

Chapter 3

The Multidimensional Dynamic Balance of Current and Future Development

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Abstract Human development can be described as having three general dimensions: needs, quality, and ability. Likewise, the human development environment can be described as having six dimensions: economy, society, culture, ecology, technology, and institutions. By integrating the six environmental dimensions with the three dimensions of human development, I construct a framework of the human development system and present a qualitative analysis of the impacts of the various environmental dimensions on each other, and ultimately on human development. Using this framework as the foundation, human development as ultimate goal of development, and fair development as the fundamental principle, the status of the system and its evolutionary trends can be assessed. At present, the United Nations Human Development Program's human development index does not reflect comprehensive human development needs, and a multidimensional, dynamic, balanced solution remains elusive. I propose static criteria of Pareto optimality and maximum equality and dynamic criteria of per capita measurement, absolute improvement, and incremental compensation as the basic mechanisms to assess the status of the human development system and intervene in its evolution.

3.1 Introduction

Development includes many dimensions, such as economy, society, culture, ecological environment, technology, etc., but underlying all developmental dimensions is the core goal of human development. Human development also includes many other dimensions (i.e., physiological, psychological, material, mental, etc.). The many dimensions of development—and more specifically, human development—are affected by many factors that also affect each other, comprising a complex system.

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Vertically incorporated into the dimension of time, the system itself is in a process of constant evolution. Statically, the system state can be described using some basic key variables; dynamically, the system's evolutionary path can be described.

The so-called *dynamic balance* implies the path of system change based on human intervention. Moreover, goals should be set for any intervention. In this chapter, I set fair development as the core goal of human intervention. To balance the evolution of system, an intervention should respect the objective laws of evolution, clearly identify the various constraints on system evolution, and be built based on several reasonable specific principles of “fair” targets. Based on my analysis, I construct a general theoretical framework and provide preliminary policy ideas and recommendations.

3.2 A Multi-dimensional Description of Human Development

3.2.1 The Subject and Object of Development

There are significant differences between the definitions of *development* and *growth*. Growth only refers to an increase in GDP and per capita GDP, while development, although limited to an understanding from an economic perspective, has broader and more profound intension and leads to large scale extension.

This understanding of the concept of development makes it difficult to remain confined to purely economic concepts for two reasons. First, the discipline itself is bounded by the obvious purpose of being used as a tool (and thus is more subject to academic requirements), yet this boundary is typically not as clear in reality. Second, even from the perspective of theoretical and empirical research and related policy studies, the boundaries between disciplines are becoming increasingly blurred. Cross-boundary research has become the dominant tendency, driven by the dynamics of the actual world—that is, the intricate relationships among different aspects of the issues and objects being studied.

Based on the distinction between subject and object, we are all human beings and therefore should focus on human development. Most current research is focused on the environment of human development (in the broad, objective sense instead of narrow sense of ecological or natural environment), including economy, society, culture, ecology, technology, etc. However, if human development is taken as the core goal, researchers who investigate the developmental environment must pay special attention to the impact of environmental evolution on human development and focus on resolving difficulties so as to ensure this goal is realized. Generally speaking, even though researchers have worked diligently and produced copious amounts of evidence, these efforts are far from adequate for identifying the myriad problems and challenges facing human development and for developing countermeasures to ensure the realization of human development goals.

3.2.2 *Human Development vs. Individual Development*

Human development is not the simultaneous development of all people as individuals; significant differences exist between human development and individual development. As the basic layer of the bubble theory (Ding 2013), the definition of the symbiotic duo clearly depicts these differences. The *symbiotic duo* is

where the desires of the species and the desires of the self (an individual member of the species) reside. Despite the fact that these desires are often at odds with each other, one cannot survive without the other. Without individuals, there is no species to speak of. Without the species (i.e., other individuals in the same species), an individual cannot survive for long, let alone lead a fulfilling life. This symbiotic relationship between the two entities is the fundamental force that drives how human society operates (Ding 2013: 11).

According to Marx and Engels (1995), human development is one of the essential ideals of communism. In their article, the authors frequently used phrases such as “the all-round development of individuals,” “the development of personal originality and freedom,” and “individuals developing in an all-round way,” pointing out that a communist society would be one in which “personal originality and free development are no longer empty talk” (Marx and Engels 1995: 294).

So, what are the connotations of “all-round development” and “original development?” According to Marx and Engels, as the goal of an ideal society, work is not just a way of making a living, but is the primary purpose of life. Once socially necessary labor is reduced to a minimum, all individuals have sufficient time for traditional cultural pursuits such as science, the arts, socializing, etc., thereby transforming the exclusive products of the ruling class into the common wealth of all members of society, furthering their development (Central Compilation and Translation Bureau 1995a). Moreover, the primary responsibility of members of society is to develop their comprehensive ability (Marx and Engels 1995).

Wu (2005: 31–32) summarized his understanding of Marx’s multi-faceted concept of all-round human development:

First, the all-round development of human activities, especially human labor activities, as well as human needs and ability... Second, the full development of human social relations, the universality of human social interaction and the complete possession and mutual control of social relations by humans... Third, the overall improvement of human quality and the free development of their character.

Building on these ideas, I describe human development in three dimensions: needs, quality, and ability. The development of needs is the foundation for the development of quality, the development of quality is the foundation for the development of ability, while the development of ability is the explicit feature of human development. Although the ideal communist society is far from reality, Marx and Engels (1995) depicted a beautiful picture for the core target of development, clearly illustrating the essential characteristics of the ideal state of human development.

