A SURVEY STUDY OF HUMAN CAPITAL AND EDUCATIONAL ATTAINMENT

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Abstract

The development of human capital is the essential thing to determine a country's growth. The existence of a country's human capital quality depends on its education. The change of information in society is going rapidly and it is important to cope up with information and knowledge to all economic process. With the role of human capital in the modern societies many people are still unaware about the process of educational production. This paper is aimed to provide the process on human capital formation and educational attainment from microeconomic perspective. The literature reviews indicate that education attainment in the society are influence by many factors namely religion, family background, teacher's quality and incentive, and the peer effects. In the empirical studies, Mincerian wage equation is the most widely used to analyze education and earnings. Besides from educational production function, to determine the quality of human capital, fiscal policy through taxation and educational subsidies have impact to the end result of students.

Keyword: *Human Capital, Education and Return to Education*

1. Introduction

The modern economy has indicated that education and human capital are the important elements. Fleischhauer (2007) highlights that developed countries are focused to have an economy that concentrates on skill-intensive in order to defend their leading position. The existence of country's human capital quality depends on its education.

There is a big difference on the education system in developed and developing countries. Provost (2014) in The Guardian reports that one in four adults in developing countries is not able to read a sentence. Moreover, the access to education is still poor and 175 million of young people lack of basic literacy skills.

The change of information in society is going rapidly hence it is important to cope up with information and knowledge that crucial for input and output of all economic process. With the role of human capital in the modern societies, many people are still unaware about the process of educational products as well as individual and collective decision with regards to how much and what kind of education to obtain.

This study is aimed to provide a better interpretation of the process on human capital formation and educational attainment from microeconomic perspective. We analyze policy instruments and institutional features that may support to increase the aggregate welfare that relates to the setting up in order to have efficiency in the educational system.
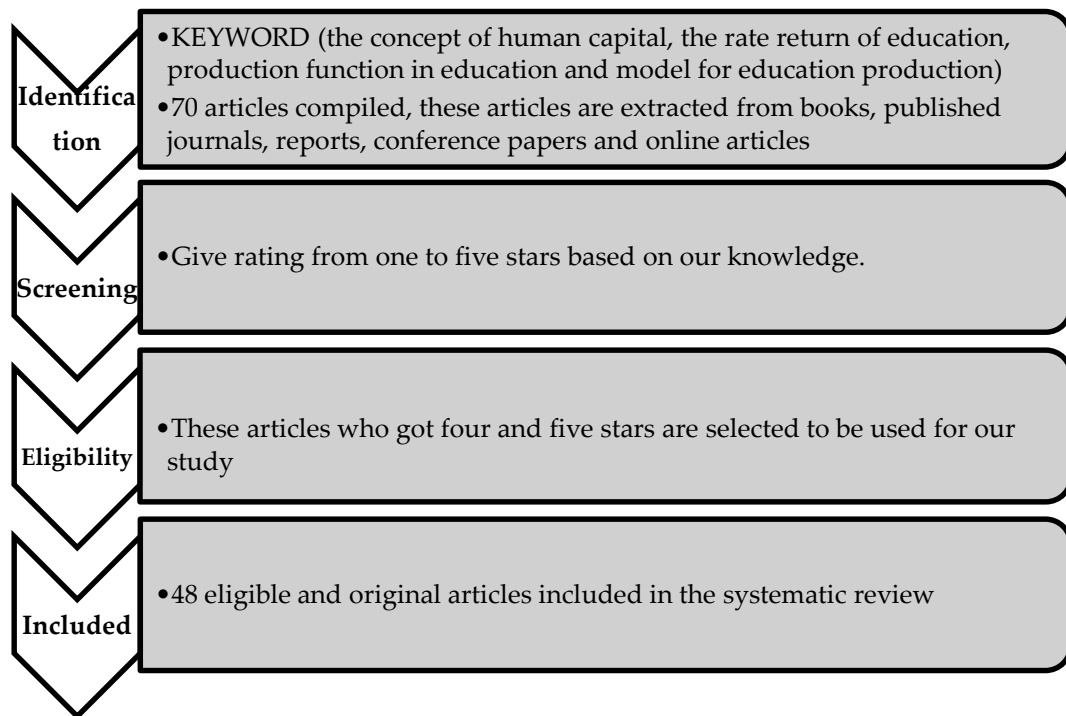
The study is structured into six sections. At the beginning of a discussion, we begin with the human capital theory. In section two the content elaborates the basic concept of human capital that model individuals who invest in skills in response to the expected returns to education. Next, we examine the rate return of education and review the previous study to get a confirmation on the theory. Section four discusses the literature on educational production function and investigate the significance of potential inputs into the process of educational production. Section five describes a model of educational production from previous studies. Section six observes the fiscal policy and human capital formation. Besides that we explain the effect on tax and education subsidies on human capital formation. Lastly, we make a conclusion on the entire sections.

