

Human Capital and Knowledge

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Introduction

Human capital and knowledge are frequently used interchangeably and broadly refer to people's acquired or innate abilities that are conducive to productivity and economic growth. Human capital is not only heterogeneous but, unlike physical capital, is also inseparable from an individual who possesses it. The concept of human capital is generally associated with the intangible attributes of people such as education and training, experience, skills, health, language (Lazear 1995, Pendakur & Pendakur 2002), or even attitudes toward work. Investment in human capital is seen as an improvement in people's productivity, which in turn can contribute to a higher level of economic growth for a country.

The present interpretation of the knowledge economy (or knowledge-based economy) focuses on the role of knowledge or human capital in long-run economic growth. Research on economic growth has been reawakened since the mid-1980s. According to the new growth theory developed by Romer (1986) and Lucas (1988), advancing knowledge is a crucial determinant of long-term growth. In recent years, discussions and investigations on the knowledge economy have intensified (see, e.g., Grossman & Helpman, 1991, Freeman & Polasky 1992, Jones 1995, OECD 1996, Atkinson & Court 1998, Aghion & Howitt 1998, Thurow 1999).

The significance of "human capital" and "knowledge", indeed, has been explored and elaborated by economists of different generations and groups, ranging from Adam Smith to contemporary Nobel laureates (such as Friedrich August von Hayek of the

Austrian school and Theodore W. Schultz, Gary S. Becker, and Robert E. Lucas of the Chicago school). In view of the long span and voluminous research on the subject, economists have classified types (or classes) of human capital and/or knowledge from different dimensions. Blaug (1976:829), for example, considered the following phenomena—health, education, job search, information retrieval, migration, and in-service training—as investments in human capital. According to Machlup (1962, 1980), knowledge can be classified into the following five types: (1) practical knowledge, (2) intellectual knowledge, (3) small-talk and pastime knowledge, (4) spiritual knowledge, and (5) unwanted knowledge. In addition, he classified knowledge production into six major knowledge industries and branches: (1) education, (2) research and development (R&D), (3) artistic creation and communication, (4) media of communication, (5) information services, and (6) information machines. According to some preliminary estimates provided by Machlup (1962), total knowledge-production for the U.S. in 1958 was \$136,436 million, with \$60,194 million in education, \$10,900 million in R&D, \$38,369 million in media of communication, \$8,922 million in information machines, and \$17,961 million in information services. The ratio of knowledge-production to adjusted GNP was almost 29 percent. It is anticipated that the share of knowledge-production in GDP has been increasing over the past several decades. According to the OECD (1996), more than half of GDP in the major OECD countries is now knowledge-based.

Early Thoughts and Intellectual Roots

The concept of human capital is not novel in economic literature. An embryonic emphasis

on “human capital” or “knowledge” can be extended at least back to the early works of Adam Smith and David Ricardo (Kurz 1997, Nerdrum 1999:15-19). Smith envisaged the importance of education and skilled labor in his day and wrote in 1776 that “man educated at the expence of much labour and time ...may be compared to one of those expensive machines. The difference between the wages of skilled labour and those of common labour, is founded upon this principle” (Smith 1776:97-98).

Following Smith, Ricardo did not deny the existence of different kinds of labor (such as skilled and unskilled labor). There are, however, more references to Smith’s works than to Ricardo’s works. This probably has much to do with Ricardo’s vision of long-term economic development as a *stationary state*, which later gave economics the nickname *the dismal science*. Besides Smith and Ricardo, Thomas Robert Malthus argued that poverty could be resolved through institutional changes in enhancing human capital in the form of introducing universal education (Jensen 1999).

A sketch of the early contributors must, at least, include Irving Fisher’s capital theory and Joseph A. Schumpeter’s ideas of innovations. At first sight, Fisher did not seem to have much to do with the theory of human capital. Fisher, however, developed a heterogeneous capital concept that was functionally applied to literature on human capital thereafter (Nerdrum 1999:25-40). According to Fisher (1906:66), capital can be defined as “a quantity of wealth existing at an instant of time. ... Such a collection of wealth is, however, heterogeneous; ...They may, however, be reduced to a homogeneous mass by considering, not their kinds and quantities, but their values.” All types of capital (including human capital in a sense),

according to Fisher, that give rise to an income stream can be converted into a common standard, say, money. With further modification, it is not difficult to draw an analogy between physical and human capital. Fisher’s concept of capital has, as a result, thereafter been extended by the Chicago school to analyze human capital. According to Schumpeter (1942), under trustified capitalism, innovations were selected by large incumbent firms with market power that emphasized innovations as the key impetus to economic growth. Schumpeter (1942:82-83) argued that “in dealing with capitalism we are dealing with an evolutionary process...The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers’ goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates...This process of Creative Destruction is the essential fact about capitalism.” In Schumpeter’s view, the gap between firms creating technologies and firms appropriating them triggered periods of “creative destruction.”

