Predicting in Economic Growth based on Indicator of Education Expenditure using Historical data in Thailand*

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Abstract

The research article aims (1) To demonstrate the relationship between educational expenditure, HDI, and GDP. (2) To examine the relationship between HDI and economic growth by GDP and the causal direction between them, measuring the Human Development Index (HDI) in terms of quantity. (3) To provide policy recommendations for government to support a more sustainable education. Use quantitative research to examine the relationship between education expenditure and economic growth, employing linear regression analysis. Data Description. The study used time series annual data that spans 2007 to 2018. A total of four variables were used for the study which presents a summary of the descriptive statistics using data averaged over 2007-2018.

The result means (1) To demonstrate the relationship between educational expenditure, HDI, and GDP. that if the educational expenditure increases by 1 unit, it will increase GDP by 0.0126 units. (2) To examine the relationship between HDI and economic growth by GDP and the causal direction between them, measuring the Human Development Index (HDI) in terms of quantity. Thus, education expenditure should be considered as a vital variable, which implies that education contributed to economic growth in Thailand during the estimation period. (3) To provide policy recommendations for government to support a more sustainable education. The results may provide some insights into how the formulation and implementation of appropriate fiscal policies relating to education could help improve the quality of education and thereby contributes to economic development of Thailand. Additionally, the study may serve as a guide in the reform of Thailand's education policies leading to improved learning and educational outcomes.

Keywords: Economic Growth; Education Expenditure; GDP

*Received August 31, 2020; Revised December 15, 2020; Accepted January 3, 2022

Introduction

The expenditure of the Ministry of Education is supported by the government every year, though the amount of educational expenditure is depended on the situation of the country and policies of the government at that time. However, the influences of education on economic growth are extensively issued because of the accumulation of qualified human development, including well-being. Education is a significant factor in the country to be considered as the strong foundation that leads to development in various fields, research, sustainable development, science, technology, and innovation. Every aspect of society is linked to the base. Especially, economics might be related educational aspect. Takii and Tanaka (2009) suggested that if the government gives priority to educational resources throughout the household, the negative impact of inequality income on GDP will be reduced. However, the result of capability monitoring depended on the structure of production of economic. The study of the relationship between educational expenditure indices and economic growth has been investigated for decades (Pereira, and Aubyn, 2009; Odit, Dookhan, and Fauzel, 2010). There are several papers from various countries to study expenditures and growth. For instance, the long run economic growth can be explained by education, health, and social expenditures in Australia, while economic growth is explained largely by health and social expenditures in New Zealand (Khan, and Bashar, 2015). Khan and Bashar (2015). suggested that developing countries, ASEAN nations, especially should not neglect expenditures on education and society since their study indicated a positive link between education and social expenditures and economic growth. The more generous policy should be adopted toward well-being development (Khan, and Bashar, 2015). In Morocco and Tunisia, public expenditure on education serves to increase the GDP per capita in the ling-term relationship, but more intensively so in Morocco than in Tunisia (Ifa, and Guetat, 2018). The study of Abdellatif, Rodrigues andd Pauline (2013). show the positive relationship between the rate of economic growth, payments, and education spending in Philippine. Moreover, Islam, Wadud and Qamarullah (2007) found that there is bidirectional causality between education and GDP in Bangladesh. However, the study of Yousif (2008) indicated that the relationship between education and economic growth cannot be generalized across countries because of their different policies and institutional environment.

If we discuss about education, growth, and development, HDI will alway involve as an indicator to certify. The concept of Human Development Index (HDI) was formulated in the first Human Development Report (HDR) in 1990 and reaffirmed on the occasion of the 20th

anniversary report in 2010, identifies education as a critical component in advancing HD (UNDP, 2020). The Human Development Index (HDI) was created to point out that the national capability of the population should be the final criterion for assessing national development. The assessment of national development is not the only claimed about economic growth while HDI can debate about the priorities of policies on human capital development. In addition, HDI is a summary indicator of average success in key dimensions, including long and healthy life, knowledge, and the right standard of living. HDI score is measured as the geometric mean of the index that is normalized for each dimension. However, the Human Development Index (HDI) still cannot reflect inequality, poverty, human security, and Empowerment (UNDP, 2020). Having a high HDI is linked to a high quality of life.