Human beings are both individuals and a collective species; the two concepts are interdependent, but have some important differences. These differences become especially prominent when measuring human development levels. The Human

Development Index (HDI) published by the United Nations Development Program (UNDP) is the most authoritative measurement tool. In 1990, the UNDP published its first Human Development Report, which included an HDI. In the report, the UNDP (1990: 9) stated: “People are the real wealth of a nation. The basic objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives.”

The use of HDI to measure the human development level of a country is an extension of the traditional GNP index. Specifically, the HDI consists of three indicators: life expectancy, adult literacy, and GDP per capita adjusted for purchasing power. These three indicators reflect people’s longevity, knowledge, and living standards, respectively, and after specific calculation methods are applied, comprise a comprehensive index. Rather than discussing the specific design of the index and the rationality of the calculation, I focus on whether the range covered by the index can truly embody all aspects of human development. The HDI was not comprehensive as originally structured. Clearly, the UNDP also recognized defects in the HDI, because it later expanded the framework to reflect the conditions of human development in a more comprehensive way, enabling comparisons between different countries.

In 1995, the UNDP (1995) released another two indexes based on HDI: the Gender-related Development Index (GDI) and the Gender Empowerment Measure (GEM). GDI is calculated based on the HDI after adjusting for gender factors to reflect existing inequality between men and women in health, education, and living standards, while GEM focuses on three variables that reflect women’s participation in political decision-making, access to professional opportunities, and earning power. In 2010, the UNDP (2010) further expanded the HDI and released the Inequality-adjusted Human Development Index (IHDI), Gender Inequality Index (GII), and Multidimensional Poverty Index (MPI). GII reflects existing inequality of women in reproductive health, empowerment, and the labor market, while MPI uses microdata from families to represent multiple dimensions of poverty at the population level, which can reflect the degree of poverty in a country.

Domestically, the Research Center for China’s Modernization and Research Group for China’s Modernization Strategies of Chinese Academy of Science (2010) published a report and proposed a new Human Development Index (HDI_n) based on the three original dimensions of HDI, and two new dimensions, including the Internet coverage rate to reflect the degree of information sharing, and the disposal rate of domestic wastewater to reflect environmental quality.

If the state described by Marx is ideal for pursuing the goal of human development, then the current state of human development should be measured against that ideal state. Thus, the measurement index used for comparison should be in direct correspondence with the ideal. The HDI and its extended versions created by the UNDP, as well as the new Human Development Index created by the Chinese Academy of Social Sciences, are far from reflecting the objectives of all-around human development. One reason is that the design and application of a statistical index is inherently limited. Because of the need to collect relevant data and compare them internationally, data availability limits

the application of most similar indexes, which is understandable to some extent. Moreover, the UNDP may not have used the ideal state as its objective when it designed the HDI. The three dimensions covered by the HDI directly correspond to the three general dimensions of human development: living standards correspond to human needs; health, longevity, and education level correspond to human quality; and educational level corresponds to human ability to some extent, although a more comprehensive measure of the development of human ability is basically nonexistent.

Second, and more importantly, these indexes measure characteristics of humans as individuals, not characteristics of humans as a species. With each individual as an independent sample, both the average value and distribution of the larger sample of the group are of great significance. Due to data unavailability, the initial index designed by the UNDP did not take inequality into account; the index was updated later to more fully reflect the group development condition. Furthermore, due to personal individual development, differences exist among different individuals, which affect measurement values. At the macro level, taking income distribution as an example, unequal distribution within a moderate range has a certain rationality, but if the gap is too big, severe unfairness can lead to social instability. This basic principle applies to all the three dimensions of human development (i.e., needs, quality, and ability). But at the micro level, for more specified indexes, differences among individuals may have positive influences. For example, people's ability may vary in the field of art, which is beneficial to the development of art and individual creativity.

Generally speaking, individual human development tends to dominate species-level human development in current discourse, as evidenced in statements made by Marx and Engels (1995). Therefore, in the following sections, I shift the focus of my analysis toward aspects of individual human development.

3.3 The Human Development Environment

There exists a bidirectional cause-and-effect relationship between human development and the development environment. On one hand, human development is restricted by the environment; on the other, human behavior (especially as a species) changes the environment, even its natural tendencies. Nevertheless, development generally follows the respective objective laws of each environmental dimension, and humans are merely one of a vast number of species that live on this planet. Although humans have intellectual advantages over other species, it is very difficult to change the laws that govern this world in the long term, especially those of the ecological environment. For this reason, I first focus on the effect of the environment on human development before analyzing the effects of human intervention on the environment.

3.3.1 *The Multiple Dimensions of Environment*

The environment, which is comprised of more than just ecological factors, significantly impacts human development. Specifically, the *development environment* is commonly classified as including dimensions such as economy, society, culture, ecology, technology, and institutions.

If human development is regarded as the core of development, related research on the status of the development environment should use human development as both the starting point and the end result. That is, when any dimension of the environment is analyzed, researchers should aim to determine whether the status quo is good for human development or not and the effects changes will have on human development. Any analysis must consider potential changes in external conditions, determine whether human intervention is necessary, and assess potential results of intervention to ensure that specific interventions (e.g., policies) are based on the basic principle of supporting human development.