Austrian Analysis of Knowledge

The subject of human capital and knowledge has not only attracted individual economists but also different schools. The Austrian analysis of knowledge can be traced as far back as the early work of the founder of the Austrian School, Carl Menger, in his *Principles of Economics* published in 1871 (Baetjer 2000). The *knowledge problem*, however, was formally introduced and analyzed by Hayek in the 1930s and 1940s (Hayek 1937, 1945). Later, Hayek (1974) warned that economists pretended to know what was in practice not fully known or

measurable, and they inevitably risked giving false advice.

To Hayek, competition meant decentralized planning by heterogeneous individuals who possess differential knowledge. The best use of knowledge in society is to ensure that heterogeneous individuals with distinct plans can promptly apply their limited or partial knowledge to cooperate and/or compete with each other in the market. Hayek's notion of equilibrium, in this context, implies a specific situation in which all heterogeneous individuals' plans are synchronized. In addition, the interactions of all these heterogeneous individuals (best known as the market process or a *catallaxy*) can lead to the creation or discovery of new knowledge.

To paraphrase Hayek, Austrian economists recognize that the lack of (perfect) knowledge or human ignorance is constitutional. In essence, the economic problem is concerned with how heterogeneous individuals with limited knowledge carry out their actions and execute their plans over time through exchanges with each other. The market is an institution for the coordination, exchange, and utilization of the differential knowledge of individuals. People learn by doing through the market process and acquire new knowledge by interacting with others.

Machlup, a late president of the American Economic Association (AEA) and an eminent Austrian economist specializing in the subject of knowledge, followed the Austrian tradition and published some important works including *The Production and Distribution of Knowledge in the United States* (1962), *Knowledge and Knowledge Production* (1980), *The Branches of Learning* (1982) and *The Economics of Information and Human Capital* (1984). His unusual insights and works have become the

de facto standard, and have highlighted the importance of knowledge production for economic growth in modern economies which have stimulated subsequent research into the knowledge economy. From an Austrian perspective, the competitive market process, as illustrated above, has led to beneficial interaction among market participants. This process, over time, reduces ignorance for economic agents to manageable levels and promotes the discovery of knowledge that was not previously available. This dynamic process furthers the emergence of knowledge and could contribute to economic growth.

Human Capital and the Chicago School

Although the Austrian school investigated the knowledge subject earlier and made a phenomenal contribution, it was the Chicago school economists, namely, T. W. Schultz, Gary Becker and Robert Lucas, who promoted the research domain of human capital to the frontier. T. W. Schultz, a native of South Dakota, delivered a presidential speech entitled "Investment in Human Capital" to the AEA in December 1960 and emphasized that the most unique feature of the US economic system was the growth in human capital. He described the important activities that improve human capabilities as follows:

"I shall concentrate on five major categories: (1) health facilities and services, broadly conceived to include all expenditures that affect the life expectancy, strength and stamina, and the vigor and vitality of a people; (2) on-the-job training, including old-style apprenticeship organized by firms; (3) formally organized education at the elementary, secondary, and higher levels; (4) study programs for adults that are not organized by firms, including extension

programs notably in agriculture; and (5) migration of individuals and families to adjust to changing job opportunities.” (Schultz 1961:9)

He concluded his speech by stating “The man without skills and knowledge [is] leaning terrifically against nothing” (Schultz 1961:16). Later, he published another short article entitled “Reflections on Investment in Man” in the *Journal of Political Economy* (JPE) in October 1962 and empirically examined the role of human capital as a source of economic growth. He identified that the growth in investment in man (i.e. educational capital) improved the quality of workers, which in turn became a major source of economic growth. In 1963, Schultz published another important book entitled *The Economic Value of Education*.

