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HUMAN CAPITAL AND ITS MEASUREMENT

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1. Introduction

Recent challenges such as globalization, a knowledge-based economy, and technological evolution, have promoted many countries and organizations to seek new ways to maintain competitive advantage. In response, the prevailing sense is that the success depends in large part on the people with higher levels of individual competence. In the end, the people are becoming valuable assets and can be recognized within a framework of human capital.

Broadly, the concept of human capital is semantically the mixture of human and capital. In the economic perspective, the capital refers to ‘factors of production used to create goods or services that are not themselves significantly consumed in the production process’ (Boldizzoni, 2008). Along with the meaning of capital in the economic perspective, the human is the subject to take charge of all economic activities such as production, consumption, and transaction. On the establishment of these concepts, it can be recognized that human capital means one of production elements which can generate added-values through inputting it.

The method to create the human capital can be categorized into two types. The first is to utilize ‘human as labor force’ in the classical economic perspective. This meaning depicts that economic added-value is generated by the input of labor force as other production factors such as financial capital, land, machinery, and labor hours. Until the monumental economic growth of the 1950’s, most of economists had supported the importance of such quantitative labor force to create products. The other is based on the assumption that the investment of physical capital may show the same effectiveness with that of human capital on

education and training (Little, 2003). Considering that the assumption accepts as a premise, the human capital expansively includes the meaning of ‘human as creator’ who frames knowledge, skills, competency, and experience originated by continuously connecting between ‘self’ and ‘environment’.

Among those concepts of the human capital, it tends to be recognized that the latter is more important than the former (Beach, 2009). Actually, many empirical literatures show that human capital affects various social components. In the 1950’s, some economists discovered that the investment of human capital was the primary element to raise individuals’ wages compared to the quantitative input of other components such as land, financial capital, and labor force (Salamon, 1991). Similar to this, Woodhall (2001) presents that the investment of human capital is more effective than that of physical capital. Throughout the investment of human capital, an individual’s acquired knowledge and skills can easily transfer to certain goods and services (Romer, 1990). Considering that accumulation of knowledge and skills takes charge of important role for that of human capital, there is a widespread belief that learning is the core factor to increase the human capital. In other words, learning is an important component to obtain much knowledge and skills through lots of acquisition ways including relationship between the individual and the others (Sleezer, Conti, Nolan, 2003). Currently, it is acceptable that the conceptual foundation of one’s human capital is based on ‘something like knowledge and skills’ acquired by an individual’s learning activities. Assuming that knowledge can broadly include other factors of human capital such as skills, experience, and competency, human capital and ‘knowledge as broad meaning’ is recognized as synonymous expression.

Such accumulation of human capital through learning activities significantly influences many sectors. In the macroscopic aspects, many researchers present that accumulation of one’s human capital on education and training investment largely affects the growth of an individual’ wage, firms’ productivity, and national economy (Denison, 1962; Schultz, 1961). Microscopically, Lepak & Snell (1999) show that firm’s core competences or competitive advantage is induced by the investment of human capital entailed with value creating potential.

Human capital has being paid more attention in the workplace as well. According to Lucas (1988), a microeconomic model shows that education investment for workers significantly affects his/her productivity in the workplace. Along with the belief of education about improving workers’ productivity, many researchers stress the importance of education and training in the human capital field (Griliches & Regev, 1995; Rosen, 1999).

Not only one’s productivity but others are affected by the investment of human capital. Through participating in leaning activity, the learning participators are likely to easily implement job-seeking activities with increasing the human capital (Vinokur et al., 2000). After being employed, the workers tend to easily control their working condition in the workplace and relatively receive high rewards in the internal/external labor market (Edward, 1979). Furthermore, the investment of human capital affects national economic growth on the above-mentioned impacts as well (Romer, 1986).

With perceiving about the importance of human capital, many countries have tried to effectively and efficiently measure their human capital to understand their current status and thereafter implemented various ways to improve their human capital. Therefore, it can be recognized that human capital measurement is an important source in terms of suggesting various policies regarding human resources.

Despite this necessity of human capital measurement, traditional method of the human capital measurement includes a few limitations. To begin with, Wolf (2002) suggests that some of indicators can be actually considered as incomplete ones. To support his assertion, he exemplifies that a worker's wage-one of human capital indicators as proxies-hardly measures 'authentic human capital'. By the drawback of traditional human capital measurement, it is acceptable to measure the authentic human capital instead of utilizing proxies such as income and productivity.