Take the institutional environment, for example. In *The Communist Manifesto*, Marx and Engels imagined an ideal world: “[in place of] the old bourgeois society where exists class and class antagonisms will be a consortium like this, where the free development of each individual is the condition of all people’s free development” (Central Compilation and Translation Bureau 1995b: 294). Here, Marx and Engels emphasized the relationship between personal development and human (all people’s) development, with the former as the necessary condition for the latter, as well as the free development of development itself. Whether or not human development has enough freedom depends mainly on the institutional environment. An inclusive institutional environment is apparently more conducive to people’s free development, while an institutional environment that constrains people’s behavior, even speech and thought, is not beneficial to the free development of human beings.

3.3.2 *Structural Characteristics of Environment*

A multidimensional environment has structural characteristics related to the position of each dimension comprising it. Different environmental dimensions should be both oriented toward achieving the core objective of human development and associated with the three dimensions of human development. Integrating the multiple dimensions of environment with the three dimensions of human development yields a matrix that represents the human development system, shown in Table 3.1. The different environmental dimensions have relatively more or less impact on human development. In Table 3.1, number of asterisks is used to show these differences. One, two, and three asterisks represent low, middle, and high impact, respectively. Although these judgments are highly subjective, they are inferred from evidence in the existing literature; further in-depth theoretical studies and corresponding empirical tests are needed for verification.

Table 3.1 The human development system

Environmental dimensions	Dimensions of human development		
	Needs	Quality	Ability
Economy	**	**	**
Society	**	***	**
Culture	***	***	**
Technology	*	**	*
Ecology	*	**	**
Institution	***	***	***

As shown in Table 3.1, based on the total number of asterisks across all three dimensions of human development, as per the relative importance the environmental dimensions in descending order are institution, culture, society, technology, economy, and ecology. Most people believe that human development is based primarily on economic development, and many theories confirm this belief. If this is true, the level of economic development should be the most important factor affecting human development. But such conclusions must be based on qualitative and, if possible, quantitative definitions of these environmental dimensions and the three dimensions of human development. Therefore, a clear description of the status of human development system is required.

3.4 Status Description of the Human Development System

To clearly describe the status or assess the development level of the human development system, I discuss the definition of the three dimensions of human development and the six dimensions of the development environment in detail. I also suggest specific quantitative indexes to assess the development status of certain dimensions, where applicable.

3.4.1 *Status Description of Dimensions of Human Development*

Because individual human beings collectively comprise the species, descriptions here are based on the development of human beings as individuals; if necessary, the related status of human beings as a group can be inferred.

3.4.1.1 Needs

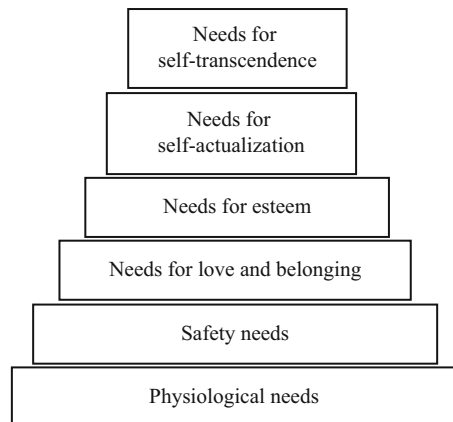
According to Baidu Baike¹:

In the process of survival and development, an organism feels some kind of physical and psychological needs for objective things. Its internal insufficient or unbalanced status shows its dependence on the objective conditions for survival and development. Needs are important conditions for the survival and development of an organism, which reflects the needs of the organism for a stable internal environment or external living conditions.²

Different needs emerge at different stages and levels of human development. One broadly accepted theory explaining this phenomenon is Maslow's (1943) hierarchy of needs. More than 20 years after he originally proposed the theory, he further divided the highest-level need for self-actualization into two levels, creating an even higher-level need for self-transcendence. Maslow's complete hierarchy of needs is shown in Fig. 3.1. Among them, the lowest two levels—physiological needs and safety needs—correspond with Theory X (McGregor 1960) in management science; the three levels in the middle—needs for love and belonging, esteem, and self-actualization—correspond with Theory Y (McGregor 1960) and the highest level—needs for self-transcendence—correspond with Theory Z (Maslow 1969b).

In general, using the satisfaction of people's needs to reflect the level of human development is appropriate. There are obvious differences in the nature and characteristics of human needs at each level, which progress from lowest-order needs at the bottom of the pyramid to highest-order needs at the top of the pyramid. While Maslow's hierarchy reflects progress in the needs dimension of human development, it is worth emphasizing that an absolute correlation does not exist between the two. In real life, many individuals do not progress through the levels in order. For example,

Fig. 3.1 Maslow's hierarchy of needs



¹ Baidu Baike is a Chinese wiki encyclopedia formed by the search engine Baidu in 2006.

² <http://baike.baidu.com/subview/215827/11108085.htm#viewPageContent>, quoted from Guo (2005).

even without enough food and clothing, many prioritize needs for self-actualization; likewise, many have excessive food and clothing and no safety concerns, yet never progress to satisfying higher-order needs for esteem and self-actualization.