Immediately following Schultz’s 1962 article, a second article entitled “Investment in Human Capital: A Theoretical Analysis” written by Gary Becker and a third article entitled “On-the-Job Training: Costs, Returns, and Some Implications” written by Jacob Mincer appeared in the *Journal of Political Economy* in the October 1962 supplement on “Investment in Human Beings.” Both Becker (1962) and Mincer (1962) conducted in-depth analyses of on-the-job training. In 1964 Becker published *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, which became a classic book in the area of human capital. A special note should be reserved for Jacob Mincer, who maintained a close connection with both T. W. Schultz and Gary Becker at that time. Indeed, prior to both Schultz and Becker, Mincer employed the concept of human capital to explain the differentials of earnings and published a paper entitled “Investment in Human Capital and Personal Income Distribution” in the *Journal of*

Political Economy in 1958. In the 1980s, Lucas (1988) considered the *external effects* of human capital built on the concept of human capital developed by Schultz (1963) and Becker (1964). These effects are seen as spillovers from one person to another and to some extent contribute to the productivity of all factors of production. That is, human capital increases the productivity of both labor and physical capital. Lucas (1988:19) emphasized that “human capital accumulation is a *social* activity, involving *groups* of people in a way that has no counterpart in the accumulation of physical capital.”

Under the human-capital research program (the term used by Blaug 1976), some interesting issues with strong important policy implications emerge such as the phenomenon of human capital flight or the brain drain, which refers to the migration of the more highly-skilled labor to foreign countries to pursue higher rates of return. The brain drain issue, indeed, has drawn significant attention since the 1970s (see, for example, Bhagwati and Wilson 1989). Some recent studies have re-examined the brain drain issue and have considered human capital formation in the context of endogenous growth theory (Haque & Kim 1995, Beine *et al.* 2001, Stark 2004).

Empirical Analyses

Since education is recognized as the most common type of human capital, it has by far drawn the most attention in empirical literature. Empirical studies such as Barro (1991) and Barro and Sala-i-Martin (1995), for example, have found a strong relationship between schooling and the growth rate of per capita GDP across countries. Bils and Klenow (2000) have recently pointed out that the impact of

schooling on growth explains less than one-third of the empirical cross-country relationship. The previous results documented by Barro (1991) and Barro and Sala-i-Martin (1995) can be best explained as partly reflecting the impact of schooling on growth. In this regard, they suggest that an important part of the relationship between schooling and growth may be due to omitted factors and such factors are subject to further study.

Foster and Rosenzweig (1996) employ longitudinal data of over 4,000 rural household in India covering the 1968-1981 period to investigate the complex relationships between schooling and economic growth. They find that technical change (in exploiting new high-yielding variety crop seeds) not only affects the returns to schooling but also leads to greater private investment in schooling. The central implication of their evidence indicates that the returns to investment in schooling and technical change are complementary to each other. The returns to investment in schooling will be higher if technical change is faster and the returns to investment in technical change will be higher if more schooling is available. Using data from the 1989 Taiwan Women and Family Survey, Parish and Willis (1993) investigate how parents choose to invest in sons' versus daughters' education and find that early-born female children in large families often marry early (rather than work) to solve the problem of tight family budgets. When older sisters do marry early, they can help increase the education of younger brothers and sisters. Zucker *et al.* (1998) investigate the close connection between intellectual human capital created by frontier research and the founding of firms in the high-tech industry. They conclude that the growth and diffusion of intellectual human capital was the

principal determinant of the growth and location of the U.S. biotechnology industry for the 1976-1989 period.

Haveman *et al.* (2003) have recently developed an indicator, earnings capacity (EC), to measure the U.S. human capital stock value from 1975 to 2000 and the extent to which that capital has been utilized. The EC measure is a potential measure and reveals what annual earnings in the US would be if all working-age population employed their human capital at its capacity. Then, the potential EC can be compared to the actual utilization of human capital. According to their estimates, the annual rental value of the human capital stock in the U.S. was about \$6.26 trillion in 2000, and it had grown by almost 74 percent since 1975. In 2000, the average working-age individual had over \$39,000 of EC, with the average male EC at about \$46,500 and the average female EC at about \$32,000. The EC gap between males and females has substantially narrowed over the 1975-2000 period. Furthermore, their estimates indicate that utilization of human capital has fluctuated from a low of 60 percent in 1982 to a high of 72 percent in 2000.