Second, it is difficult that human capital itself independently contributes to individual development and national economy growth. According to Ashton & Green (1996), it is necessary that the link between human capital and economic performance should be considered within a social and political context to precisely measure the human capital. Furthermore, many empirical literatures present that financial, human and social capital positively influence 'something like individual health' (Blakey, Lochner, & Kawachi, 2002; Veenstra, 2001; Veenstra et al., 2005; Wilson et al., 2004).

Consequently, the purpose of this study is to clarify a new approach of human capital measurement through the related literature review. Before doing this, this paper presents some concepts and characteristics of human capital. On such understanding of human capital, traditional human capital measurement and its demerit, a new approach of human capital measurement is proposed.

2. Concept of Human Capital

The origin of human capital goes back to the emergence of classical economics in 1776, and thereafter developed a scientific theory (Fitzsimons, 1999). After the manifestation of that concept as a theory, Schultz (1961) recognized the human capital as one of important factors for a national economic growth in the modern economy. With the emergence and development of human capital as an academic field, some researchers expansively attempted to clarify how the human capital could contribute to socio-political development and freedom (Alexander, 1996; Grubb & Lazerson, 2004; Sen, 1999).

The concept of human capital can be variously categorized by each perspective of academic fields. The first viewpoint is based on the individual aspects. Schultz (1961) recognized the human capital as 'something akin to property' against the concept of labor force in the classical perspective, and conceptualized 'the productive capacity of human beings in now vastly larger than all other forms of wealth taken together'. Most of researchers have accepted that his thought viewing the capacity of human being is knowledge and skills embedded in an individual (Beach, 2009). Similar to his thought, a few researchers show that the human capital can be closely linked to knowledge, skills, education, and

abilities (Garavan et al., 2001; Youndt et al., 2004). Rastogi (2002) conceptualizes the human capital as 'knowledge, competency, attitude and behavior embedded in an individual'.

There is the second viewpoint on human capital itself and the accumulation process of it. This perspective stresses on knowledge and skills obtained throughout educational activities such as compulsory education, postsecondary education, and vocational education (De la Fuente & Ciccone, 2002, as cited in Alan et al., 2008). Despite the extension of that concept, this perspective neglects that human being would acquire knowledge and skills throughout his/her own experience.

The third is closely linked to the production-oriented perspective of human capital. Romer (1990) refers to the human capital as 'a fundamental source of economic productivity'. Rosen (1999) states the human capital as 'an investment that people make in themselves to increase their productivity'. More recently, Frank & Bemanke (2007) define that human capital is 'an amalgam of factors such as education, experience, training, intelligence, energy, work habits, trustworthiness, and initiative that affect the value of a worker's marginal product'. Considering the production-oriented perspective, the human capital is 'the stock of skills and knowledge embodied in the ability to perform labor so as to produce economic value' (Sheffin, 2003). Furthermore, some researchers define that human capital is 'the knowledge, skills, competencies and attributes in individuals that facilitate the creation of personal, social and economic well-being' with the social perspective (Rodriguez & Loomis, 2007).

Consequently, human capital simultaneously includes both of the instrumental concept to produce certain values and the 'endogenous' meaning to self-generate it. In order to dependently/independently create these values, there is no doubt that leaning through education and training can be an important in terms of defining the concept of human capital. Considering that experience can be included as a category of knowledge, the human capital is a synonym of knowledge embedded in individuals.

3. Characteristic of Human capital

3.1. Indigenous Characteristics

According to Crawford (1991), compared to physical labor, human capital as broad meaning includes expandable, self-generating, transportable, and shareable characteristic. To begin with, the expandable and self-generating characteristics of human capital are closely linked to the possibility that the stock of knowledge increases individuals' human capital. Furthermore, the increase of human capital can be expanded by either endogenous or exogenous factors. It is possible that original knowledge can be continuously elaborated and developed through the relationship between external knowledge, information, skills, experiences, and other knowledge-based factors as well. In the economic perspective, the characteristic of human capital focusing on knowledge can be a core element to solve 'problem of scarcity' which little materials is equivalently distributed to economic agents. Throughout expanding and self-generating the human capital, it is sufficiently possible that the portion of that capital as an economic agent is extended.

Secondly, the transportable and shareable characteristics of human capital mean that the original holder of knowledge can distribute his/her knowledge to others. On the circumstance that the original knowledge-holder's exclusive ownership is slightly acceptable, the equivalent distribution between the holders and the takers can be actualized. Consequently, the former two characteristics extend the 'volume' of human capital, and the latter two expand the 'range' of human capital.