2. Research Methods

Growing articles have been published in the scope of human capital and educational attainment since 1960's. The approach of this study is based on observation, online research, study analysis from journals and brainstorming with other researchers from 2016 to 2019 in the concept of human capital, the rate return of education, production function in education and model for education production. The author documents the literatures and interprets the studies to achieve the research objectives.

The process of collecting relevant articles comprises of three main steps. It begins with 70 articles, these manuscripts are extracted from books, published journals, reports, conference papers and online articles. Then in the first list, we screen and sorts them out to selects the most relevant one and rate them into list two. After that we give rating from one to five stars based on our knowledge. After reviewing and the skimming process only 48 articles are selected into list three. Lastly, we choose article based on research objectives closely related with the topic being viewed.

Flowchart of Paper Selection

Identification
- KEYWORD (the concept of human capital, the rate return of education, production function in education and model for education production)
- 70 articles compiled, these articles are extracted from books, published journals, reports, conference papers and online articles

Screening
- Give rating from one to five stars based on our knowledge.

Eligibility
- These articles who got four and five stars are selected to be used for our study

Included
- 48 eligible and original articles included in the systematic review

Source: Author

3. Result and Discussion

3.1 The Concept of Human Capital

Human being has the ability to do maximization in order to achieve something in all aspect of life. Previous studies have different meaning of human capital. However, the main thing of human capital is it cannot be transferred from one person to another person. Human capital is established through investment in education and training before or during work (Wu & Hang, 2016; Thaib, 2013). The more effort to invest in education and training, the quality of human capital enhanced in terms of productivity and income. As a result, there is an increment in earnings for a company and economic growth of a country. Previous works show that income is an indicator of market value on skill and knowledge (Alamu & Dwyer, 2017; Steen, 2004; Fleischhauer, 2007; Fahmi, 2009; Thaib, 2013)

Although the quality of human capital cannot only be judged with the level of education and the duration of training, education attainment is remained to be the main thing for workers to seek for a better job and get higher earnings. The quality of human capital consists of the ability of a human being to build a good networking that can develop innovation, transfer of knowledge and organization's capital. In the form of industry, human capital is observed as the willingness of an individual to share his or her knowledge, skill and experience in order to level up the value of a company or an organization (Kiker, 1966; Uliana et al, 2005; Baron, 2011).

Schultz (1961) mentions that expenditures on human capital is as an investment rather than consumption. While Weisbrod (1961) establishes the first conceptual framework to estimate the value of assets in the form of human capital. The capital values of human being as productive assets are associated with an analytical function of gender, age and a stock of human capital. From these theories the function of human capital is define as an investment and related with the values of a human being which associated with gender and age. The following model depicts the present value of an individual at any given age a is defined as the sum of his discounted expected future earnings Y_t (equal to the value of productivity) :

$$V(a) = \sum_{t=a}^{\infty} \frac{P_{at}}{(1+r)^{t-a}} Y_t \qquad (1)$$

In equation (1), P_{at} indicates the probability of an individual of age *a* to be alive at age *t* and *r* is the discount rate. Next section provides further explanation for human capital as an asset for future earnings or investment.

3.1.1 Investment in The Human Capital: Perfect Labor Markets

Workers receive wages that equal to their marginal product if we refer to competitive labor markets. This condition causes the firms cannot calculate investment in general skill and the implication is they refuse to pay for general training (see table 1). Acemoglu & Shimer (1999) report that this situation occurs due to incomplete contract where one party (eg. The employer) pays the costs of the investment in human capital while another party (eg. The employee) shares in the return.

As an employee, he or she has the right incentives to invest in general human capital because he or she is the sole beneficiaries of his or her increased productivity. Becker (1962) states that employees can finance such investment quite easy by accepting a wage below their productivity during the period of training. Apprentice is an example where employee often paid very low wages until they mastered a certain grade.