Human Capital, Poverty, and Institutions

Although utilization of human capital has generally increased (especially attributable to women's human capital) in the U.S. over the 1975-2000 period, Haveman *et al.* (2003) did not further investigate the relationship between human capital and poverty. It is well known that the burden of poverty has heavily fallen on women and children, and this phenomenon is particularly significant for developing countries. Furthermore, people who suffer from poverty frequently possess some characteristics such as bad health conditions. An improvement in people's health, from the perspective of the

mainstream exposition of human capital, is vital for resolving the poverty problem. Poverty, however, has become a chronic phenomenon and has continued to prevail in our human societies. In fact, the poverty issue can only be better understood from a broad institutional dimension. Borjas (1995), for example, examines human capital from an ethnic perspective and shows the empirical evidence between ethnic neighborhoods and the spillover effect of “ethnic capital.” His study clearly indicates that ethnic skill differentials persist from generation to generation and the ethnic-capital effect comes into play through the channel that low-income groups cluster in low-income ethnic neighborhoods. Intergenerational mobility is greatly affected by neighborhood effects.

A stylized fact on earth is that many poor people relentlessly die of hunger and disease every day. Locally and globally, our human societies have been continuously characterized by the scenario of pursuing a growing economy but being accompanied by rising wealth inequalities. In this regard, Kenneth E. Boulding, a late AEA president and a well-known institutionalist, emphasized that the knowledge of economics does not include the economics of knowledge and stated that “one area where economists have a good deal to be humble about is in the field of economic development of poor countries” (Boulding 1966, p. 11).

Gunnar Myrdal, a 1974 Nobel laureate and also a well-known institutionalist, investigated the South Asia region (including Pakistan, India, Indonesia, Burma, Philippines, Thailand, Ceylon, Malaya, and sometimes South Vietnam, Cambodia, and Laos as well) and published a three-volume book entitled *Asian Drama: An Inquiry Into the Poverty of Nations* in

1968. Almost five decades later, some of his penetrating insights still deserve constant attention. The entire volume III of *Asian Drama, Problems of Population Quality*, was devoted to the study of health, education, and the social system as a whole, with an application of his analysis to government action.

From a holistic perspective, the socio-economic conditions in each South Asian country can be classified into six broad categories, i.e. (1) output and incomes; (2) conditions of production; (3) levels of living; (4) attitudes toward life and work; (5) institutions; and (6) policies (Myrdal 1968, pp. 1859-1864). The first three categories represent “economic factors” and categories 4 and 5 represent “non-economic factors.” Category 6 is a mixture and can be considered to belong to the “economic factors” when the policies purpose is to induce changes in the first three conditions. In the social system all the aforementioned conditions are causally interrelated and economic conditions do not have precedence over the others. From the viewpoint of development, a change of condition in the direction of greater desirability can be considered as a change “upwards.”

Myrdal pointed out that the South Asian people have not only been insufficiently educated but also been miseducated to a great extent (due to their past colonial rule). Thus, educational reforms needed in these now independent countries are far more than the popular suggestion of increased “investment in education.” The main reason is that “existing educational establishments are part of a larger institutional system, which includes social stratification; and this system is supported by people’s attitudes, which themselves have been molded by the institutions” (Myrdal 1968:1649). Influential vested interests in these countries have been

embedded in the educational and institutional systems and they resist or warp reform policies.

According to Boulding and Myrdal, it is clear that economists need to develop substantial knowledge towards the poor to resolve the poverty problem. Poverty is frequently entangled with the phenomena such as contagious diseases and criminal activities, which cause great negative impact on other individuals and communities. Reducing poverty, in a sense, possesses the property of public good if poverty reduction induces greater public health and security. From a global village perspective, the reduction of poverty has become even more significant if it contributes to disease eradication and global peace, both of which are considered as important global (or international) public goods.

International Public Goods (IPGs) and Knowledge Spillovers

Knowledge, as previously illustrated for the role of reducing poverty, is also conceptually a type of IPG. The significance of IPGs has recently given rise to intense analyses in the literature (see, for example, Kaul *et al.* 1999 and Ferroni and Mody 2002). A pure IPG, in principle, can generate benefits that spill over borders, regions, ethnic groups, and generations. Morrissey *et al.* (2002) classify IPGs into five categories: environment, health, knowledge, security, and governance.