Controversies exist in academic circles as to whether or not Maslow actually separated needs for self-transcendence from needs for self-actualization. Maslow (1969a) differentiated *health-oriented self-actualization* (meaning self-actualization in the individual sense) from *transcendental self-actualization* (meaning self-actualization in the trans-individual sense). Those who have achieved transcendental self-actualization are more aware of existence in the universal sense, are more clearly dominated by transcendental motivations, have an understanding of the universe and life, and often have an awareness of plateau experiences and peak experiences. I believe that there are significant developmental differences between the health-oriented self-actualization and transcendental actualization. Therefore, it is more reasonable to separate it from self-actualization (which only focuses on personal value) and call it self-transcendence.

3.4.1.2 Quality

*Cihai*³ defines quality as: (a) the original physiological characteristics of humans; (b) the original nature of things; (c) the basic conditions necessary to complete certain types of activities. While the first definition is associated with humans, it refers only to physiological aspects of the human experience, and thus is too narrow to clearly describe quality in the context of the human development system.

Zhang (2003) compared different definitions of the concept of quality using several authoritative sources and summarized three consensus aspects of quality: it is unique to organisms (i.e., humans); it refers to basic, stable, and implicit human characteristics; and it is affected by both nature (innate physiology) and nurture (including education). Based on these ideas, the authors provided the following definition of quality: “Organisms, on the basis of innate physiology and through interactions with the environment and education, form a relatively stable, basic, and implicit quality with unique functions through the practical and mental activities.”

However, the above definition of quality lays too much emphasis on the physiological and psychological characteristics of human. I think that its more comprehensive definition should include at least human’s quality at the cultural level. Therefore, we can refer to the definition given by Yan (1990: 113) that “the so-called quality is an ‘alloy’ of the inherent natural factors and postnatal social factors of human. That is to say, it is an organic combination of a series of people’s natural characteristics, knowledge and skills, behaviors and habits, cultural cultivation, and quality features,” as well as what is mentioned by Zhang and Feng (2000: 57) that “the structure of quality includes three dimensions of physiological, psychological, and cultural (including moral) quality.” From the perspective that the ultimate goal of development is human development, I think that cultural quality should be taken as the core status among these three dimensions.

³ *Cihai* is a large-scale Chinese encyclopedia.

Physiological quality is mainly associated with physical health. While all humans have innate genetic characteristics, the postnatal growth environment and physical exercises can significantly improve the physiological quality. As for psychological quality, Liu and Lei (2015: 96) concluded “the academic circle has so far failed to reach a consensus on basic theoretical issues about the concept and structure of psychological quality.” Nevertheless, most generally accept Zhang and Feng’s (2000) and Zhang’s (2003) definition. Integrating diverse viewpoints and the theoretical results of several psychologists, Zhang (2003: 144) defined psychological quality as being “based on physiological conditions, and the internalization of externally-acquired stimuli into a psychological quality that is stable, basic, and implicit; having a basic, derivative and developmental function; and closely linking to adaptive and creative behavior.” In other words, “psychological quality consists of cognitive characteristics, personality and adaptability”.

Evaluating cultural quality is an even more complex and difficult task. Certainly, personal mastery of “cultural legacies, like science, arts, and ways of socializing” referred to by Marx can be used as a basic measurement index, but having knowledge does not mean a high degree of cultural cultivation. Overall, I believe that the mastery of human knowledge is neither a necessary nor a sufficient condition, while cultural cultivation is a key condition of quality. Since the ultimate goal of development is human development, cultural quality (vs. physiological and psychological quality) is the core determinant of quality.

It is also worth highlighting that the development of human quality is a process. While humans do inherit quality, its development is connected to the postnatal environment in which humans live, particularly the education they receive. Therefore, from birth to death (or at least prior to declines due to aging), quality should be constantly enhanced. However, the achievement of a specific quality level (i.e., by satisfying different levels of human needs on Maslow’s hierarchy) is quite difficult to predict. As it relates to formulating a comprehensive index of human quality, however, a similar hierarchy should be used as a classification index for the purposes of describing the current status of quality within the human development system.

3.4.1.3 Ability

According to the *Chinese Dictionary*, ability refers to the condition, capability, and strength to manage a certain task. *Cihai* defines it as “the condition of mastering and applying knowledge and skills and a personal psychological characteristic that determines the efficiency of activities.”

As for the relationship between ability and quality, different sources provide roughly the same elaboration. According to the psychology volume of the *Encyclopedia of China*:

Quality is the natural prerequisite of ability. The physiological structure and functional characteristics of the human nervous system, sense organs, and locomotive organs, especially the microscopic features of the brain, are closely related to the formation and development of ability.

Another more authoritative dictionary, *The Dictionary of Psychology*, also points out that quality “is the natural prerequisite and basis for the development of ability.” However, *Cihai* places more emphasis on the conditions for the formation and development of ability.

Quality refers to the natural prerequisite of ability, and is closely related to the formation and development of ability. But the formation and development of ability mainly depend on the conditions of human social life, particularly those of education and long-term practices. In addition, ideals, beliefs, interests and personality are important conditions that affect the formation and development of ability.

Human beings are intelligent animals, so human intelligence is of core importance to human ability. However, there still exist different points of view about the definition, classification, and measurement of human intelligence. Spearman’s (1904) two-factor theory of intelligence maintains that human intelligence can be divided into general (G) factors (which do not change, regardless of an individual’s activities) and specific (S) factors (which change and are related to different abilities). Since then, other scholars have proposed different theories of human intelligence. Thurstone’s (1934) theory of group factors classifies human mental abilities into language comprehension, the use of words, calculation, space perception, memory, perceptual speed, and reasoning. Gardner’s (1983) theory of multiple intelligences divides human intelligence into verbal–linguistic, musical, logical–mathematical, visual–spatial, bodily–kinesthetic, intrapersonal, and interpersonal intelligences.