Normally, developed countries share of national wealth devoted to the financing of the education sector largely. For instance, education absorbed 8.2% of the national wealth produced in Denmark and 7.6% in Sweden, while Myanmar and Cambodia devoted only 1.8% and 2.2% of their GDP to education, respectively (The World Bank Group, 2020). In Thailand, public spending on education, total (% of GDP) in Thailand was reported at 4.124 % in 2013 after that there is not any the recorded data to explain the ratio of spending on education of GDP (The World Bank Group, 2020). Moreover, the study of Cuesta and Madrigal (2014) found that education spending did not concentrate among the poorest household and increase household's welfare. This suspicion needs to be clarified in order to achieving economic development.

Education was believed as the public intervention and described in 'New Growth Theory' which can increase the expected income and higher growth of the country, and decrease poverty level (Mukherjee, 2007). Rehman, Tariq and Khan (2018) suggested that both physical and human capital are important for achieving the higher level of economic growth. Therefore, there is some remark about the relationship between educational development and economic growth in order to address suggestion for utilization of country. It is the right time to demonstrate what the important of education for growth in Thailand in order to suggest policy for country development literally.

Objectives of the research

1. To demonstrate the relationship between educational expenditure, HDI, and GDP.
2. To examine the relationship between HDI and economic growth by GDP and the

causal direction between them, measuring the Human Development Index (HDI) in terms of quantity.

3. To provide policy recommendations for government to support a more sustainable education.

Research Methodology

The purpose of the empirical analysis is to examine the relationship between education expenditure and economic growth, employing linear regression analysis.

Step 1 Researchers gathered from Books, documents, textbooks, academic documents related to Predicting in Economic Growth based on Indicator of Education Expenditure using Historical data in Thailand Data sources include documents from educational institutions of various universities. both public and private Documents from agencies, organizations and statistical data

Step 2 The study used time series annual data that spans 2007 to 2018. A total of four variables were used for the study (Table 1). The definitions and sources of each of the variables are described in Table 1 which presents a summary of the descriptive statistics using data averaged over 2007-2018.

Table 1 Data Description and Source

Variable	Definition	Data Source
GDP	Gross Domestic Product which measures economic growth	Bank of Thailand (2020)
Budget	Disbursement of Expenditure Classified by economic characteristics and ministry which measures education expenditure	Government Fiscal Management Information System. (2020).
Human	Human Development Index measures average achievement in key dimensions of human development: a long and healthy life, being knowledgeable, and having a decent standard of living.	United Nations Development Programme (UNDP). 2020
Edu Index	Education Index which combines average adult years of schooling with expected years of schooling for children, each receiving 50% weighting.	United Nations Development Programme (UNDP). 2020

These statistical concepts are illustrated by using a data set from World Economic Forum (2020); Bank of Thailand (2020); The World Bank Group (2019) between 2007-2018.

Step 3 of the empirical analysis tests for the integration of the variables that is Education Expenditure(budget), Gross Domestic Product (GDP) Human Development Index (Human). When the data were checked for normal distribution, these variables have a normal distribution which is classified under the conditions of linear regression analysis. Considering 2 forecasting trends, it is found that the data have the characteristics of an increasing trend which the form of forecasting is;

$$Y = \beta_0 + \beta_1 X$$

By Y is Dependent variable

X is independent variable

β_0 is Constant

β_1 is Regression coefficient

Step 4 the articel utilizes the technique of the vector error correction models. This is accomplished in four steps. Finally, the 2 forecasting models were compared by considering the coefficient of determination (R^2). The highest R^2 values means that the forecasting models are most suitable.

Research Results

1. Descriptive Statistics

Table 2 presents the descriptive statistics for the variables by using data averaged over 2007-2018. All the variables exhibit positive mean values. Also, the sum squared deviation row represents the net change over the sample period. The education expenditure has a larger standard deviation among all the variables

Table 2: Summary of Descriptive Statistics

	Budget (Million Baht)	**GDP (Billion Baht)**	**Human**	**Edu Index**
Mean	392377.5533	8,920.78	0.74	0.63
Median	413,464.084	9,022.450	0.732	0.626
Maximum	471570.978	10,673.700	0.765	0.665
Minimum	264109.32	7,579.500	0.710	0.607
Std. Dev.	76,171.342	1,040.990	0.018	0.020