Types of IPGs as diverse as internet securities, financial market stability, biodiversity preservation, and knowledge (of best development practices) can be framed in terms of the so-called *weakest link*, *weaker link*, *better shot*, and *best shot* public goods (Sandler 1998 and Arce M. 2004). The introduction of these adjectives characterize the variety of ways in which the

international collective action is translated into the provision of public goods. For instance, the smallest effort or contribution uniquely determines the public good level for a *weakest link* technology, while the largest effort or contribution uniquely determines the public good level for a *best shot* technology. Sandler (1998, p. 232) pointed out that some of the most worrisome public good challenges facing human beings adhere to the best-shot technology (such as finding a cure for avian flu). It is quite conceivable that the provision of global public goods has remained under-provided (in the absence of an international government) and faced with a global governance challenge. In his presidential address entitled “International Public Goods without International Government” to the AEA, Kindleberger (1986:11) commented that “the system should be run at all times by rules, including regimes, not people.”

Among the aforementioned public goods, the benefit that knowledge (created by the innovative firms) spills over to other firms is referred to as “knowledge spillovers,” which are considered as “engine of endogenous economic growth.” Many empirical studies have examined knowledge spillovers from a global dimension and provided different results. Using pooled time series cross section data for 21 OECD countries and Israel, Coe and Helpman (1995) discover that foreign R&D capital stocks have a significant impact on domestic productivity, indicating the existence of international knowledge spillovers. Using firm-level data for the U.S. and Japan, Branstetter (2001) only find strong evidence of *intranational* knowledge spillovers. These empirical findings are quite important for understanding the channels and barriers of knowledge spillovers across nations. Furthermore, their implications are

significant for furthering policy formation of knowledge as an IPG.

Indeed, the spread of knowledge or knowledge spillovers in a global society is greatly involved with the increase in traded amounts of knowledge-related goods and services. As property rights can be attached to identifiable pieces of knowledge, the intellectual property rights (IPRs) system (such as the patent right, copyright, semiconductor chip protection, and trademark protection for the U.S.) has become prevalent and dominant in controlling access to knowledge, the spread of knowledge, and also the trading of knowledge-related goods and services.

Knowledge and Trade-related Intellectual Property Rights (TRIPS)

In recent years, the idea of IPRs and the enforcement of trade-related aspects of intellectual property rights (TRIPS), which integrated IPRs into global trade, have attracted increased attention and debate. Under the insistence of the U.S. Trade Representative, the GATT agreement under the 1993 Uruguay Round concluded provisions in relation to TRIPS. TRIPS is an international agreement that operates under the umbrella of the WTO, which was established in 1995 and succeeded the GATT as the forum for international trade negotiations. TRIPS establishes minimum levels of protection in relation to IPRs such as copyright and drug patents that each government has to give to the intellectual property of fellow WTO members.

Proponents of the IPRs, on the one hand, believe that the current system can not only protect the process of invention and innovation but can also provide economic incentives for creative activities. Opponents, on the other hand, generally hold the view that the protection of IPRs has been

implemented at the expense of the public knowledge domain. Richards (2002) examined justificatory arguments in defense of IPRs based on the philosophical writings of Locke, Hegel and Bentham and found that their defenses for private property rights do not hold up well when applied to intellectual property. Boldrin and Levine (2002) thought that intellectual property might be better referred to as “intellectual monopoly” and argued that the extent of current copyrights has been excessive, with a similar conclusion also having been reached by Lessig (2001). Hui and Png (2002) studied the impact of a change in the U.S. copyright law in 1998 in relation to movie production and found that the Sonny Bono Act has only had a small impact on new creative activity. To facilitate the production and use of knowledge, Joseph Stiglitz (1999), 2001 Nobel laureate, argued that an international intellectual property system must balance a variety of concerns such as dynamic efficiency (derived from innovative activity), static efficiency (associated with the utilization of knowledge) and the use of the global knowledge commons. As each innovative activity currently makes free use of the global commons of (pre-existing) knowledge, the international community could claim the right to charge a fee for using it.

TRIPS has so far become the most important backdrop for global governance in the advance and spread of knowledge. Ideally, TRIPS not only aims to promote creativity and innovation, but also allows a built-in flexibility among countries to adapt them to their own public purposes (see Article 7 & Article 8.1). In practice, there has been resistance in the developing world where it has been argued that their interests were under-represented (and IPRs primarily work for the interests of developed

countries, and particularly for the U.S.). According to Ryan (1998), TRIPs was established on behalf of the U.S. multinational companies such as Pfizer Chemical and IBM. Shaffer (2004) notes structural weakness in the ability of developing countries to participate in the WTO judicial process and offers suggestions for protecting their interests. Lamy (2004) views TRIPS as a flexible instrument and only one part of a global governance mechanism and points out that IPRs can become a source of growth for developing countries only if sound economic management and the right type of flanking policies are considered simultaneously. Apparently, further studies on property rights laws and institutions are required to evaluate the IPR system.