3.1.2 Investments in The Human Capital: Imperfect Labor Markets

The condition is different when the firm investing human capital in the imperfect labor market. In figure 1, Acemoglu & Pischke (1998) highlight a model with two periods, a training period where the workers receive identical productivity zero and an amount of general training *t* at costs *c(t)* and the later period where the workers have individual productivity *f(t)* and earn wage *w(t)*.
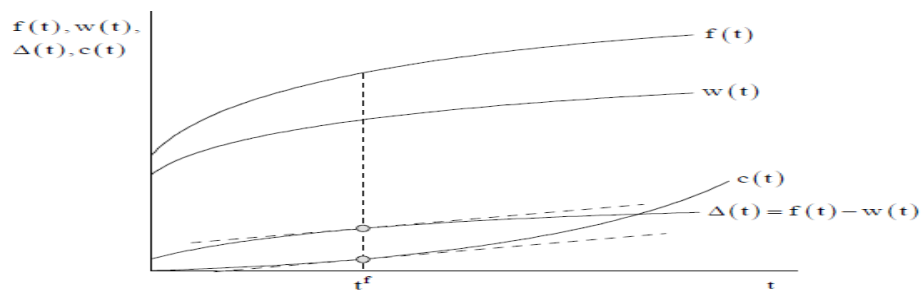
Source: (Acemoglu & Pischke, 1998)

If the condition for labor market is competitive and workers are not credit constrained then the firms do not invest in general training and workers invest efficiently by equating marginal returns and marginal costs of their investment as depicting in equation 2 where individual productivity *f(t)* equals to an amount of general training *t* at costs *c(t)*.

$$f(t^*)` = c(t^*)` \qquad (2)$$

In contrast, if the labor markets are not competitive or there are other labor markets disputed that elevate wage compression, the worker's wage is below his marginal product. If the condition where the wage structure is compressed, the general skills are turned into de facto specific skills and firms manage to skim labor market rents depend on the amount of training.

Table 1 provides a simple explanation on human capital investment in perfect and imperfect labor markets. As we can see the total investment become efficient if type of skill on human capital investment in general with the perfect labor markets and workers invest in general training while firms do not invest in general training.

Table 1. Human Capital Investment

Type of skill	Labor markets	Firms	Workers	Total Investment
General	perfect	no	yes	Efficient
General	imperfect	yes	yes	Generally inefficient
Specific	Perfect	yes	yes	Generally inefficient
Specific	Imperfect	yes	yes	Generally inefficient

Source: (Acemoglu & Pischke, 1998)

The next section we elaborate more on the rate return on education where most of the education process is discussed in microeconomic perspective.

3.2 The Rate Return of Education

The rate return to education in the economy consists of macro and micro level. In macroeconomics, the rate return of education is measured in cross-section of countries, which relate to GDP growth rate while in microeconomic perspective the level of education is gauge base on extra earnings of a worker for an additional year of schooling and training. In this study, we focus on rate return of education from microeconomics point of view that influence the amount of human capital investment at the individual level.

Several studies (see Purnastuti et al, 2012; Thaib, 2013; Wu & Hang, 2016) have defined that human capital theory stress on education that provides information and skills to enhance the productive capacities of a human being. Individual invest in education in schooling to achieve skills and productivity. These skills eventually raise the value of an employee in a firm and lead to higher wages being offered. Moreover, investment in education will provide economic growth within the country and enhancement of human quality.

Growing literature apply Mincerian wage equation to analyze the wage income as a function of schooling and experience. It is one of the most widely employed models in the empirical economics (see Wolter and Weber, 1999; Bhuller et al, 2017; Dilmaghani, 2017; Rattana-ananta, 2014; Sgobbi, 2013; Sharma & Sharma, 2017; Weng et al, 2016; Bhuller et al, 2017; Backes-Gellner et al, 2010). The following equation describes wage decomposition introduced by Mincer (1974).

$$W_i = \beta_0 + \beta_1 S_i + \beta_2 X_i + \beta_3 (X_i)^2 + \varepsilon_i \qquad (3)$$

Equation 3, W_i is define as the wage of individual i, S_i is indicate as the years of schooling, X_i is a measure of work experience and ε_i is individual disturbance term independent of β_0 and S_i. Work experience is included in the equation as quadratic term in order to capture the concavity of earnings profile. The parameter β_1 can be interpreted as the rate of return to investment in education. Past study by Harmon et al (2003) extends this original model by including dispersion in the return to schooling and treating β_i as a random coefficient. But they do not find any time trend in the mean or variance hence the deterministic Mincerian wage equation can be used. Next section we exemplify past workers who apply Mincerian wage equation in their method of analysis.

