

THE HUMAN CAPITAL ACCUMULATION THROUGH RENEWABLE ENERGY TERTIARY EDUCATION PROGRAMS IN KOREA

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Overview

Governmental-based HRD programs are especially needed in the renewable energy sector. A steady supply of educated labor in the renewable energy industry is important for the industry's development. However, because industrial boundaries remain nebulous and ill-defined, there exist extensive uncertainty regarding how to best optimize an individual's vocational education. As a result of the need for educated human resources, the Korean government increased its investment in producing manpower by 295% between 2005 and 2011. This investment has come in three forms: basic support, support for industries, and support for the development of advanced human resources. Despite these steps by the Korean government, their quantifiable effects have not been satisfactorily explored, and thus, remain unclear. Also, there is a marked lack of research related to the formulation and planning of relevant human resource development policy.

To redress this shortcoming, this study explores the necessity and effectiveness of renewable energy workforce policy in the realm of human capital accumulation. Specifically, this study proposes an estimated wage function for five renewable energy industries by applying a panel data analysis. From this wage function, human capital accumulation is estimated. On the basis of these findings, each mode of policy-specific accumulation of human capital is analyzed.

Methods

According to Mincer's [1] human capital theory, a laborer's wage is a compensation that an individual expects in return for the application of his/her education and industry experience in the workplace. This definition is based on the premise that productivity is a function of education and experience and an increase in productivity should result in a higher wage. Given that an individual is thought to have the freedom to invest in human capital throughout his or her life (in the form of schooling or extensive work experience), human capital is essentially a profit that is earned from making these investments. In this way, the decision as to whether an increase in future wages is worth additional investment in human capital (i.e., traditional education or on-the-job training) falls to the individual.

Human capital stock (E_t) can be defined as the total amount of human capital that can be possessed by a given individual at time t . If C_t represents the amount of investment in human capital in t time and r represents the return on human capital investment, the amount of human capital that is accumulated in E_{t+1} time can be represented as an aggregation of E_t and a profit from the investment (rC_t). Given the investment rate of the total human capital stock is defined as

$S_t = C_t / E_t$, the following formula (1) is obtained:

$$E_{t+1} = E_t + rC_t \quad (1)$$

If the natural log from the above formula is obtained, we can evaluate the difference between a return on investment through school education (r_s) and a return on investment through on-the-job experience (r_p). When depreciation of human capital is considered as in the case of common capital goods, the following wage function can be derived:

$$\begin{aligned} \ln Y_t &= \ln E_0 - \delta / r - r_s S + (r_p \alpha + a / 25)t - r_p \alpha t^2 / 60 \\ &= \beta_0 + \beta_1 S + \beta_2 t + \beta_3 t^2 \end{aligned} \quad (2)$$

To increase the reliability of the wage function estimation, a panel analysis was utilized.

Expected results

Results show that five renewable energy sources contribute to the development of an efficient labor market, which can lead individuals to enter the renewable energy industry when governmental policies are implemented. The accumulation of human capital also makes a difference with respect to policies related to the five renewable energy sources. Specifically, when the amount of financing available for each renewable energy industry is held constant, the fuel cell sector experiences the highest accumulation of human capital. In this way, human capital accumulation methods described in this study indicate the performance of government policy related to human resource development.

References

[1] Mincer, J. (1974) *Schooling, Experience, and Earnings*, Columbia University Press for the National Bureau of Economic Research, New York.