speeding up informatization.

In the international arena of modernization, advanced countries run at the forefront while developing ones follow up, the former need to maintain their advanced level while the latter will endeavor to catch up with the world frontier. The modernization science offers the basic principles and general methods for national modernization and advance.

Reference

He C. 2010. *Modernization Science: Principles of National Advance.* Beijing: Science Press.

He C. (ed.) 2011. *China Modernization Report 2011: Introduction to Modernization Science.* Beijing: Peking University Press.

He C. 2012. *Modernization Science: Principles and Methods of National Advancement.* Heidelberg: Springer.

现代化科学的原理和方法

何传启

中国科学院中国现代化研究中心

18 世纪工业革命以来，一些国家走在世界前列，达到和保持了世界先进水平，成为发达国家；一些国家没有走在世界前列，没有达到世界先进水平，成为发展中国家；发达国家可以降级为发展中国家，发展中国家可以升级为发达国家；两类国家之间可以转换，地位转移有一定概率。这个现象简称为国家发达现象。

国家发达现象是现代化过程的一个伴生现象，是现代化的一种表现形式。本期报告的主题是“现代化科学概论”，通过系统介绍现代化科学的基本概念、主要内容和实际应用，分析国家发达的原理和方法，为现代化建设提供科学依据。

一、现代化科学的基本概念

现代化科学是关于现代化现象的一门新兴交叉科学。现代化现象是 18 世纪工业革命以来的一种客观现象，它包括现代文明的前沿变化和国际竞争、文明进步和国际分化、生活质量提高和一些副作用等。现代化科学涉及现代化现象、现代化研究和现代化理论，涉及现代文明的世界前沿和国家发达的科学原理等。

1. 什么是现代化

在英文里，“现代化”一词大约出现于 18 世纪（1748～1770 年）。在中文里，“现代化”一词大约出现于 20 世纪初。在 18～19 世纪，“现代化”是一个普通词。在 20 世纪，“现代化”逐步成为一个专业词。在 21 世纪，“现代化科学”将诞生。

目前，现代化没有统一定义，大致有三种解释和六层含义。

首先，现代化的基本词义，指不同词典对“现代化”的解释。根据韦伯斯特英文词典，现代化有两种基本词义。（1）现代化是一种行为：成为现代的、适合现代需要的行为，即实现现代化的行为。（2）现代化是一种状态：具有现代特点的、满足现代需要的状态，即实现现代化后的状态。现代化可用作动词、名词和形容词。通俗地说，最新的、最好的和最先进的就是现代化的。

其次，现代化的理论解释，指现代化理论对“现代化”的解释。现代化理论是关于现代化的特征和规律的系统阐述。现代化理论有不同流派，不同流派的理论对现代化的解释有所不同。关于现代化的理解解释，目前没有统一认识。

其三，现代化的政策解释，指在国家相关政策中对“现代化”的解释，包括推进现代化的各种战略和措施等。一般而言，不同的现代化理论有不同的政策含

义，在不同时期国家现代化有不同的政策，现代化的政策解释是与时俱进的。

其四，现代化的六层含义。第二次现代化理论认为，现代化大致有六层理论含义。它们分别是：现代化既是一种文明变化，也是一种国际竞争；既是一种文明状态，也是一种文明行为；既是一个历史过程，也是一种文明转型。

在现代化科学里，现代化具有特定的内涵、外延和性质。

首先，现代化的内涵。现代化是 18 世纪工业革命以来的一种世界现象，是现代文明的一种前沿变化和国际竞争，它包括现代文明的形成、发展、转型和国际互动，文明要素的创新、选择、传播和退出，以及追赶、达到和保持世界先进水平的国际竞争和国际分化；达到和保持世界先进水平的国家是发达国家，其他国家是发展中国家，两类国家之间可以转换。

其次，现代化的外延。现代化包括不同时期、层次、领域、部门和方面的现代化，包括行为与生活、内容与结构、组织与制度、知识与观念的现代化等。

其三，现代化的二重性。（1）从文明变化角度看，每一个国家的现代化都在前进，都有可能成功。当然，国家进步有快慢，国家水平有高低，成功时间有先后。（2）从国际竞争角度看，只有部分国家能够达到和保持世界先进水平。在过去 300 年里，发达国家的比例不到 20%，发展中国家的比例超过 80%；在大约 50 年里，发展中国家升级为发达国家的概率约为 5%，发达国家保持发达水平的概率约为 90%。