3.3 Empirical Result

The Mincerian wage equation is a log-linear transformation of an exponential function and can be analyzed with OLS (Ordinary Least Square) method. The coefficients have semi-elasticity interpretation and gauge the percentage change in W_i for absolute variations in the independent variables. Estimation in equation 3 on cross-sectional data from 1960 census in the United States, Mincer (1974) presents that an additional year of schooling result a net increase of 11.5% in annual earnings. The Mincerian wage equation is applied in many countries by using Ordinary Least Square (OLS) method.

In the scope of Europe, Backes-Gellner et al (2010) examine the rate return of

education with the labor outcome in Switzerland using the Mincerian wage equation and they found out that the occupational choice might have influence from the educational background. Hence, we can see that industry has an effect on the educational attainment. In Italy Sgobbi (2013) report that the number of under-educated employees is more than over-educated ones and the returns to required education and over-education are lower than other industrialized countries.

As the highest populated country in the world, the rates of returns on education in China have risen significantly over these years and it occurs due to the effects of institutional reforms. A study conducted by Weng et al (2016) shows that women's return on education is consistently higher compared than men. However, the scales of gender differences are different between rural and urban areas, smaller for rural area and larger for urban. While a recent study in India by Sharma & Sharma (2017) shows that over-educated workers receive lower wages compare to other workers with the same level of education who are employed in occupations for which they are adequately qualified. These studies apply Mincerian wage equation to measure the wage effects of educational mismatch.

As we can see there is a distinction between Europe and Asian region in the rate of return on education. Although Asia is described as developing countries, the number of over-educated workers is higher compared to low educated workers. The surplus of highly educated workers in Asian countries is not adequate with numbers of firms hence the over-educated workers have to bear the consequences of receiving lower wages compared to other workers. Different cases occur in Europe where the industry has developed, the demand for labor is high however the number of a low educated worker is higher than the number of highly educated workers.

3.4 Human Capital Theory and Signaling

Although the previous section has a different result on the rate return of education for developed and developing countries, the positive impact of schooling on earnings has two different perspectives. Fleischhauer (2007) reports that those perspectives comprise of human capital theory (eg. Education as productivity and enhancing activity) and signaling (eg. education as the indication of innate ability). He states that those concepts have different implications for the optimal amount of education.

Previous study by Kroch & Sjoblom (1994) distinguishes two competing theories through estimation of earnings equations that include both absolute (eg. Year) and relative (eg. Percentile) measures of education. The result shows that only years of schooling affect earnings that provide evidence for human capital theories. In the same year, Groot & Oosterbeek (1994) examine human capital theory by differentiating between actual and effective years of schooling with regards to the Dutch educational system. The finding indicates that earnings are negatively related to class skipping, positively to dropout years and neutrally to repeated years. Their study strongly supports the human capital theory.

Other study by Black & Lynch (1996) explores whether education is positively related to productivity as suggested by human capital theory. The result shows that 10% increase in average education leads to a productivity – enhancement of 8.5% in manufacturing and 12.7% in non-manufacturing consequently. While Bedard & Ferrall (2003) apply international data on test scores and wages for eleven countries and two birth cohorts and mention that the test score dispersion and wage dispersion are positively related.

Overall, these studies prove that years of schooling positively relate to earnings increment. Knowledge enhancement on human being can provide differences in their productivity.

3.5 Production Function in Education

Previous works have different ways to gauge school inputs and outputs, most

studies measure inputs as expenditure per student, religious belief, student-teacher ratios, teacher salaries, family background, peer group and individual ability. While for the output, the educational production is gauged with the test scores and high-school graduation or college attendance. The following section only discusses input in educational production which is the essential thing in educational attainment according to Fleischhauer (2007)

3.6 Input in Educational Production

3.6.1 Religion

Religion is a subject that influences attitude and activities of individuals, groups and societies. Each religion affiliation conveys their knowledge through education. Religion is a foundation for human education where it gives a deeper understanding of human necessity and motivate a man to achieve knowledge (Merriam, 1948: 140, 145). Religion also has the specific guideline that stresses on the important thing in the ethical behavior.