To assess ability, Spearman’s two-factor theory might be too simple, while the comprehensive intelligence quotient (IQ) assessment index, which is currently universally adopted, clearly cannot rely on the simple division of G factors and S factors. But there are still scholars who criticize universally acknowledged testing methods, believing that intelligence tests are misused and do not accurately assess human ability. Creating an index that reflects a person’s overall abilities in a scientific and comprehensive way remains a major research topic.

Since human development is the ultimate goal of development, general abilities corresponding to G factors from the two-factor theory of intelligence should be emphasized. Since human beings are individuals, their general abilities and special abilities will naturally vary due to differences in inherent quality. Since freedom of human development is emphasized by Marx and Engels (1995), personal choices should lead to large differences in personal development.

3.4.2 Dimensions of the Human Development Environment

The boundaries of the six dimensions of the human development environment are relative. This is especially true in regions where the process of modernization has been quite profound; some countries have entered the post-modern era with cross-border activities being mainstream. However, this does not mean that boundaries between these dimensions have disappeared. Thus, I provide definitions for environmental dimensions in a narrower sense.

3.4.2.1 Economy

The level of economic development is used to describe the human development environment purely from an economic perspective. Whether for a country or a region, the GDP per capita, a measure of purchasing power that is used to make international comparisons, is by far the most reasonable index and typically occupies a central position. Though from the perspective of sustainable development the Green GDP has received increasing attention, it generally has not replaced per capita GDP due to imperfect statistical index settings and difficulties related to data access.

3.4.2.2 Society

Society is formed by individuals living in various social relationships (i.e., among individuals, families, groups, and countries) in a specific environment. Social forms can be classified differently from different perspectives, based on which we can investigate the basic laws of social evolution. While communism should be the social form that is most conducive to human development, there are two problems. First, development is eternal and never stops; even if the ideal state of communism is achieved, human development will continue. The question of whether a higher social form exists remains to be answered. Second, although it can be said that in a higher social form, the level of human development is relatively high, a one-to-one correspondence does not exist between the level of human development and social form. In particular, different social forms may coexist at the same time. It is difficult to claim that the level of personal development in capitalist societies must be lower than that in socialist societies. In many cases, the concept of this social form has become a kind of label, which is used more for political purposes, and cannot truly reflect the degree and level of social development and progress.

From the perspective of the impact on human development, society here should be interpreted to mean civilization. As for civilization, one explanation refers to the sum of the wealth created by humans, especially spiritual wealth, such as literature, art, education, and science. Civilization covers the relationships between and among people, society, and nature. A narrower understanding refers to the spiritual civilization of humans at a particular place and time, such as the Mayans, the Ancient Egyptians, etc.

In this chapter, I adopt this narrower definition and limit connotations to social relationships. I use social civilization to refer to the state of social progress, which is mainly reflected in the progress of all aspects of social relations, including social customs, folk traditions, behaviors and manners, ethics, values, etc.

3.4.2.3 Culture

Culture refers to the comprehensive knowledge system created and accumulated by humans over the course of development. It is very difficult to provide a strict and precise definition of culture. Scholars in different fields have tried to define

it from their respective disciplines, but they still have not reached a consensus. Here, I provide a schematic explanation of the definition adopted above. First, knowledge includes all the human cognitions of the objective and subjective worlds, which comprise a system. Knowledge has many different categories, forms and mechanisms, and culture is the sum of all of these. Second, knowledge is intangible. Even if knowledge is materialized in physical form, it can still exist independently. Culture is also intangible and subordinate to the spiritual world of humans, although in many cases material mechanisms are essential to its existence.

Furthermore, the concepts of culture and civilization are different. In the definitions provided by some scholars, culture is an aspect of—and incorporated into—civilization (in a broad sense). While this incorporation is largely true, it is not an absolute. For example, some scholars define civilization as the collection of all the social and natural behaviors that separate humans from the savage state, including concepts, tools, languages, characters, beliefs, religion, laws, etc. Based on this definition, the word civilization itself is commendatory; yet in a general sense, the word culture should be neutral. In this chapter, culture covers a broader scope than the narrow interpretation of social civilization used for the environmental dimension of society.

3.4.2.4 Ecology

Ecology refers to the state of the survival and development of creatures in a certain natural environment. As the environment for human development, I use the dimension of ecology to refer to the state of various natural resources on earth that comprise the survival environment for humans. Therefore, ecology here mainly refers to the goodness of the environment for human survival.

An assessment of the quality of the ecological environment must be based on theories of ecology, environmental science, etc. and measure the entire ecological environment and various resources for human survival and development in a specific range of time and space. The international community has created some indexes to measure ecological quality. The industry standard in China, the *Technical Criterion for Eco-environmental Status Evaluation* issued by the State Environmental Protection Administration, was put into trial use on May 1, 2006. Environmental quality standards are used to assess water, air, soil, and biological quality; each category has set different levels of quality standards according to their different uses or control mechanisms. These standards vary by country or region, reflecting their different levels of development. To meet human survival and development needs, resources like energy, water, air, and land are indispensable and have important impact on human development. As a consequence, corresponding indexes are also needed to measure them. Various aspects of these assessment indexes can be used to create a comprehensive index system that will enable the impact of the entire ecological environment on human development to be studied.