2. 什么是现代化科学

现代化科学是关于现代化现象的一门科学，大致有三层含义。

首先，现代化科学是关于现代化现象的事实、特征和规律的知识体系。

其次，现代化科学是关于现代化现象的科学研究活动。

其三，现代化科学是从事现代化研究的理性思维和方法。

一般而言，现代化科学是关于现代化现象的知识体系和科研活动。

通俗地说，现代化科学是关于18世纪以来世界前沿和国家发达的一门科学，是关于现代文明的前沿变化和国际竞争的一门科学。

3. 现代化科学的结构

现代化科学包括现代化知识和现代化研究。现代化知识包括现代化理论和现代化经验。现代化理论包括一般理论、阶段理论、层次理论、领域理论、部门理论和专题理论等；其中，一般理论是其他理论的一种抽象，其他理论是一般理论在不同阶段、层次、领域、部门和专题方面的一种体现。现代化研究是关于现代化现象的一种科学研究，可以分为基础研究、应用研究和开发研究（政策研究）三大类。

现代化科学的学科结构一般包括七个部分：一般理论（一般原理）、现代化

史、分段现代化、分层现代化、领域现代化、部门现代化和现代化政策等。

4. 现代化科学的特点

在科学的大家庭里，现代化科学是一名新丁（一门新兴学科）。

现代化科学既是一门交叉科学，又是一门应用科学，还是一门综合科学。

现代化科学既与各门科学有交叉关系，又涉及各门科学的综合运用。

现代化科学大致有 16 个主要特点，如大交叉、大综合、大尺度和大战略等。

如果说，发展研究是关于发展中国家发展问题的一门交叉科学，那么，现代化科学是关于国家发达现象的一门交叉科学。现代化科学关注世界前沿和国际分化，解释现代文明的世界前沿和达到前沿的过程、国家发达的原理和方法等。

5. 现代化科学的研究范式

研究目的：揭示 18 世纪以来文明前沿的变化规律和国家发达的科学原理，解释和提供达到世界前沿和国家发达的途径和方法，满足人们对现代化现象的好奇心。

研究对象：现代化现象。现代化科学关注 18 世纪以来现代文明的前沿变化、达到前沿的过程，关注国家发达和国际分化，它们是现代化科学的主要研究对象。

研究内容：现代化的内涵、特征和规律，国家发达的原理和方法等。一般包括现代化的过程、结果、动力和模式，文明前沿的行为、结构、制度和观念的变化等。

研究步骤：提出问题、概念化、操作化、收集资料、客观分析、结果表述和提出建议。七个步骤可以循序进行、循环进行、交叉进行或有选择地进行。

研究要求：明确研究的目的、界定研究的对象、界定研究的内容、采用科学的方法、客观和没有偏见、完善的科学引文。

6. 现代化科学的研究方法

现代化研究的方法论：实证主义、阐释主义和现实主义等。一般而言，实证研究提供现代化现象的事实和原理，阐释研究提供现代化现象的意义和关联，实用研究提供现代化建设的方法和建议等。此外，批判理论和未来学有很大影响。

自然科学和社会科学的研究方法，可以有选择地采用。例如，观察、调查、模拟、假设、心理分析、统计分析、定量分析、定性分析、模型方法、理论分析、比较分析、历史分析、文献分析、过程分析、情景分析和案例研究等。

现代化研究的坐标分析法是一种综合研究方法，它包括现代化的坐标体系、变量分析和结果表达等。坐标体系包括文明和现代化的时间表、周期表、坐标系和路线图等；变量分析包括范式分析、定量评价、时序分析和截面分析等；结果表达是将现代化定量评价、时序分析、截面分析、范式分析和过程分析的结果，标记在现代化坐标系里，构成现代化的坐标图和路线图等。

现代化研究的分析变量。选择分析变量需要考虑三个因素：具有学术或政策意义，便于国际比较和分析，可以获得连续数据或资料。分析变量可以分为不同类型，例如，定性和定量指标，共性和个性指标，上升变量，下降变量，转折变量，长期波动变量，随机变量，地域变量，稳定变量，饱和变量。