3.2. Impacts of Human Capital

The impact of human capital is largely categorized into three parts: individual, organization, and society. In the perspective of individual in the internal labor market, most of researchers refer to the possibility of increasing individual income, resulting from the individual productivity (Becker, 1993; Denison, 1962; Schultz, 1961; Schultz, 1971; Sidorkin, 2007). Because of the increment of an individual's productivity on human capital, for the purpose of maximizing organizational profits, most of employers prefer to high-productive individuals. Furthermore, it is considerable that individual mobility increases owing to the improvement of productivity in the internal labor market. By the increase of productivity in the workplace, the high-productive individual is recognized as the worker with much possibility to move to higher level in the internal market (Sicherman, 1991; Galor 1990).

In the perspective of individual in the external market, an unemployed individual's human capital affects his/her job-seeking and employable opportunities (Greider, Denise-Neinhaus, & Statham, 1992; Vinokur et al., 2000). On the internalized human capital, an individual easily holds the possibility to access job-related information with high level of human capital, and thereafter he/she can easily obtain the occupational chances compared to otherwise.

With respect to organization, Lepak & Snell (1999) suggest that the potential of human capital is closely linked to core competences and competitiveness of organization. Similar to this perspective, Edvison & Malone (1997) present individual human capital can affect organizational human capital such as 'collective competences, organizational routines, company culture and relational capital' as well.

Finally, the social perspective of human capital is the synthesis of both individual and organizational perspective. McMahon (1999) depicts the possibility of human capital for 'democracy, human rights, and political stability' on common consciousness of social constituents. According to Beach (2009), human capital can increase social consciousness of constituents within community. Consequently, the link between human capital and social consciousness is based on a close inter-relationship resulting in socio-political development (Alexander, 1996; Grubb & Lazerson, 2004; Sen, 1999).

3.3. Division of Human Capital

Generally, some researchers present three distinguished kinds of human capital such as general, firm-specific, and task-specific human capital (Gibbons & Waldman, 2004; Hatch & Dyer, 2004). Otherwise, Becker (1964) delineates that human capital is categorized into general and specific one. General human capital is 'to be defined by generic knowledge and skill, not specific to a task or a company, usually

accumulated through working experiences and education' (Alan et al., 2008). The general human capital holds 'transferable' characteristic across jobs, firms and industry. It is relatively easy that the general human capital embedded in an individual transfers to different industries.

Contrast to the general human capital, firm/task specific human capital is usually accumulated through education, training, working experience on 'knowledge specific to a firm/task' (Alan et al., 2008). As pointed out by Becker (1964, 1976), the specific human capital is rarely transferable to be applied to other jobs, firm, and industry, and thus it is impossible to transfer much income in the labor market. Furthermore, human capital is 'specific if it increases a worker's productivity only at the firm' (Becker, 1964). Consequently, it is difficult that the specific human capital embedded in an individual transfers to different industries.

4. Conventional Measurement Method of Human Capital

The conventional standard to measure human capital stock has been largely categorized into three parts: Output-, Cost-, and Income-based approach. School enrollment rates, scholastic attainments, adult literacy, and average years of schooling are the examples of output-based approach; cost-based approach is based on calculating costs paid for obtaining knowledge; and income-based approach is closely linked to each individual's benefits obtained by education and training investment.

4.1. Output-Based Approach

For the purpose of analyzing relationship between human capital and economic growth, some economists attempted to measure the stock of human capital utilizing 'school enrollment rates' as a proxy of human capital (Barro, 1991; Barro & Lee, 1993). Throughout calculating the ratio between individuals of school age and students enrolling in the educational institutions, the economists show the stock of human capital that each country holds. However, the method includes a drawback that a student's effectiveness can be recognized after participating in production activities.

In the perspective of educational attainment, Nehru, Swanson, & Dubey (1993) attempted to measure relationship between human capital and students' 'accumulated years of schooling' in the employable age as educational attainment. Assuming that the stock of human capital is the sum of each individual's years of schooling; it is difficult to clearly demonstrate this relationship, because educational attainment is a part of regular [school] education. Actually, many of adults tend to participate in many formal education and training activities to improve their productivity.

Besides measuring the stock of human capital with school enrollment rates and educational attainment, Romer (1990) suggested the ratio between skilled-adults and total adults to measure the stock of human capital in the national economy. Furthermore, Organization for Economic Cooperation and Development (OECD) utilizes International Adult Literacy Survey (IALS), the ratio between literate adults and total adults, to measure the stock of human capital. However, the method of IALS includes a few drawbacks in

that literacy can be slightly related to labor productivity, and the productivity can be increased by informal/non-formal learning activities such as personal learning and On-the-Job training

Finally, Psacharopoulos & Arriagada (1986) suggested the average years of schooling to measure the stock of human capital. They refer that the average years of schooling is meaningful to measure the stock of human capital as a proxy. This suggestion assumes that an individual's productivity is increased in proportion to his/her average years of schooling; they exemplify that someone's productivity with completing twelve years of schooling is twelve times compared to otherwise productivity with doing one years. As mentioned above, this method includes a drawback that an individual's years of schooling can be slightly related to his/her productivity.