3.4.2.5 Technology

Technological inventions and creations are the main drivers of human productivity and play a major role in the long-term evolution and progress of the economic, social, and especially the ecological environment. Technology here mainly refers to techniques, rather than science. Science belongs to the scope of basic theories, and as a result, should be included in the knowledge system which belongs to the dimension of culture. The reason why the word “technology” is used rather than “techniques” to describe this dimension is to avoid the latter being narrowly understood in the engineering sense.

3.4.2.6 Institutions

Institution refers to the system of human rules that govern the operating mechanisms of various social relationships and organizations. In institutional economics, the word “institution” refers to the game rules of society. In simpler terms, they are the constraints set by humans for interpersonal relationships. Institutions can be divided into three types: formal rules, informal rules, and rule enforcement mechanisms. Formal rules comprise the formal system, including laws and regulations, codes of conduct, and political, economic, and social contracts made by governments, enterprises, and various social organizations in accordance with certain purposes and procedures. Informal rules include values, ethics, morals, customs, habits, etc. Rule enforcement mechanisms are the relevant institutional arrangements that ensure the implementation of the rules.

In this chapter, informal rules belong to the scope of social civilization, so institutions here are interpreted quite narrowly, consisting only of formal systems and their enforcement mechanisms. Since there are no clear written records of informal rules in many cases, they might take on various forms within social relationships, making enforcement mechanisms unclear as well. Thus, social civilization is also included in the broad definition of systems.

3.4.3 Dimensional Interactions Within the Human Development System

The complete human development system includes the three dimensions of human development as the core, and the various environmental aspects of human development as external variables. This system is in constant evolution. Statically, the previously mentioned measurement indexes can offer an assessment of the system status for any period (in this case, the measurement of moment is meaningless); dynamically, the indexes can describe and depict the evolutionary path of the system.

However, many questions arise when contemplating assessment of the human development system. Do objective laws govern the evolution of the system? If so, what are these laws and how are they decided? On which benchmarks and values should system assessments be based? If certain values are adopted as benchmarks, the system status will appear distorted or imbalanced. Are interventions in the future evolution of the system warranted? If so, what are the goals and mechanisms of intervention and which ones will achieve the desired effect?

Based on the discussion thus far, some preliminary answers can be provided for some of the questions. The core and ultimate goal of development is human development. Qualitatively, if the current system status and its future evolutionary trends are not conducive to the realization of this goal, it can be said that the system status is distorted and imbalanced. Therefore, the goal of intervention is to return the system back to a normal status that is reasonable and conducive to the realization of the goal of human development. However, deciding how to intervene and how to assess the effects of interventions based on a clear description of the system status also requires deeper analysis of the system structure—that is, the key factors that affect the evolution of the system, as well as the relationships and interaction logics of these factors. Table 3.1 has shown the relative impacts of the six dimensions of the human development environment on the three dimensions of human development. Building on this foundation, it is necessary to analyze the mechanisms behind the correlations and functions of the six environmental dimensions as key factors of impact.

Based on my personal understanding of the human development system, in Table 3.2 I depict the interactions among various factors, with rows representing actions and columns representing effects. The number of asterisks shows the magnitude of the impact. As can be seen, most of interactions are not symmetrical. For example, society has a medium effect on culture, while culture has a high impact on society.

As shown in Table 3.2, institutions have a profound impact on all of the other dimensions, and thus deserve the most attention from researchers. The impact of culture is also important. Culture influences institutions, society, economy, ecology, and technology, with a medium impact on the latter three. While culture has a significant impact on economy, the reverse is not true. Moreover, quality of human development does not entirely depend on income. In other words, even if the per capita GDP is low, the cultural quality of its people might still be quite high. In a certain sense, we can regard institutions as an exogenous factor affecting the evolution of the system, which makes them an important policy tool.

Table 3.2 Mutual influences of various environmental dimensions of human development

Dimension	Economy	Society	Culture	Ecology	Technology	Institutions
Economy	—	**	*	***	**	*
Society	**	—	**	**	*	**
Culture	**	***	—	**	**	***
Ecology	**	*	—	—	*	—
Technology	**	*	*	***	—	—
Institutions	***	***	***	***	***	—

3.5 The Gap between the Target of Fair Development and Reality

3.5.1 Fair Development

Ding (2013: 35) defined fair development as:

human development that strives to ensure distributive, procedural, and restorative fairness related to the opportunities, resources, and outputs of human development to the extent they are compatible in any particular application, between a benchmark entity and X, where X is a well-defined entity that either exists now or will exist Y years from now.

He further defined the meaning of the three aspects of fair development—distribution fairness, procedural fairness, and restorative fairness—referred to here as the *three fairness principles*.

Distribution fairness refers to the fact that any X should receive a fair share of the opportunities, resources, and outputs of human development. Procedural fairness refers to the fact that opportunities, resources, and outputs of human development are allocated to any X using an unbiased method. Restorative fairness refers to the fact that any X should be held responsible to offset any advantages it has enjoyed due to unfairness in the distributive or procedural process. (Ding 2013: 36)

There are three dimensions of distribution: opportunities for human development, resources, and output. “Fair development is an ideal principle of human development” (Ding 2013: 36). The ultimate goal of development is human development, and fair development is related to the assessment of overall development processes and trends. Therefore, assessment should proceed from two perspectives: the static perspective, from which development in any given period is assessed based on its compliance with the three fairness principles; and the dynamic perspective, from which developmental trends (both past and future) are analyzed based on their compliance with the three fairness principles.