二、现代化科学的基本原理

现代化科学是一门新兴科学，但现代化现象是一个历史现象，现代化研究有50 多年历史，现代化理论有众多流派。目前，现代化科学的主要内容是基于过去300年的现代化现象和50多年的现代化研究。在21世纪，现代化现象会继续，现代化研究会深入，现代化科学会发展。现代化科学的未来空间是广阔的。

1. 现代化科学的主要内容

从学科结构角度看，目前，现代化科学的主要内容包括七个部分。

（1）一般理论

现代化科学的一般理论是关于现代化现象的主要特征和基本原理的系统表述，一般包括关于现代化的定义、过程、结果、动力和模式等方面的阐述。目前，现代化理论有不同流派，不同理论对现代化特征和规律的认识有所不同。第二次现代化理论的一般理论，比较集中地反映了现代化的特点和规律，将在后面专题讨论。

（2）现代化史

现代化史包括现代化进程、现代化研究史和现代化思想史等。

现代化进程既有共性，也有国别和领域差异。一般而言，18 世纪 60 年代（英国工业革命）可以作为世界现代化的起点，目前尚不能确定它是否有终点。在18～21 世纪期间，现代化进程的前沿轨迹可以分为两大阶段和六次浪潮。

一般而言，西方的现代化研究是 20 世纪 50 年代开始的。在过去 60 年里，现代化研究大致有三次浪潮：现代化研究、后现代化研究和新现代化研究。中国学者的现代化研究有三次高潮：20 世纪 30 年代的中国现代化讨论、80 和 90 年代的经典现代化研究、90 年代末以来多学科的现代化研究。

经典现代化理论大致诞生于 20 世纪 50～60 年代。20 世纪 60 年代以来，先后大致诞生了 10 种现代化理论和相关理论。它们依次是：经典现代化理论、依附理论、世界体系理论、后现代化理论、生态现代化理论、反思性现代化理论、继续现代化理论、全球化理论、多元现代性理论和第二次现代化理论等。

（3）分段现代化

在 18～21 世纪期间，现代化过程可以分为两个阶段，不同阶段有不同理论。

在人类文明的世界前沿，第一阶段的现代化（大约 1763～1970 年）简称为第一次现代化，是从农业文明向工业文明、从传统社会向现代社会的转变，主要

相关理论包括经典现代化现代化、依附理论和世界体系理论等。

第二阶段的现代化（大约 1970～2100 年）简称为第二次现代化，是从工业文明向知识文明、从物质文明向生态文明的转变，主要相关理论包括第二次现代化理论、反思性现代化理论、后现代化理论和继续现代化理论等。

在 20 世纪后期和 21 世纪，发展中国家面临两次现代化的双重挑战，一些发展中国家可以选择两次现代化协调发展的道路，简称为综合现代化路径。主要相关理论包括综合现代化理论、多元现代性理论和全球化理论等。

（4）分层现代化

现代化发生在人类文明的不同层次，如世界、国际、国家、地区、机构和个体层次等。不同层次的现代化既有共性又有差异，每个层次的现代化都与国家现代化有紧密关系。关于不同层次现代化的特征和规律的理论阐述，简称为分层理论。本期报告简要讨论了六个层次现代化的历史进程、基本事实和主要理论。

（5）领域现代化

现代化发生在人类文明的不同领域，如经济、社会、政治、文化、生态和个人行为领域等。不同领域的现代化既有共性也有差异，现代化一般理论在不同领域的适用性有所不同。关于不同领域现代化的特征和规律的理论阐述，简称为领域理论。本期报告简要讨论了六个领域现代化的历史进程、基本事实和主要理论。

（6）部门现代化

现代化发生在人类文明的各个部门。不同部门的现代化既有共性也有差异，现代化一般理论在不同部门的适用性有所不同。关于不同部门现代化的特征和规律的理论阐述，简称为部门理论。本期报告简要讨论了农业、教育和科技现代化。