Indigenous Knowledge and Sustainable Development

The efforts to comprehend the importance of *human capital* or *knowledge* are by no means limited to economists. To further expand the global knowledge commons, a serious acknowledgement and thorough understanding of a unique intellectual knowledge system – indigenous knowledge – seems to be indispensable. The recognition of and emphasis on indigenous knowledge has been intensified by recent developments in environmentalism and feminism (Jacobs 1994). Indigenous knowledge usually refers to unwritten knowledge preserved locally in oral traditions and has been increasingly recognized as critical for sustainable development (see, for example, Brokensha *et al.*, 1980 and Fernando 2003). A central argument is that sustainable development must be embedded in indigenous knowledge systems, and ignorance of the systems will certainly lead to failure in development. Weatherford (1994) argued that the

indigenous people may be the only people capable of salvaging modern civilization. As indigenous people have gradually lost their cultural identities, we are actually losing indigenous knowledge, our connections to the past, and jeopardizing our future.

According to Fernando (2003:58), it would be far more productive to regard indigenous knowledge as “a social phenomenon produced within a specific social, economic, and political context and, thereafter, proceed to analyze the relevance of such meanings and the institutional and power relations embedded in them for achieving the goals of sustainable development.” Indigenous knowledge is seen to be particularly abundant in the knowledge of the environment or nature and, therefore, critically important to sustainable resource use and balanced development (Brokensha *et al* 1980). Take two of Taiwan’s indigenous tribes, Thao and Tsou, for example. The Thao are Taiwan’s smallest ethnic group with a population of about 300 people and live in the surrounding area of Sun Moon Lake. The Tsou population is approximately 7,000 people and most of them live in the Alishan area. Alishan and Sun Moon Lake are two of most famous scenic areas for enjoying natural beauty in Taiwan. Without the Thao and Tsou’s indigenous wisdom, the natural environment of Sun Moon Lake and Alishan cannot be well preserved until today.

The following is another real example of indigenous knowledge. The Onge people make up an aboriginal tribe with a population of less than 100 people. They live in the Indian Nicobar and Andaman islands in the Bay of Bengal. They possess indigenous knowledge encompassing medicine, biology, and nature (Norchi 2000). They rely on their knowledge of a specific plant to treat fever and

gastrointestinal disorders. This same plant is also effective in dealing with malaria and, consequently, the Onge people no longer suffer from malaria. Now, scientists have been conducting tests on the medicinal plants used by the Onge people and pharmaceutical companies have also shown an interest in reaching an agreement with the patentee. (Note: New cures for malaria could be regarded as a *best shot* international public good.) In addition, all 96 Onge people survived the tsunami in December 2004. The tsunami, however, has left around 300,000 people missing or dead in or around the Indian Ocean, including residents of the Onge people's nearby town of Hut Bay. Before the tsunami, the Onge people fled into the jungle for protection after they found that the water in the creek had suddenly run out to sea.

The work of protecting and promoting indigenous knowledge, however, has been challenging. The following urgent issues need to be examined and evaluated. First, it is important to conduct research on how people can preserve the natural environment of the indigenous people as indigenous knowledge and their natural habitats go hand in hand. Second, the existing intellectual property system still remains controversial. Thus, whether it can be applied or extended to cover indigenous knowledge needs in-depth research. Third, a unique institutional system for the advancement of indigenous knowledge needs to be developed. The US Tribal Colleges, indeed, were created in the late 1960s and the early 1970s in response to the higher education needs of American Indians. There are currently over 30 Tribal Colleges located in Indian reservations around the US. Tribal Colleges are different from standard community colleges or mainstream 4-year colleges in their cultural identities, and are relatively involved in a

broad range of community services – including education, counseling, and economic development initiatives – that are specifically focused on communities that would otherwise be isolated from such resources. So far, the Tribal Colleges have not drawn enough attention from either academia or the general public and have been persistently under financial pressure.