Jewish, Catholic and Protestant invest in human capital to get high rate return of earnings. Tomes (1985) proves that in 1980 the university graduates are an important thing for religious group in Canada namely Jewish and Christianity. This result shows that the West community is focused on developing human resources through knowledge and improve the specific skill.

3.6.2 Family Background

Previous studies indicate that educational attainment of parents, language spoken at home significantly influence the educational achievement of a child. Haveman & Wolfe (1995) show that the strong effect of parental education on children's educational success proven in their research. Other than that, Borjas (1994) finds a positive correlation between parents' skills and the skills of children in the United States. While in the previous year Rosenzweig & Wolpin (1994) state that each additional year of schooling increases the children's test scores significantly by 2.4%. Eventually, there is a positive relationship between maternal educations on human capital of their children. In brief, we can see that parents' role and skill has a big impact on their child's quality in terms of education.

3.6.3 Teacher's Quality and Incentive

Hanushek (1989) reports that differences in school quality are produced by "teacher's skills" which are not strongly related to teacher education, teaching experience, and the class size. In the other study Hanushek et al (1998) recommend that at least 7.5 % of the total variation in the student achievement can be explained by the teachers. Thus, they stress out that educational reforms should focus on improving the quality of the teacher force and it requires a new set of incentives such as selective hiring, retention and, payment.

Teachers have important role to convey a good knowledge and school material to their pupils. The quality of teachers will influence the student's quality to attain education. Hence a better management from the government and the school can impact on the teachers' quality.

3.6.4 Peer Effects

Peer effects are described as external effects by some students to others. Epple & Romano (1998) state that the peer effects can be defined as the influence of students' mean ability on school quality. While Hoxby (2000) stress on the expression of peer effect is specifying knowledge spillover, influence on the classroom standard and individual behavior such as self-discipline and disruption.

In terms of estimating peer effects problems, Manski (1993)and Rivkin (2001) report these three problems as follow :

a.   Endogeneity such as self – selection due to family income or educational

b. The simultaneous interaction of student's mutual influence, and
c. The difficulty to differentiate between peer effects by individual background and the peer effects by individual behavior.

From these three problems in estimating peer effects, Evans et al (1992) claim that there are no peer effects once endogeneity is controlled for by estimating simultaneous equations. While Aaronson (1998) and Plotnick & Hoffman (1999) employ fixed-effects models that rely on peer variation between siblings and controlling for parental characteristic and he finds there are significant peer effects while Plotnick & Hoffman (1999) do not.

Peer effect come from any kind of environment namely from family or school. Students are aware that peer effects can influence their ability in positive and negative ways. The positive way is the students can enhance their ability and the grades in the school. While the negative influence from peer effect is students might get interact with the wrong person which can end up in juvenile delinquency.

3.7 Models for Education Production

Peer effect is included in education production function by Nechyba (1996) that illustrates in the following equation for the educational achievement y_{ij} of individual *i* in peer group *j* :

$$y_{ij} = (\bar{y}_j)^\rho (e_j)^{1-\rho} \qquad (4)$$

In equation 4, ρ is the strength of peer effect. In this production function, e_j describes as the expenditure per student in group *j* , and $\bar{y}_j$ is the average educational outcome of peer group *j*.

In the economic model introduced by Blank (2009), a school produces a level of educational production according to a production technology for the school. The production technology can be represented by an isoquant. An isoquant is a set of combinations of resources that can produce a certain amount of production. The amount of educational production follows from the allocation of resources. While the maximum amount of resources that can be allocated is restricted to the school budget.

In the other study by Caucutt (2001), the study considering different levels of θ_k with n_{kj} as the fraction of ability type *k* in the peer group of *j* :

$$y_{ij} = \alpha (\theta_i)^{\beta_1} (\sum_k n_{kj}\theta_k)^{\beta_2} (e_j)^{\beta_3} \qquad (5)$$

Based in the equation 5 for production function, Caucutt (2001) and Caucutt (2001) develop a general – equilibrium model with school interpreted as clubs to a completely private system of school with voucher resulting several mixed schools with sorting according to the ability of the students and the school tuition fee.