（7）现代化政策

现代化政策是现代化理论的一种实际应用。发达国家和发展中国家的现代化政策有较大差别。现代化政策涉及现代化评价、现代化战略和现代化措施等。

现代化战略是基于现代化理论的战略，发展战略是基于发展理论的战略。前者适合于所有国家，后者常见于发展中国家。两者既有联系又有区别。

现代化政策和措施的突出特点是针对性和时效性等。政策创新与措施选择，需要遵循现代化规律，需要适合基本国情和国际环境。发达国家和发展中国家的政策创新和措施选择是不同的。现代化科学包括众多理论，其政策含义各有差别。

2. 现代化科学的一般理论

现代化是一种文明变化，变化是有规律的。目前，关于现代化没有统一理论。这里讨论第二次现代化理论的一般理论，它可以反映现代化科学的一般理论。

（1）现代化的操作性定义

在现代化科学里，现代化没有统一定义，但有多种操作性定义。根据现代化

的理论含义和现代化研究的需要，可以提出现代化的操作性定义。

定义一，现代化是 18 世纪以来人类文明的一种前沿变化和国际竞争，是现代文明的形成、发展、转型和国际互动的前沿过程，是文明要素的创新、选择、传播和退出交替进行的复合过程，是追赶、达到和保持世界先进水平的国际竞争和国际分化；达到和保持世界先进水平的国家是发达国家，其他国家是发展中国家，两类国家之间可以转换，地位变迁有一定概率。

定义二，现代化是 18 世纪以来文明发展、文明转型和国际互动的交集。

定义三，现代化是现代文明的世界前沿，以及达到世界前沿的行为和过程。

第一种定义适用于理论分析，第二种和第三种适用于政策分析和定量评价。

现代化的判断标准。现代化是现代文明的一种前沿变化，满足三个标准的前沿变化才属于现代化。在 21 世纪，现代化的三个判断标准如下：

首先，生产力标准：有利于生产力的解放和提高，又不破坏自然环境。

其次，社会进步标准：有利于社会的公平和进步，又不妨碍经济发展。

其三，人类发展标准：有利于人的解放和全面发展，又不损害社会和谐。

现代化的多面性。例如，现代化既是一种世界潮流，也是一种社会选择；既是一种文明进步，也有副作用；既有共性和现代性，也有个性和多样性；既有国际趋同，也有国际分化；现代化不是一劳永逸的，而是不进则退等。

从文明发展和文明转型角度看，现代化是一个“时间问题”。每一个国家的现代化都在前进，都有可能成功，但成功的时间是不确定的。从世界前沿和国际竞争角度看，现代化是一个“比例和概率问题”。在过去 300 年里，达到和保持世界先进水平的国家所占比例小于 20%；在大约 50 年里，发达国家降级为发展中国家的概率约为 10%，发展中国家达到世界先进水平的概率约为 5%。

（2）现代化的过程

一般而言，现代化过程大致可以分为两类：前沿过程和追赶过程。两类过程既有联系又有差别，而且相互影响。在公平贸易条件下，两类过程可以相互促进；在不公平贸易条件下，两类过程可能发生相互矛盾，甚至相互抑制。

根据过去 300 年的历史经验，现代化的前沿过程大约有 20 多个特点，如长期性、阶段性、全球性、竞争性和风险性等；它们反映了现代化过程的一般特点。追赶过程大约有 12 个特点，如目标性、多样性、矛盾性、集成性和挑战性等。一般而言，历史阶段不可跨越，技术阶段可以跨越，追赶过程可以降低时间成本。

在 18～21 世纪期间，现代化前沿过程可以分为第一次和第二次现代化两大阶段。第一次现代化是从农业文明向工业文明的转型和国际竞争，包括从农业经济向工业经济、农业社会向工业社会、农业政治向工业政治、农业文化向工业文化的转变等，它的主要特点包括工业化、城市化、民主化、理性化、市场化和福

利化等，在不同领域有不同特点。第二次现代化是从工业文明向知识文明的转型和国际竞争，包括从工业经济向知识经济、工业社会向知识社会、工业政治向知识政治、工业文化向知识文化、物质文化向生态文化的转变等，目前它的主要特点包括知识化、信息化、绿色化、全球化、个性化和多元化等，在不同领域有不同特点。