Objective 1 To demonstrate the relationship between educational expenditure, HDI, and GDP. Model Test Result

Model 1: The Forecasting of Education Expenditure of Ministry of Education affects GDP

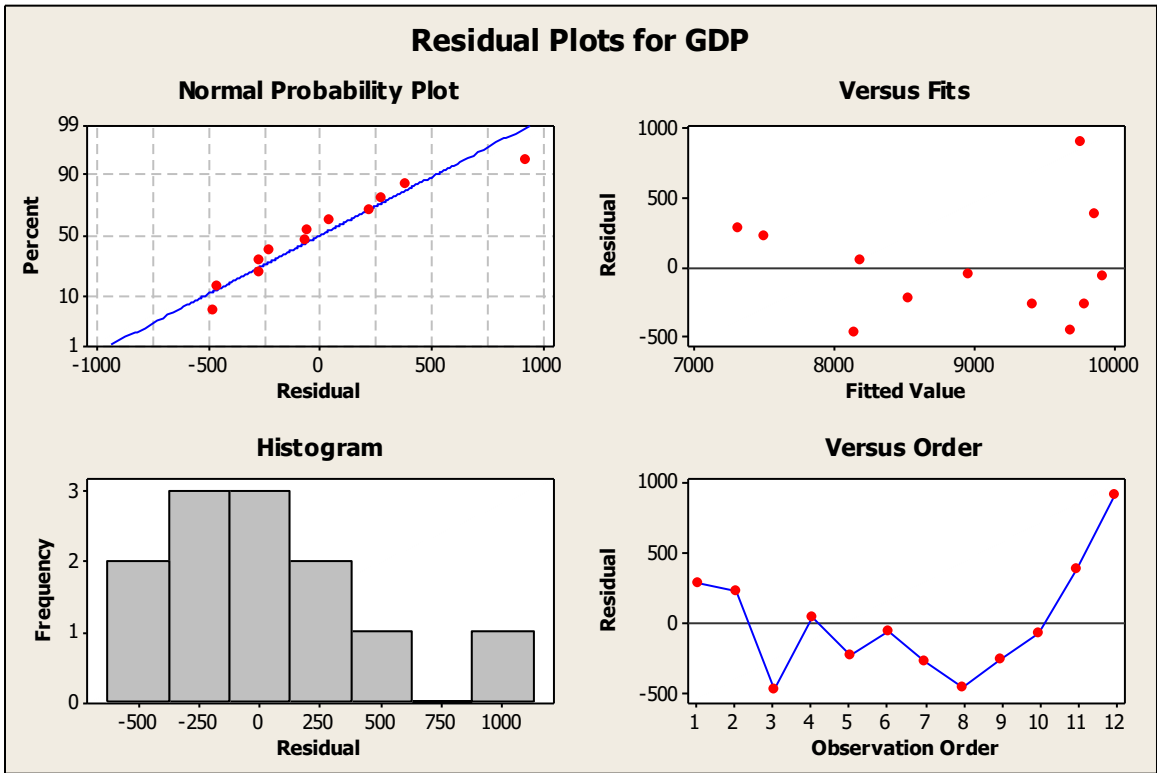

Figure 1 Normalization of data

From figure 1, the data is surrounded by straight lines that it means the forecasting data for the educational expenditure affects GDP with normal distribution. The data has also a higher forecasting trend. From the analysis of the predictive model, it is found that the equation is;

GDP = 3973 + 0.0126 budget

R^2 is 85.1 % which means the model fits the data highly. The result indicates that budget can explain the variance of GDP as 85.1%.