4.2. Cost-Based Approach

Cost-based approach is based on measuring the stock of human capital through summing costs invested for one's human capital. For the purpose of calculating the invested costs, Kendric (1976) utilized an individual's investment costs considering depreciation, and Jorgenson & Fraumeni (1989) presented discounted income in the future. Considering that this approach is based on indirectly measuring stock of human capital, it is difficult to precisely classify boundary between investment and consumption in the perspective of costs for the human capital.

4.3. Income-Based Approach

This approach is based on the returns which an individual obtains from a labor market throughout education investment. Mulligan & Sala-i-Martin (1995) defines that aggregate human capital is the sum of quality adjustment of each individual's labor force, and presents the stock of human capital utilizing an individual's income. Considering that 'human-unrelated factors' can more influence an individual's income, this approach rarely presents a complete measurement for human capital.

4.4. How is Currently Human Capital Measured? : Based on OECD Measures

Hansson (2008) shows that OECD measurement on human capital is closely linked to international comparable statistics considering investment in human capital, quality adjustments, and result of education. On the constitution of human capital measurement, Table 1 presents how the constitution is divided into sub-factors in detail. The first sub-factor is 'investment in human capital' focused on the current level of human capital investment within a national boundary, and the second focuses on how the quality of that investment is managed and adjusted through the international comparison of academic achievement. Finally, third sub-factor presents how the result of educational investment is preformed after postsecondary education.

Table 1. OECD measures on human capital

Factors

Factors

1. Investment in human capital

1-1. High-level qualification

1-1-1. Growth in university-level qualifications

Growth in attainment levels in different fields

1-2. Graduation and enrollment rates

1-2-1. Trend in university-level graduation output

1-2-2. Contribution of international students to university graduate output

1-2-3. Entry rates into tertiary-type A education

1-2-4. Entry rates at tertiary education compared to population leaving without completing tertiary education

1-3. Time invested in education

1-3-1. Instruction time per year

1-3-2. Number of hours per week spent on self-study or homework

1-4. Investment in education

1-4-1. Expenditure per student at different level of education

1-4-2. Percentage of GDP spent on educational institutions

1-4-3. Private and public expenditure

1-4-4. Public subsidies for education to households

1-4-5. Expenditure on core service, ancillary services, and R&D

1-4-6. Change in student numbers, expenditure, demographic forecasts, etc

2. Quality adjustment in human capital investments

2-1. PISA assessments

2-2. PUIAAC (Program for the international assessment of adult competencies)

3. Results of education

3-1. Matching of education to occupation

3-2. Labor market outcomes by age, gender, and educational attainment

3-3. Rates of return to education

5. Demerits of the Conventional Measurement and New Possibilities

5.1. Demerits of the Conventional Measurement

According to Winkler (1987), the conceptual critique of human capital measurement is closely linked to screening theory which expresses relationship between an individual's credentials and employability. This critique addresses the unclear causality whether education credentials reflect the productivity. On the criticism that an individual's human capital increases his/her employability, Winkler (1987) surmises that human capital investment rarely influence his/her outcome of it. Rather, the capital-unrelated factors more affect the effectiveness of human capital investment. In this sense, it is necessary to seriously consider which one can clearly express the concept of human capital.

Second, the conventional measurement of human capital slightly considers the qualitative benefits of human capital such as family health, fertility and child morality (Lewin et al., 1983; Woodhall, 2001). Actually, McMahon (1998) presents that the impact of human capital includes both of financial monetary and social nonmonetary benefits with 'lower fertility rates, lower population rates, public health, democratization, human rights, political stability, poverty reduction, property crime rates, environmental effects, higher divorce rates, later retirement, more work after retirement, and community service'.

Third, other indicators that can contribute to estimate more accurate concept of human capital are rarely considered. For example, Bassani (2008) shows that social capital can be related to human capital to some extent. Similar to the mentioned conceptual framework, Coleman (1988) suggested that 'certain aspects of social capital could be directly linked to a child's academic success in that they provided a more supportive environment that enhanced individual levels of achievement'. Overall, for the purpose of more precise measurement of human capital as stock, it is necessary to consider relationship between human capital and other related factors such as social capital.