第一次现代化是第二次现代化的基础。第二次现代化在某些方面是第一次现代化的延续和发展，如民主化、理性化和科技进步等；在某些方面是第一次现代化的“反向”或转折，如从工业化到非工业化、从城市化到郊区化、从集中化到分散化、从生态破坏到环境保护等；在某些方面是创新，如知识化、信息化和网络化等。两次现代化的协调发展并向第二次现代化转型的过程是综合现代化。

现代化遵循 10 个基本原则：进程不同步、分布不均衡、结构稳定性、地位可变迁、行为可预期、路径可选择、需求递进、效用递减、状态不重复、中轴转变原则。

如果说，现代文明可以分为初级和高级两个阶段，那么，工业文明是初级现代文明，知识文明和生态文明是高级现代文明。如果说，第一次现代化是从传统文明向初级现代文明的转变，那么，第二次现代化是从初级现代文明向高级现代文明的转变；两次现代化的协调发展和持续向高级现代文明的转变是综合现代化。

（3）现代化的结果

一般而言，现代化的结果包括现代性、特色性和多样性的形成，包括劳动生产率和生活质量提高、社会进步、政治民主、文化多元、生态变化和人的全面发展，包括国际分化、国家分层和副作用，包括世界前沿、国际体系和国家状态的变化等。

第一次现代化过程的主要结果是第一现代性、特色性、多样性和副作用的形成。第一现代性的主要特点包括：工业化的、城市化的、民主的、法治的、理性的、世俗的、流动的、市场化的、社会福利、高效的、自由的、平等的、现代科学和能源、大众传播和普及义务教育等。第一次现代化的副作用包括：环境污染、贫富分化、经济危机周期和人情淡化等。传统价值部分存在并发挥一定作用。

第二次现代化过程的主要结果是第二现代性、特色性、多样性和副作用的形成。2005 年第二现代性的主要特点包括：知识密集的、信息密集的、网络化的、智能的、全球的、创新的、个性的、多元的、绿色的、生态的、风险性、城乡平衡、环境友好、终身学习和普及高等教育等。目前第二次现代化的副作用包括：网络犯罪、信息鸿沟、国际风险和国际不平等扩大等。传统价值部分存在并发挥一定作用。

从理论角度看，国家现代化的主要目标有三个。其一，完成第一次现代化，

实现从农业文明向工业文明的转型。其二，完成第二次现代化，实现从工业文明向知识文明的转型。其三，追赶、达到或保持世界先进水平，走在世界前列。关于前两个目标，所有国家都有可能实现，但完成时间有先后。关于第三个目标，只有部分国家能够达到和保持世界先进水平，发达国家是少数，发展中国家是多数。

从政策角度看，国家现代化的主要目标有两个。其一，国家进步目标：提高生产力和生活质量，促进社会的公平和进步，促进人的全面发展，促进人与自然互利共生等。其二，国际地位目标：追赶、达到或保持世界先进水平；发达国家的政策目标是保持世界先进水平，发展中国家的政策目标是追赶和达到世界先进水平。

在 1950 年以前，没有现代化理论，没有现代化目标；国家现代化的过程是一种“自然发展”，国家现代化的结果是一种“自然结果”。1960 年以来，经典现代化理论对发展中国家的发展政策和国家目标产生了重大影响；1970 年以来，涌现了多种新现代化理论如生态现代化理论和第二次现代化理论等，它们对发达国家和发展中国家的国家目标都有一定影响；国家现代化的结果与目标之间的联系逐步加强。

（4）现代化的动力

现代化的动力分析涉及微观和宏观两个层次、动力因素和动力机制两个方面。

在微观层次上，动力因素包括个人心理因素和社会因素等；在宏观层次上，动力因素包括国内因素和国际因素等。一般而言，现代化的动力因素包括创新、竞争、适应、交流、国家利益和市场需求等。其中，创新是现代化的根本来源，竞争是现代化的激励机制，适应是现代化的自调机制，交流是现代化的促进因素，国家利益是国际竞争的主导因子，市场需求是产品创新的主导因素。

在微观层次上，现代化的动力模型主要包括五个模型。其一，创新驱动：创新产生新观念、新制度、新知识和新物品，形成从创新到现代化的正反馈循环驱动。其二，三新驱动：知识创新、制度创新和技术创新的共同作用，推动现代化。其三，双轮驱动：国家利益和市场需求的共同作用，推动现代化。其四，联合作用：创新、竞争、适应和交流的联合作用，推动现代化。其五，四步超循环：文明要素的创新－选择－传播－退出的超循环，推动现代化等。