Ding proposed three standards for measuring fairness based on average, equality, or needs. However, he did not state which one is most appropriate. Generally speaking, output distribution is an easy way to measure distribution fairness. An average standard is based on all people receiving an equal share of human outputs. Equality is more complicated, and we can first exclude the option of needs-based distribution.

Needs-based distribution considers everyone’s needs, which should not be confused with the economic concept of demand. If it is demand, price is an easy way to balance supply and demand and thus this would be the fairest distribution mechanism in a market economy system. However, the feasibility of needs-based distribution is problematic, because needs are not restricted by purchasing power, and thus cannot be quantified. Thus, the needs of given number of people cannot be accurately estimated, and a balance between supply and demand cannot be achieved with 100 % certainty.

Considering all these factors, fair distribution is the best choice. But when it comes to the methods of fair distribution, there are several possibilities: distribution based on an individual's actual contribution (i.e., the socialistic distribution principle); and distribution according to an individual's actual contribution and ability, and, in a more complicated version, taking into account real needs as well. Considering all of the limitations in the real world, including the difficulty in estimating one's real ability and needs, distribution according to contribution is generally the most reasonable and feasible method, even though accurately assessing one's contribution remains a problem. Given the extreme complexity of procedural justice, I do not discuss it further.

3.5.2 Static Perspective of Fair Development

Using the framework of the human development system presented in this chapter and fair development as the basic principle, the system can be assessed from a static perspective for a given period (i.e., 1 year). This assessment method covers a large range of factors yet falls short of being a comprehensive index system, so it is difficult to implement using present theories. Therefore, I try to use simple standards (i.e., the three fairness principles) to assess fair development and briefly analyze some representative topics to delineate the significance of the static perspective in practice.

3.5.2.1 Pareto Optimality

In economics, Pareto optimality (or Pareto efficiency) is applied to evaluate the status of resource (i.e., output or wealth) distribution from a static perspective. In this situation, no individual's status can be improved without negatively impacting another individual's status. Pareto optimality is a condition in which there is no room for Pareto improvement (i.e., at least one person's situation can be improved without negatively impacting another individual's status).

3.5.2.2 Equity Maximization

In a sense, Pareto optimality has nothing to do with actual "optimality" because an extremely unfair and extremely fair income distribution can both be conditions of Pareto optimality. Thus, this concept implies no value judgment or only in a very narrow sense. Therefore, Pareto optimality can be used to assess the status of the system, but can only show one direction. This makes it difficult to perceive the exact direction of improvement when Pareto optimality is not achieved and Pareto improvement is needed. In such situations, the equity maximization principle can be used as a tool.

Taking income distribution as an example, the Gini coefficient can help determine the equity of income or wealth distribution. In China, the Gini coefficient of income distribution is currently between 0.47 (according to official data) and 0.61 (according to unofficial data), which indicates a large income gap. If enough data were available to compute the Gini coefficient for wealth distribution, the number would be much larger. In this regard, there is still a long way to go for China to realize equity in income distribution, which is a potential area in which efforts could be made.

3.5.3 *Dynamic Perspective of Fair Development*

Theoretically, there are two dynamic analysis techniques: discrete analysis and continuous analysis. Here, I use discrete analysis to dynamically assess fair development. Intergenerational equity is an important concept in eco-economics and the theory of sustainable development and has great significance in studying fair development. I focus on resource allocation fairness and draw conclusions from two dimensions: opportunities and output.

In *Our Common Future*, sustainable development was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (World Commission on Environment and Development 1987: 43) Intergenerational equity is expressed in this definition, but its meaning is not that explicit. Moreover, as Ding (2013) pointed out, the very meaning of “sustainable development” is elusive. In fact, the “ability of future generations to meet their own needs” can hardly be explained, either. First, the needs of future generations form the basis for all research. Second, how can contemporary people recognize the needs of “future generations”? Predicting future needs is a very difficult task indeed.

Thus, research on intergenerational equity provides an outlet for analysis. Three issues deserve particular attention: the exhaustion of resources that will be required by the next generation, the creation of environmental problems for the next generation, and unfairness in the acquisition and utilization of resources for the next generation. Correspondingly, those who study intergenerational equity mainly investigate the sustainability of life on earth, ecological processes and environmental quality, and a comfortable environment for human beings. Among these scholars, Weiss (1984) proposed the concept of *planetary trust*, which means that every generation is the trustee of the next generation’s rights, and that all generations have equal rights to explore and use natural resources (i.e., duty principle, reasonable storage principle, etc.). Few can argue with these ideas. But, how should generational equity be judged, and based on which principle(s)?

Generational equity is associated with at least two complex problems. First, how should intergenerational negative externalities be measured? Second, will resources have the same value in the future that they do now? Should there be a discount? If so, how should the discount rate be set? Instead of probing into this issue, I present several basic principles for assessing fair development from a dynamic perspective.