Model 2: The Forecasting of Educational Expenditure of Ministry of Education affects Human Development Index

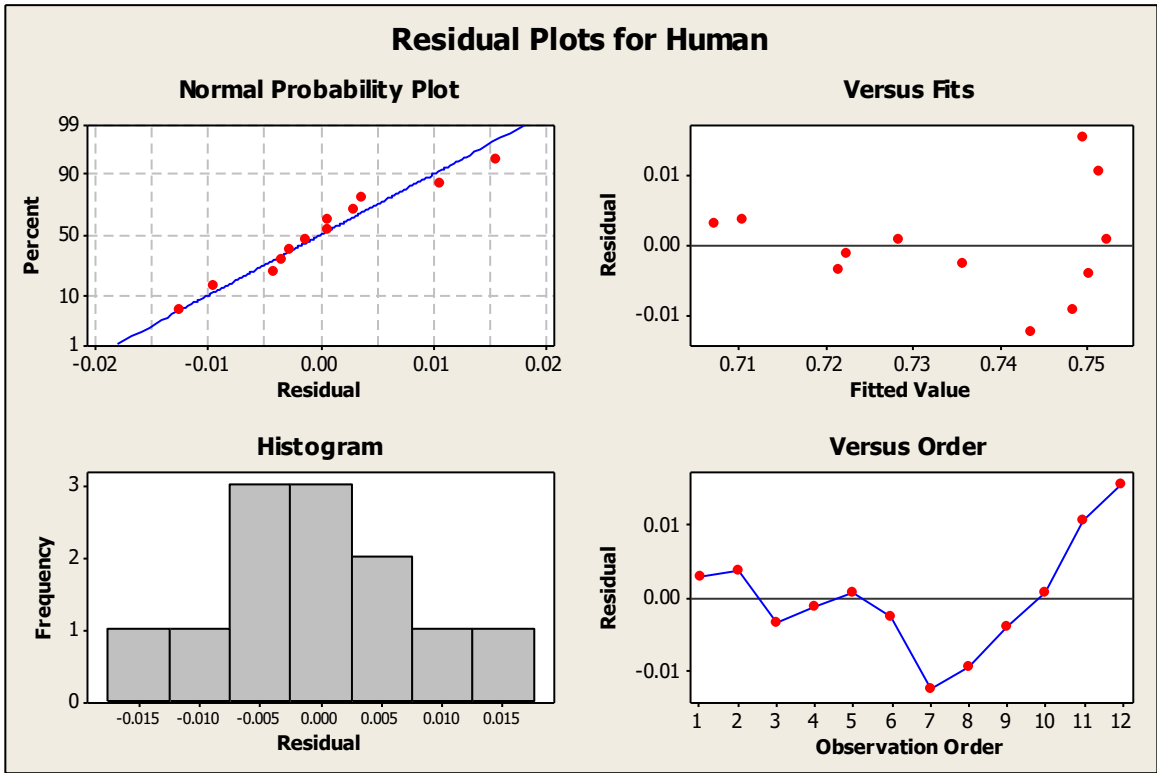

Figure 2 Normalization of Data

From figure 2, the data is surrounded by straight lines that it means the forecasting data for the educational expenditure affects Human Development Index with normal distribution. The data has also the higher forecasting trend. From the analysis of the predictive model, it is found that the equation is;

Human = 0.650 + 0.000000 budget

R^2 is 82.1% which means the model fits the data highly. The result indicates that expenditure can explain variance of Human Development Index as 82.1%.

Model 3: The Forecasting of Educational Expenditure of Ministry of Education affects Human Development Index