在宏观层次上，现代化的动力模型主要包括四个模型。其一，创新扩散：重大创新的国内扩散和国际扩散。其二，创新溢出：重大创新的外部效应（对其他领域的影响）。其三，竞争驱动：国际竞争、市场竞争、民主竞选的作用。其四，三元复合互动：新文明－现实文明－文明遗产的复合互动等。

现代化的生产力函数：生产力与技术进步、人均技能和人均资本成正比。

（5）现代化的模式

现代化具有路径依赖性、路径和模式多样性。在 21 世纪，现代化大致有三条基本路径和 50 多种要素组合模式，不同国家和地区可以选择不同路径和发展模式。

第二次现代化路径：从工业文明向知识文明、从物质文明向生态文明的转变；重点是知识化、信息化、绿色化、个性化、多元化和全球化等。

综合现代化路径：两次现代化的协调发展，并持续向知识文明的迈进；重点是新型工业化、新型城市化、新型福利化、知识化、信息化、绿色化和民主化等。

追赶现代化路径：借鉴发达国家的史经验，先完成第一次现代化，实现从农业文明向工业文明的转变，然后再推进第二次现代化。适合于发展中国家和地区。

现代化没有标准模式，没有最佳模式。在现代化的不同阶段，可以选择不同的现代化要素的组合模式。第一次现代化的要素组合模式有 10 多种，如工业化优先、民主化优先、城市化优先、经济优先或教育优先等。第二次现代化的要素组合模式有 20 多种，如知识化优先、信息化优先、生态化优先和协调发展等。综合现代化的要素组合模式有 20 多种，如工业化优先、知识化优先、信息化优先和协调发展等。

三、现代化科学的实际应用

现代化科学是关于现代文明和国家发达的一门科学。它有两个任务：阐述现代文明的世界前沿和变化规律，解释国家发达的原理和方法。简单地说，前者是它的理论意义，后者是它的实际应用，现代化战略和政策是两者的结合部。

1.现代化与国家发达

国家是现代化研究和现代化建设的基本单元。在现代化过程中，国家分类、国家分层和国际分化是客观存在的。关于国家分类有多种方法。关于发达国家与发展中国家的国家分类，是基于国家发展水平的一种国家分类。

首先，国家发达是一个世界现象。在国家层次，它是一个国家发展过程，指达到和保持世界先进水平（发达国家水平），国家地位可以变化。在国际体系层次，它是一个国际分化过程，一批国家成为发达国家，其他国家成为发展中国家。

其次，发达国家的分类标准。2005 年发达国家的分类标准是：国家现代化水平和主要领域现代化水平进入世界前 20 名左右，第二次现代化指数、综合现代化指数和主要领域现代化指数达到或超过 80（高收入国家平均值的 80%）等。发达国家并非每一个领域和每一个指标都是发达的，发展中国家有可能在某些领域或某些指标达到世界先进水平。一般而言，发达国家 80%以上的指标有可能是发达的。

其三，国家发达是一个复合现象。从国家分类角度看，发达国家是一种国家发展水平分类。从国家分层角度看，发达国家是达到世界先进水平的国家。从国际分化角度看，发达国家是处于国际分工高端的国家。当然这是相对的。

2、国家发达的理论解释

首先，国家发达是一个历史现象，是国家现代化、国际竞争和国际分化的结果。在现代化过程中，发达国家是达到和保持世界先进水平的国家，其他国家是发展中国家；发达国家的比例一般低于 20%，发展中国家的比例一般高于 80%；两类国家不是固定的，而是可以相互转换的。

其次，国家发达与国家水平正相关。一般而言，国家发展水平与国家的创新价值比例成正比，与劳动价值比例成反比；与物化劳动比例成正比，与活的劳动比例成反比；与有效劳动比例成正比，与无效劳动比例成反比；与有效投资比例成正比，与无效投资比例成反比；与高级资产比例成正比，与初级资产比例成反比；与先进技术比例成正比，与落后技术比例成反比等。