3.5.3.1 Per Capita Measurement

Considering the current developmental stage reached by developed countries and the total amount of resources consumed in order to do so, comparing only the current resource consumptions of developing and developed countries is not fair. Moreover, on a per-capita basis, consumption in developed countries is much higher than in developing countries. Therefore, resource consumption should be assessed based on per-capita consumption.

3.5.3.2 Absolute Improvement

Regarding the world holistically and all human beings a single community, contemporary people must make full use of technological advancements to make continuous improvement. Our focus must be holistic. Based on this principle, the per-capita consumption of developing countries can grow, but must be counterbalanced by decreased consumption in developed countries.

3.5.3.3 Incremental Compensation

A dynamic process of human development will result in incremental improvements in opportunities, resources, and outputs. A system will never be perfect, so incremental adjustment provides a basic way to improve the system. Distribution of incremental improvements should be based on the status quo and adjustments should conform to the principle of maximum equity.

3.6 Policy Proposals for Dynamic Human Development

The evolution of the human development system is dynamic. In the past, people intervened quite frequently. Although the nature of the system itself will ultimately determine development trends for the system, human intervention can also cause the system to deviate from its original path, creating plenty of unfairness. Fair development requires the use of human intervention to decrease the amount of distortion and deviation in systematic development, and the fair development principle offers a basis for this intervention.

I believe that the ultimate goal of fair development is human development and that fairness should be embodied by the condition of the system during all stages of its evolution. There are three primary dimensions of human development (i.e., needs, quality, and ability) and six environmental dimensions (i.e., economy, society, culture, ecology, technology, and institutions) that jointly comprise the human development system. Based on the framework presented in this chapter, the possibility of quantitative and perhaps qualitative evaluation, the three fairness principles, and other specific principles, I assess the current state of the system to reveal appropriate areas for future human intervention.

There is still a long way to go to transform the interventions into real policy proposals. In my opinion, the significance of institutional improvement is fundamental and beneficial to eliminating distortion and deviation in perpetuity. Institutions affect the other five environmental dimensions and thus significantly affect the three dimensions of human development. This does not mean that the other five dimensions do not require human intervention. However, given uncertainties about the mode and effect of intervention, it is nearly impossible to deliver policy proposals with optimal or even highly beneficial effects. Moreover, the system is complex and constantly changing, so all present suggestions should be adjusted as the system evolves.

I discuss two specific topics at the micro level and attempt to propose respective policy changes to show that the advancement of fair development and human development does not necessarily wait for comprehensive, complex proposals. Once the principles and standards are established, it is possible to advance fair development and human development by making minor policy adjustments.

3.6.1 Reform the Education System

The educational system in China is examination-oriented, but opinions differ about its advantages and disadvantages. It is possible to comprehensively assess the system based on the three human development dimensions of need, quality, and ability, but the outcome inherently relies on the index system and the value system of the assessor. Judgments of advantages and disadvantages may differ for measurements from same index.

I believe that exam-oriented education can stimulate students to learn and consolidate knowledge, but undermines their ability to engage in independent, critical, and creative thinking, which are of vital importance for human development. Thus, the present educational system jeopardizes people's free development.

Take college enrollment, for example. The enrollment system has been reformed to allow independent enrollment in recent years, which has to some extent solved some of the problems of the old system. But it has not enabled two-way selection between colleges and students, which can provide the best opportunity for students to develop their skills and abilities. In developed countries, students can apply to more than one college at a time. The colleges evaluate students' previous academic performance and personal achievements (and sometimes, standardized test results) and offer students who meet their criteria the option to enroll. A single student may receive several admission notifications and choose the most appropriate college. In this way, students can have many choices and colleges can send out more offers than will be accepted, thereby effectively avoiding problems associated with insufficient enrollment.

In contrast, students in China have less choice. Regardless of the process, a student can receive only one acceptance notification. If a student is not satisfied with the "chosen" college, he or she has no choice but to re-enroll in high school or enter the workforce. This is ridiculous. Before acceptance notifications are sent, colleges

will do almost anything to attract high-quality candidates; yet after enrollment notifications are sent, colleges do an about-face and act quite domineeringly because students have no other choices. Sometimes, students are forced to transfer into a major that is of no interest to them. In the present system, students' access to education is not equal.

The inequity of educational system is also evidenced by the unfair distribution of enrollment quota. Apparently, students with *hukou* in large cities like Beijing and Shanghai are more likely to be accepted than students from other areas. This inequity significantly affects the enrollment system.

I recommend that China reform its higher education enrollment system to realize equity in education and provide students with adequate development opportunities. This will not only be beneficial for the development of students' careers and abilities, but will promote the improvement of human resources for all of society. Extending this reform to high schools and preliminary schools will also be essential for offering students more choices.

3.6.2 Implement a Waste Sorting Education Program

Waste sorting is a basic task in developing a recycling economy. Due to historical reasons and people's general lack of sense, China has not done a very good job at classifying garbage compared with developed countries. Even in relatively more developed cities like Beijing, Shanghai, Guangzhou, and Shenzhen, there are too many fine distinctions made between different types of waste and not all types are covered.

Waste sorting can enhance citizens' sense of environmental protection and sustainable development; however, it is not easy to change people's habits. Therefore, China should begin by providing waste sorting education to children in kindergartens and citizens in first-tier cities. Cultivating kids' habits may be an effective way to fundamentally change societal practices, which can have a far-reaching influence on later generations.

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