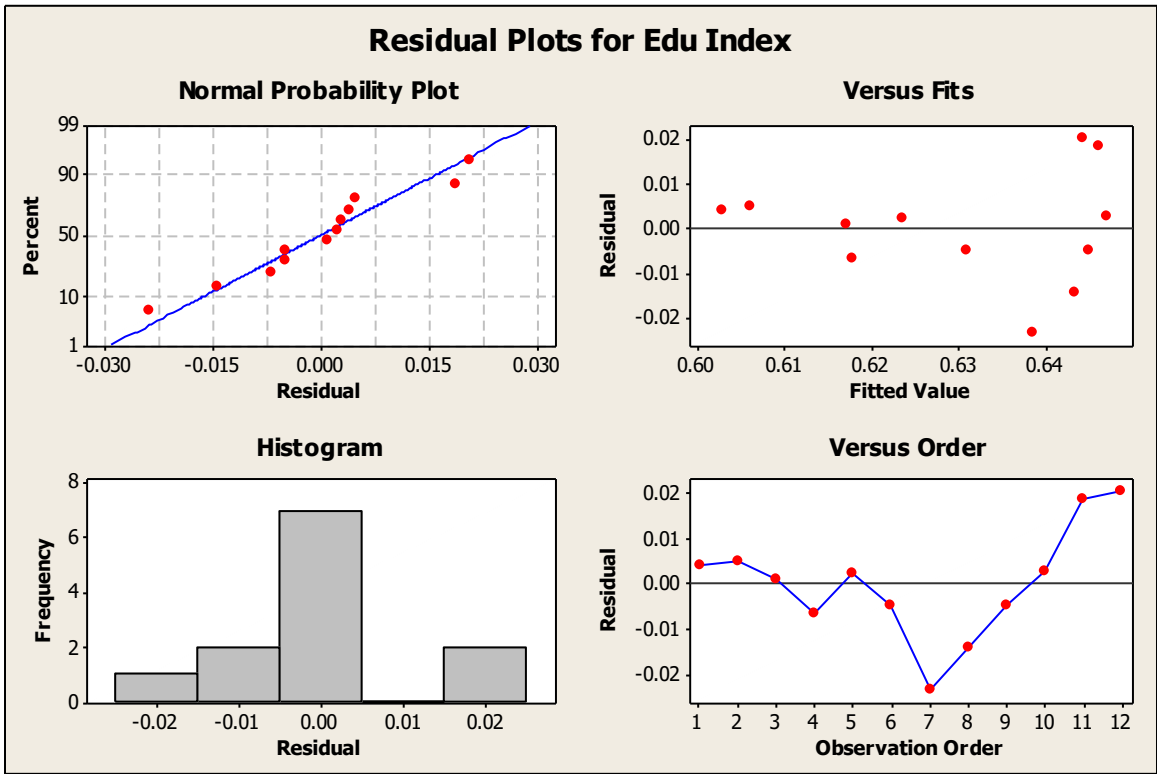

Figure 3 Normalization of Data

From figure 3, the data is surrounded by straight lines that it means the forecasting data for the educational expenditure affects Educational Index with normal distribution. The data has also the higher forecasting trend. From the analysis of the predictive model, it is found that the equation is;

Edu Index = 0.546 + 0.000000 budget

R^2 is 63.2% which means the model fits the data moderately. The result indicates that expenditure can explain variance of Educational Index as 63.2%.

Objective 2. To examine the relationship between HDI and economic growth by GDP and the causal direction between them.

Table 3 The comparative results of all model that educational expenditure affects GDP, Human Development Index, and Educational Index

Model	R^2
GDP = 3973 + 0.0126 budget	85.1 %
Human = 0.650 + 0.000000 budget	82.1 %

Edu Index = 0.546 + 0.000000 budget	63.2 %

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The results suggest that there is a significant predicting variable with all model. From table 1, the education expenditure is most suitable for predicting GDP because of the highest value of R^2. The result means that if the educational expenditure increases by 1 unit, it will increase GDP by 0.0126 units

However, the combined results of all model indicate that both GDP and Human Development Index depends on the public expenditures on education with a good result.

Objective 3. To provide policy recommendations for government to support a more sustainable education.

The governments introduce these new ideas, policies, and models into the local context to start the process of change, then quick decisions are made to solve urgent problems without sufficient regard for essential infrastructure and contextual factors. With implementation, the focus is on the adaptation of what is borrowed and the suitability of the context that will determine the speed of change. Finally, indigenization involves objectives that are examined about the existing system; absorption of external features to understand the extent to which features have been adopted; synthesis, when policy/practice becomes part of the borrower country's strategy; and evaluation, a review to determine whether a practice has been successful, which can lead to the start of the process again. If the majority of the country's population are well educated, the country will be able to develop its economy as well.

The new body of knowledge

Predicting in Economic Growth based on Indicator of Education Expenditure using Historical data in Thailand found that education contributed to economic growth in Thailand during the forecast period. The findings have important policy implications for Thailand due to the economic uncertainty that affects all aspects of human activities in society, especially education. The conclusions drawn from this analysis may be helpful for education policymakers to invest in education. In particular, there is an incentive for the government to increase public expenditure on education. because it causes the economy to grow.

Discussion

1. In this paper we examined the best model for predicting education and economic growth in Thailand covering the period from 2007 to 2018, using linear regression analysis. The empirical result suggests the best model to predict in economic growth based on indicators of education expenditure over the period 2007-2018 that the education expenditure is most suitable for predicting GDP. Thus, education expenditure should be considered as a vital variable, which implies that education contributed to economic growth in Thailand during the estimation period.