其三，国家发达具有二重性。一是相对稳定性。例如，在大约 50 年里，发达国家保持发达水平的概率约为 90%。二是流动性。例如，发达国家可以降级为发展中国家，在大约 50 年里降级概率约为 10%；发展中国家可以升级为发达国

家，在大约 50 年里升级概率约为 5%。

其四，国家发达的三个标准：先进生产力、社会进步、人的全面发展。国家发达首先表现为具有先进生产力，生产力、社会进步和人的发展水平都达到世界先进水平的国家才是发达国家。一般而言，生产力指在单位时间里劳动创造的价值，社会劳动创造的总价值包括劳动价值、创新价值、资源价值和环境价值等；其中，劳动价值是普通劳动创造的价值，创新价值是创造性劳动产生的价值，它们是主体价值；在社会总价值中，发达国家创新价值所占比例比较高，发展中国家劳动价值所占比例比较高。第四个标准是环境友好，经济与环境双赢，人与自然互利共生。

其五，国家发达的三个动力：创新、学习和竞争。在技术层面，发达国家既重视创新，也重视学习，发展中国家更加重视学习。在制度层面，发达国家既重视竞争，也重视对市场竞争和收入分配的合理调节，发展中国家对市场竞争和收入分配的调节力度要适度和渐进。

其六，国家发达的一般方法：遵循现代化和国家发达的基本原理，结合自己的国情和国际环境，选择合适的现代化路径、模式、战略和措施。发达国家和发展中国家的方法选择既有共性，又有差别。一般关注四个方面：各尽所能，公平竞争；按贡献分配，按需要调节；按业绩晋升，按民意选择；生财有道，平等互利。

3.国家发达的战略选择

在 21 世纪，发达国家要保持世界先进水平，发展中国家要追赶世界先进水平，它们都需要不断做出战略选择。很多时候，选择决定成败。一般而言，国家发达要求在经济、社会、政治、文化、生态和个人现代化六个方面达到世界先进水平，重点在生产力、社会进步和人的全面发展方面达到世界先进水平。

（1）发达国家的战略选择

目前，世界上大约有 20 多个发达国家，它们都已经进入第二次现代化。

目标选择：达到和保持在世界前列，现代化指数的世界排名进入前 10 名。

路径选择：第二次现代化路径。不同领域和不同地区可以选择不同路径。

模式选择：根据国情，选择第二次现代化路径的某种要素组合模式。

重点选择：不同国家、不同领域和不同地区可以选择不同重点。从生产力、社会进步和人的发展三个维度选择重点：大约 80%的创新和 20%的学习，80%的竞争和 20%的调节（有些国家调节比例为 30%左右）；重点关注四个方面：各尽所能，公平竞争；按献分配，按需调节；民主竞选，凭绩晋升；生财有道，平等互利。

（2）发展中国家的战略选择

目前，世界上大约有 100 多个发展中国家，它们的现代化水平有很大差别。

目标选择：分三类。中等发达国家的目标是达到世界先进水平，世界排名进入前 20 名；初等发达国家的目标分两步走，第一步目标是达到中等发达水平，世界排名进入前 40 名；欠发达国家的目标分三步走，第一步目标是达到初等发达水平，世界排名进入前 80 名。

路径选择：不同水平国家可以依据自身条件，分别选择第二次现代化路径、综合现代化路径、追赶现代化路径。

模式选择：根据国情，分别选择三种路径的某种要素组合模式。

重点选择：不同国家、不同领域和不同地区可以选择不同重点。从生产力、社会进步和人的发展三个维度选择重点，可以分为三类。中等发达国家：大约 40%的创新和 60%的学习，85%的竞争和 15%的调节；初等发达国家：大约 20%的创新和 80%的学习，90%的竞争和 10%的调节；欠发达国家：大约 10%的创新和 90%的学习，95%的竞争和 5%的调节；提高创新效率、投资效率和有效劳动比例；公平竞争，合理分配；按业绩晋升，按民意选择；普及义务教育，加快信息化等。

Reference

He C. 2010. *Modernization Science: Principles of National Advance.* Beijing: Science Press.

He C. (ed.) 2011. *China Modernization Report 2011: Introduction to Modernization Science.* Beijing: Peking University Press.

He C. 2012. *Modernization Science: Principles and Methods of National Advancement.* Heidelberg: Springer.