Fourth, the increase of human capital can rarely ensure that of social progress. Schuller (2001) refers to 'merely increasing the stock of human capital in any given society will not ensure social or economic progress'. On the reference about the limitation of human capital, the conventional measurement of human capital can slightly measure the extent of social progress. Considering that human capital should contribute to constituents' development in the normative perspective, it is essential that new additional approach of human capital measurement deliberates the aspects of social progress.

5.2. New Approach of the Measurement

On the above-mentioned demerits of conventional human capital measurement, new additional approach of the human capital measurement should be based on the following consideration; what are more precise proxies for human capital measurement with the evolving of the human capital?

To begin with, the new approach of human capital measurement partially needs to accept the conceptual framework of Human Development. Since 1990, United Nations Development Programme (UNDP) has

reported Human Development Index (HDI) investigating most of countries, measuring a country's human development and well-being (<http://hdr.undp.org/en/statistics/indices/hid>). The structure of the index is constituted to health, knowledge, and standard living with many sub-variables such as life expectancy at birth, adult literacy rate, gross enrollment ratio, and GDP per capita. Considering that the HDI index includes quality aspects, the approach of HDI focuses on all of individuals' life quality and economic situation. Furthermore, International Labour Office (ILO) tends to utilize the similar index considering the quality aspects such as the Key Indicators of the Labour Market (KILM).

Therefore, it is necessary that the advanced measurement of human capital considers the concept of 'human development', assuming that the concept of development includes both of quantitative growth and qualitative progress. With referring to the concept of human development, it is necessary that the new approach of human capital measurement needs to pay more attention to social capital. As mentioned, an individual's social capital is closely linked to his/her human capital focused on the stock of knowledge. Considering that the core of the social capital is based on the networking among constituents, it is possible that the networking component of social capital contributes to the increase of human capital owing to the characteristics of that: transportable, and shareable. The accumulation of one's human capital is easily performed through social capital. Actually, someone's level of knowledge and skills can be more improved by the networking of family, colleagues, social and constituents rather than isolated situation (Coleman, 1988). This assumption can provide an important clue in terms of understanding how human capital can play a role in social progress.

Finally, it is necessary that the new approach of human capital measurement clarifies what indicators can be considered to precisely measure more accurate human capital. It is likely that the conventional measurement of human capital utilizes proxies such as an individual's productivity. OECD presents that the measurement on human capital is closely linked to education-related factors such as high-level qualification, graduation and enrollment rates, time invested in education, and investment in education in the perspective of the human capital investment as well (Hansson, 2008). However, these proxies have to do with the possibility that human capital takes place. A new approach need to seek indicators that are more strongly related with the possibility and identify how to measure them.

6. Policy Implications

Based upon the related literature review, some implications for both public decision makers and practitioners who are interested in human capital and its measurement can be discussed as follow:

First, there is no doubt that human capital is difficult to identify and measure directly. So many researchers have used to indirect measures. As such, more accurate measurement of human capital can be accompanied with more plausible indicators as proxies. Furthermore, the concept of human capital needs to be expanded toward 'human development' with one's wellbeing on health, knowledge, and standard living. Because the conventional measurement of human capital focuses on the monetary perspective of

human capital, it neglects the importance of its non-monetary aspects such as creativity, motivation, social networks etc. Today's key feature is to emphasize the 'humanware' approach, such as reinforcing the role of knowledge creator and human relationship creator to improve overall productivity, as opposed to the 'software/hardware', which would rather focus on downsizing, restructuring, and knowledge taker. As mentioned, the non-monetary characteristic of human capital includes the possibility of creating added-values, and thus the new approach of human capital needs to consider both of monetary and non-monetary characteristic.

Second, it is necessary to seriously consider how the broaden concept of human capital should be measured on all of monetary and non-monetary characteristic of human capital. Human capital is closely linked to social capital. As mentioned, the core of social capital is the networking among constituents. The degree of one's knowledge creation and sharing depends on the variety of networks focusing on tie density, frequency, strength and so on. This characteristic can result in stronger human capital in this rising era.

Third, it is necessary to analyze the result of human capital measurement within the socio-cultural framework of a society. Because few countries are same socio-cultural framework, there are many cases that same result entails in different interpretation. In Korea, most of parents hope that their children go on to university compared to other countries. Without the consideration of socio-cultural background, it is difficult to exactly understand the status of human capital in a nation.

Fourth, it needs to build an effective and efficient database to present estimates of human capital stock and flow at all levels such as individual, organization, and/or nation. Throughout the database, policy-makers and practitioners can easily understand the current weaknesses and strengths of human capital at all levels. Through the collaboration with other nations, the gaps between 'as is' and 'to be' about human capital can be identified and then prioritizing the gaps can be decided. To do this, it needs to be standard practice for official statistical agency to include human capital in their capital stock measures.

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