Importance of education for economic development was first spotted by father of economics, Adam Smith (Evensky, 2015). Adam Smith represented the idea of specialization of labor. According to Smith, the amount of annual products of a nation depends on two factors: the amount of labor employed in the production and productivity of labor. According to Smith, the first factor is of lesser importance than the other factors, as can be seen from the fact that people in earlier times lived much poorer than modern people, even though the percentage of the employed labor was much higher. Smith primarily indicates the importance of the division of labor, as well as first-rate factor increase in national wealth.

2. Educational, political, or social and economic relationships are characterized by inseparable relationships. Politics, economy and education are important factors for development of the country. Investing in education will play vital improvement of the country sustainability. As discussed above, policy instruments are based on the direct regulatory approach. Taking the results of this study into account as well as people's well-being, education expenditure should be considered as a vital variable, which implies that education contributed to economic growth in Thailand. I make the following policy recommendations which the government should support sincerely for a sustainable growth in Thailand by starting with educational investment:

1) Design an effective information and education program in the rural communities to enhance public education and contribute to more effective education access in the future. Educational disparities still make Thailand has high-skilled labor which is less than standard, while developing country requires skilled or highly skilled workforce. According to Lorenzo (2008) explained "Access to natural resources is broadly defined here as the processes by which people, individually or collectively, are able to use natural resources, whether on a temporary or permanent basis" (p.9) as well as education is based resource which the citizen is able to have. The people should have opportunity equality in educational foundation.

The development of the existent knowledge system would prove a useful educational tool. The education programs must educate student democratically, furthermore, the education programs recognizing the ways in which their practices contribute to the sustainable growth. At the local level, governments should promote education in schools, local communities, and through civic organizations. Therefore, the education in Thailand should be supported from government in funding, resource, and experienced staff seriously. Nowadays, technology make the people live more easily and media technology has influenced operation even in education for a few year ago. Public media can access to people easily, therefore, knowledge was disseminated widely via public media. For example, government should provide funding for television programs about educational production. Moreover, the government should provide funding for educational institutes that provide education program.

2) Making available financial assistance helps student to provide an incentive to try something new. Educational finance is strategically important for eradicating extreme poverty and boosting shared prosperity. However, government policies from the past to the present do not solve long-term problems but it solves the problem at that time in the era of each government. Though Student Loan Fund has been assisted many students, the fund does not cover living cost during studying. The government should also launch policy about finance strategies and enhancing access to suitable financial services to student, particularly poor student in backcountry. For example, the government supports loan program with low interest rate or no interest for poor student in backcountry or rural. The long term loan is an interesting policy that the government should support in order to reduce the debt burden of student.

3. To establish transparent farm management policies identify the full economic, environmental and social costs and benefits in education, and any associated transfers between educational institution and student. The educational institution plays vital role in human capital. According to OECD (2012) stated that the skills available in the labour force and the price of those skills from human capital development determine how countries will fare in the global market. As services and production systems become more complex, they require workers with higher levels of education. In order to attract and retain skilled workers, it is important for societies to strike the right balance between fostering overall equity and offering strong economic incentives. Increasing attainment levels in the population, better employment prospects and the increasing earnings that come with higher educational attainment can all contribute to growth and prosperity in OECD countries. In this context, labour income growth in GDP by educational categories provides a simple measure to illustrate

this move towards higher skills and the impact it has on economic growth. People should receive a thorough education in order to be well-being and meaningful life. The increasing educational budget has resulted in the increasing accessibility of the school-age population, especially at the elementary and middle school levels.

In a study of predicting in economic growth based on indicator of education expenditure using historical data in Thailand indicated that education are important factors for economic growth development of the country. Furthermore, education will lead to sustainability in every aspect in society. As an analytical framework, these two key stages can be further broken down into distinct stages, as based on Phillips and Ochs (2003). These authors describe a circular and sequential model as a process of four stages of educational improvement, as illustrated in Figure 4.

