Does Education Increase Labor Productivity? An Evidence from Indonesia during Reform Era

Rizqon Halal SyahAji, Syarif Hidayatullah State Islamic University Jakarta,Indonesia
rizqon.halal@uinjkt.ac.id
IshakYussof, National University of Malaysia, Malaysia
Mohd Nasir Mohd Saukani, National University of Malaysia, Malaysia
Roziana Baharin, National University of Malaysia, Malaysia

Abstract:
This research investigates the effect of education on labor productivity in Indonesia, after the establishment of new education budget policies in the reform era. The focus of this study aims to measure the significance of the influence of primary, secondary and tertiary education variables on labor productivity. The data source in this study is panel data covering 34 provinces in Indonesia and time-series data from 2015 to 2018. Through the econometric approach of the fixed-effect model, the objective of this research is to observe whether it is true that education increases labor productivity in Indonesia. Therefore, the null hypothesis built is that education in Indonesia does not affect the level of labor productivity. The results showed that the level of primary, secondary and tertiary education had a strong and significant positive effect on increasing labor productivity in Indonesia, so the null hypothesis was rejected. However tertiary education has a lower influence than primary and secondary education. The increase in the education budget introduced by the government has been able to prove an equal distribution of education at every level in each province, thereby affecting the productivity of the Indonesian workforce. This study recommends that the Indonesian government focus its attention on tertiary education and keep improving the quality of education at this level so that the workforce capabilities of tertiary-institution graduates are able to increase and the graduates can compete in the labor market with reliable productivity and can be evenly distributed in each province as well as be able to meet labor market standards.

Keywords: *education, labor productivity, panel data analysis, reform, Indonesia.*

I. INTRODUCTION

Indonesia as a densely populated country has realised the important role of human capital in a country. The important role of human capital through education is a key factor in increasing productivity in Indonesia. Competition of productive labor forces Indonesia to prepare human capital with reliable productivity qualifications. This burden unavoidably falls on education in Indonesia. This means that Indonesian education must be able to provide workers who are able to compete in the labor market both in national and international scope.

Provision of a productive workforce requires Indonesia to respond to global challenges in education investment. Responses to these conditions are proven by amending article 31 of the Indonesian constitution which covers the field of education. These efforts encourage the role of education to be more progressive in producing productive workforce candidates required by the labor market. This step is the answer to the latest labor productivity needs. It is clear that Indonesia's efforts to increase participation and quality of education to supply productivity growth are the backbone of the short-term and long-term economy. This important role has been based on theories presented by [3,9,11,14, 22, 26]. The level of labor productivity resulting from education investment can be identified through the extent of

the competitiveness of Indonesian workers compared to foreign workers. Wages received by workers are indicators of productivity because high wages of the workers can contribute greatly to national income. Likewise, GDP is also an indicator of labor productivity. All of those can then be returned to increase education investment.

Educational Investment in Indonesia

Educational investment is the amount of expenditure in improving education. [13, 22] emphasise that formal and informal education is an investment in human capital because it can directly increase labor productivity and have a positive impact on increasing wages and welfare. The fundamental effort undertaken by Indonesia to increase the cost of education investment is a necessity to increase the participation and the quality of education increase. The constitutional order was clearly implemented by the Indonesian government. The realisation of this is a budget allocation of 20 per cent of the total national expenditure. Following are the development of the education budget since the process of commencement of the implementation of the constitutional order;listed on the Indonesia Stock Exchange.
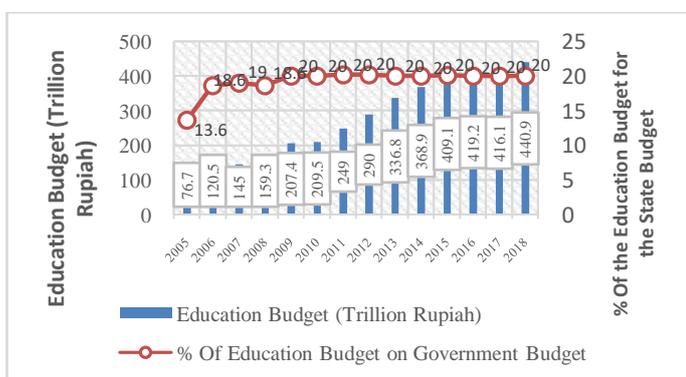

Figure 1. Education Budget**.** Number of Education Budgets and Percentage of Education Budget against government budget, 2005-2018
Source: National Planning Institution (Bapennas RI), 2018

The development of an increased education budget is expected to be able to equalize increasing

participation and especially the quality of education in all provinces in Indonesia. In line with this, it is necessary to look at benchmarks for the quality of human resources through the Human Development Index (HDI), the extent of Indonesia's condition compared to some ASEAN countries. Table 1 explains the Ranking of Human development Index in 2018.