Sustainable Perspective on the Knowledge Economy

Finally, it is time to seriously reconsider the knowledge issue from the perspective of our position in human history. Clearly, knowledge is not only critical for economic growth but also for poverty alleviation and environmental conservation. In short, knowledge is critical for a sustainable society. In this respect, John Stuart Mill's concept of *the stationary state* is in line with contemporary analysis of sustainable development and is worth further review.

O'Connor (1997) investigates Mill's concepts of a private property-based liberal society as well as a stationary-state society and argues that the writings of Mill represent a prototype for ideals of a "sustainable development." Winch (2004:111) points out that Mill is one of the earliest green thinkers and his "defense of a zero-growth society conveys the substance of his environmentalist concerns." Mill's virtuous stationary-state (zero-growth) society, according to Winch (2004:122), is "a continuous state of dynamic equilibrium" in which all improvements in new technologies can be redirected towards redistribution of wealth and the promotion of life quality.

Lin (2003, 2005) has further argued that the rich communities (nations) have tended to waste resources, whereas the poor communities (nations) have tended to destroy resources. Due to severe wealth

inequalities all over the world and limited resources on earth, the global community has become less and less sustainable. To maintain a sustainable society with an efficient use of resources, it is necessary to achieve a more equitable distribution of wealth. In this regard, Lin (2003, 2005) has restated that Mill's concept of *the stationary state* is conceptually consistent with modern exposition of sustainable development.

Although greatly influenced by David Ricardo, Mill's *stationary state* was not the dismal one David Ricardo visualized. Mill took a different view of his desirable society and outlined his desires for a good future. Indeed, in his chapter on *the stationary state*, in which he discussed the long-run tendencies of the economy, he said:

“But the best state for human nature is that in which, while no one is poor, no one desires to be richer, nor has any reason to fear being thrust back by the efforts of others to push themselves forward. ...There would be as much scope as ever for all kinds of mental culture, and moral and social progress; as much room for improving the Art of Living, and much more likelihood of its being improved, when minds ceased to be engrossed by the art of getting on.” (Mill 1848:748-51)

Looking at the economic and social conditions of his time, Mill felt that the mass of society was bypassed by the materialistic development of the Industrial Revolution and wondered whether a country with a growing economy was a desirable living place. He envisioned that *the stationary state* would result in an improvement in the art of living and emphasized that “only in the backward countries of the world that increased production is still an important object: in those most advanced, what is

economically needed is a better distribution” (Mill 1848, p. 749).

Thus, Mill's *stationary state* might be narrowly interpreted as a society with *no (or limited) growth in physical output*. Alternatively, it should be best understood as a society with unlimited growth in mental culture and improvements in economic equality (by means of wealth redistribution). Mill's perspective, in fact, is very much closed to the ethical-utopian perspective of sustainable development. The ethical-utopian perspective of sustainable development emphasizes the emergence of new individual value criteria and new social objectives. Furthermore, it encourages altruistic behavior on the part of modern citizens in contrast to individual egoistic behavior (Bergh 1996:59).

From the perspective of the mainstream literature, an improvement in human capital is seen as crucial for enhancing the *competitiveness* of a single person or country. To date, we have begun to inquire into the possibility of a global *sustainability* from an overlapping-generations perspective. Fundamental to this holistic perspective is the recognition that human generations are interrelated and ought to be examined as an integrated whole. This ongoing progress, indeed, implies our intellectual breakthrough to some extent and also reveals our common desires for a sustainable future. Undoubtedly, our human generations will continue to develop new values, beliefs, and knowledge compatible with the goal of a sustainable future. What I have offered here, therefore, are only some very basic prolegomena on the subject.

Acknowledgments: This article was originally completed during the author's visit on a Fulbright scholarship to Augustana College, South Dakota, USA. The author

gratefully acknowledges the auspices of Augustana College and is indebted to Reynold Nesiba, Brian Eggleston, David Sorenson, and Donn Grinager for their generous support. The author also wishes to thank Phil O'Hara, Yih-Chyi Chuang, and anonymous referees for helpful comments and the Fulbright program, administered by the Institute of International Education and sponsored by the United States Department of State, which has helped with the creation and spread of knowledge, an important type of international public good.

Internet Sites

Commission on Intellectual Property.

www.iprcommission.org

Global Public Goods.

www.earthsummit2002.org/es/issues/GP/G/gpg.htm

Indigenous Knowledge Pages. www.ik-pages.net

Trade-Related Intellectual Property Rights.

www.wto.org/english/tratop_e/trips_e/trips_e.htm

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