Every model has its purpose to analyze the objective of the study. In the model for education production function, the latest study by Blank (2009) shows that technology has an important role in the school. To ease education system and convey the knowledge to students, teachers are aware of technology through the online education system.

3.8 Fiscal Policy and Human Capital Formation

The government has the role to manage resources effectively for the well-being of its people. Beside managing resources on human capital and natural resources, the government should manage its revenue and expenditure. Tax is one of fiscal policy implement by the government to subsidize the public facility such as road, education and social welfare. The following section elaborates the purpose of the

tax on the human capital formation.

3.8.1 The Effects of Taxation on Human Capital Formation

Kaplow (1994) mention that human capital should be taxed similarly to a physical or financial asset. We can see that human capital has the potential to contribute his or her knowledge for the development of a country and become the source of earnings. Kaplow (1996) also add in other study that theoretically human capital should be taxed in three ways namely at birth (eg. The present value of expected future earnings net of costs should be taxed immediately), over time (reflecting the difference between earnings and depreciation of human capital) and lastly at all moment when uncertainty resolved.

Ideally, income tax should define income uniformly as the sum of earnings from all possible sources whether it is a human capital or a financial asset. Income tax is not always feasible in reality if we analyze the effects of taxing on labor and capital income within a prevalent fiscal system.

If we relate tax with education which is one of the elements that enhances the quality of human capital, in the absence of direct costs of education there is no direct effect of a proportional income tax on the accumulation of human capital because both marginal returns and marginal costs are scaled down in the same proportion. If there are direct costs of education, an increase in the tax rate decreases the human capital investment when there is a net financial benefit before taxes is positive (Heckman et al, 1999). If we refer to their work, the net marginal effects of proportional income taxation on human capital formation may be significantly negative for three reasons. Firstly, some direct inputs into the process of human capital production are not tax-deductible. Secondly, the negative effect of taxation on labor supply reduces the return to education. And lastly, the negative effect of taxation on savings reduces the amount of physical capital.

3.8.2 The Effects of Education Subsidies on Human Capital Formation

Bovenberg & Jacobs (2005) mention that optimal education subsidies can increase efficiency in human capital formation by offsetting tax-induced distortion. Davies & Collins (2003) report that in their works the incentive on human capital accumulation depends on the net effective tax rate (NETR) that comprise of two elements, the effective tax rate (ETR) and the effective subsidy rate (ESR). There is a difference between the effective tax rate (ETR) and the effective subsidy rate (ESR). Their concept is based on the internal rate of return that determined by comparing the sum of discounted earnings with and without taxation and subsidies respectively. The following equations illustrate their concept.

$$NETR = ETR - ESR \qquad (6)$$

$$ETR = \frac{r_g - r_n}{r_n} \qquad (7)$$

$$ESR = \frac{r_g - r_p}{r_g} \qquad (8)$$

Equation 6, 7 and 8, ETR, ESR, and NETR are calculated by considering the relationship between the gross rate of return (r_g), the net rate of return (r_n) and the public rate of return (r_p). They investigate their objective in Canada and found out that the net effective rate is smaller than zero.

For the implementation of education subsidies, Dur & Teulings (2004) recommend three contributions which are 1) redistribution, 2) positive externalities of education and 3) credit constraints due to capital market imperfection. The study states that the positive external effects of higher

education are hard to establish. Another argument is given by Benabou (2002) with regards to education subsidies, the study highlights that insurance has an effect on education subsidies because subsidies to higher education make college attendance more attractive by reducing both the direct costs and the risk especially for a student with low wealth endowment. Hence, if the investment in human capital is risky and uninsurable may generate large changes in college attendance.

4. Conclusion and Recommendation

This paper is aim to provide a better understanding on the process of human capital formation and educational attainment from the microeconomics perspective. We also analyze human capital theory from the basic concept in response to investment for human capital in perfect and imperfect labor market. In the rate return of education different results shown in the empirical studies. Theories of educational attainment is not based on the reality where there is a case in developing countries where highly educated workers got paid lower which contrast with the theory that education will influence higher wages of the people.

The production function of education is examined in the input factor namely religion, family, teacher's quality and incentive, and peer effects. In the fiscal policy and human capital formation, it is essential to apply taxation on human capital. As we know human capital can be considered as an asset that produces knowledge and earn earnings. Eventually, the human capital provides wealth to a company and a country.

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