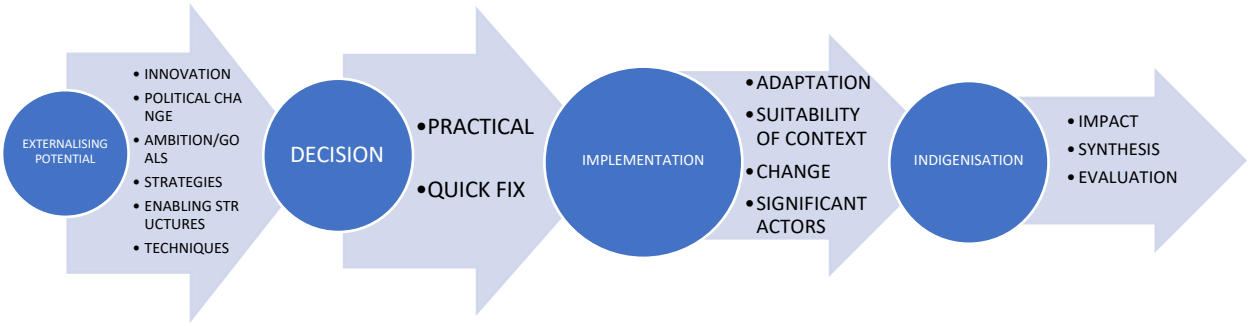

Figure 4 An indicative framework for education quality

From figure 4, Externalizing potential can be direction to solve problems. The externalizing potentials are the 'borrowable' elements from an educational system, including guiding philosophy, ambitions/goals, strategies, enabling structures, processes and techniques. Secondly, the decision stage, indicates when educational systems decide to change and refers to the ways in which governments introduce these new ideas, policies and models into the local context to start the process of change, then quick decisions made to solve urgent problems without sufficient regard for essential infrastructure and contextual factors. With implementation, the focus is on the adaptation of what is borrowed and the suitability of the context that will determine the speed of change. Finally, indigenization involves objectives that are examined in relation to the existing system; absorption of external features to understand the extent to which features have been adopted; synthesis, when policy/practice becomes part of the borrower country's strategy; and evaluation, a review to determine whether practice has been successful, which can lead to the start of the process again.

If the majority of the country's population are well educated, the country will be able to develop economy as well. Because it is quite clear that most developed countries have good education system, they are able to create new technologies with added value. While the poor countries are not efficient in terms of education statistically. Therefore, education is one of the most important matters and deserves a great investment because it will enable people to lead a good, meaningful, and complete citizenship.

Conclusion

In this paper we examined the best model for predicting education and economic growth in Thailand covering the period from 2007 to 2018, using linear regression analysis. The empirical result suggests that the best model to predict in economic growth based on indicators of education expenditure over the period 2007-2018. Thus, education expenditure should be considered as a vital variable, which implies that education contributed to economic growth in Thailand during the estimation period. The findings have important policy implications for Thailand because of the economic uncertainty, which affects every aspect of human activity in society, especially education. Conclusions drawn from this analysis could be useful for educational policy makers to invest in education. Specifically, there is a motivation for the government to increase the public expenditures on education, since that cause economic growth. At the present day, people are really studying more than they can use in their real work life. Most are continuing to study especially university education which will cause distortion of the structure of education and the labor market in the country.

Suggestion

1. The suggestions from the research

From the research result of the 1st objective, it was found that the best model to predict in economic growth based on indicators of education expenditure. Therefore, the related institute should consider education expenditure as a vital variable for developing country sustainability. the findings have important policy implications for Thailand because of the economic uncertainty, which affects every aspect of human activity in society, especially education.

From the research result of the 2nd objective, it was found that conclusions drawn from this analysis could be useful for educational policy makers to invest in education.

Therefore, there is, specifically, a motivation for the government to increase the public expenditures on education, since that cause economic growth.

From the research result of the 3rd objective, it was found that Policy on financial supporting for education need to be addressed by the government in form of expenditure and improving in human capital. Therefore, the related institute should concentrate on policy of well-being of education which should be implemented immediately. Any student can approach education in term of creating quality of human capital in sustainable future.

2. The suggestions for future research

The future research should involve the following issues:

2.1 In the further research, the study can be extended to include quality of education variables to assess how these measures have influenced the labor force and thereby its impact on economic development in Thailand.

2.2 Furthermore, future study could assess which specific variable of education contributes mostly to economic growth. This will enable policymakers to direct resources towards which variable of education contributes less to the economic development.

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