Table 1. Human Development Index (HDI) Ranking in ASEAN Year 2018

Country	HDI value	HDI rank	[a]Expected years of schooling	[b]Mean years of schooling
Singapore	0.932	9	16.2	11.5
Brunei Darussalam	0.853	39	14.5	9.1
Malaysia	0.802	57	13.7	10.2
Thailand	0.755	83	14.7	7.6
Philippine	0.699	113	12.6	9.3
Indonesia	0.694	116	12.8	8
Viet Nam	0.694	116	12.7	8.2
Laos	0.601	139	11.2	5.2
Cambodia	0.582	146	11.7	4.8
Myanmar	0.578	148	10	4.9

Note: Data is based on the United Nation Development Program (UNDP).
[a]HLS (range of school year): Duration of preschool (year) of children of a certain age. HLS is used to determine the development process of the educational system at various levels. In Indonesia, HLS is estimated to be from the age of 7 years on the basis of government policy known as compulsory education programs.
[b]RLS (Average School Length): The number of years a resident has received formal education.
Source: Central Statistics Agency of Indonesia (BPS), 2018

The development of the education budget has not yet looked positive on the human development index. Increasing the amount of public investment for education which has been running for more than ten years has not yet put Indonesia at the 116th rank, far below Singapore, Brunei, Malaysia, and Thailand.

This indicates clearly that Indonesian education is still unable to result in productive workforces.

Indonesian Labor Productivity

Productivity is an important factor in a country's economic growth indicator. Productivity indicators can wage proxy, GDP or with Total Productivity Factor (TFP). High TFP growth in a country will provide benefits such as producing better quality products, providing better services, lower costs, higher consumer satisfaction and achieving sustainable economic growth. The level of labor productivity in Indonesia is a reflection of its economic growth. We can see the position of Indonesian labor productivity in terms of per-worker labor productivity. This unit is defined as GDP with a constant base price per worker. Table 2 shows the productivity figures per worker.

Table 2. Comparison of Labor Productivity Figures in ASEAN and 3 Selected Countries,
2004-2016

Year	ASEAN	Indonesia	Thailand	Malaysia
2004-2005	4.69	5.29	3.45	6.28
2005-2006	4.13	3.77	3.82	2.90
2006-2007	2.96	1.58	3.21	3.50
2007-2008	2.09	3.26	-0.11	3.55
2008-2009	-0.29	2.30	-1.95	-3.84
2009-2010	5.13	2.90	-6.45	1.53
2010-2011	2.54	4.65	-0.63	1.42
2011-2012	3.68	4.83	6.46	1.37
2012-2013	3.20	3.65	3.13	-1.21
2013-2014	3.56	3.25	3.56	3.68
2014-2015	5.30	4.59	2.71	3.25
2015-2016	1.89	0.89	5.60	3.48

Source: APO, 2019

A description of educational investment measured by the number of school enrolments in all regions in Indonesia and the level of labor productivity is the focus of this study. Increasing education expenditure is expected to increase education quality in a country. Better education will increase labor productivity, as a driver for economic growth [15]. The question in this research is "what is the effect of increasing the quality of education on labor productivity in Indonesia?" This research is very important to do in Indonesia because rarely do previous researches address this problem. The hypothesis of this research is that education does not affect labor productivity in Indonesia. Therefore, the objective of the research is to explain the empirical findings of the influence of education on increasing labor productivity in the reform era. The writing section afterward will outline the literature review, data sources and methodology, empirical results discussion and finally the conclusions and recommendations section.

II. RELATED LITERATURE

There have been many studies that examine the relationship of education with productivity in several countries, but the research that examines this problem in Indonesia is still few. Below are outlined some of the existing literature on the study of this problem. The literature review related to this article refers [1] which explains that the contribution of human capital shown through the proportion of skilled workers and the average education in East Africa, positively influences labor productivity. Then other studies that examine the level of education and productivity can be seen from the results of the study of (18), which examines the effect of the human capital stock in European countries on labor productivity. The results obtained in this study indicate a strong correlation between labor productivity and the availability of human capital stock through the achievement of worker education.

Another study covering the issue has also been carried out in Malaysia by [2]. The research involving data for all countries in Malaysia states that higher levels of education have positively and significantly increased the level of labor productivity in Malaysia. Relevant to the study of [4] conducting research in Israel suggested that higher level of education affected the productivity of sector labor which can be traded with evidence of the amount of wages received by each worker. In another study,

which also examined the effect of education on productivity was carried out in Poland by [17]. The study looked at the effect of the level of education of agricultural managers on total productivity factors on a farm in Poland. The results of the study indicate that farm groups that have managers with higher education result in a positive effect on the average productivity of livestock products.

In Egypt, research conducted by [19] explains that labor productivity through Total Productivity Factors as its proxy is significantly influenced by higher education. The same thing was stated by [16] who examined ASEAN countries and three other selected countries, namely Malaysia, Singapore, Thailand, Indonesia, Philippines, Cambodia, Viet Nam, China, South Korea, and Japan. The study provides an explanation that the influence of human capital, average school year and the ratio of skilled workers have a significant effect on the long-term growth of Total Productivity Factors. All researches have proved that education influences the level of productivity.

III.   METHOD

This study focuses on panel data in 2015, 2016, 2017 and 2018 (T = 4 years). Data involves selected variables such as school registration data as a proxy for education and GRDP per capita in rupiah at the current value as a proxy for productivity. Data sourced from the Indonesian Central Statistics Agency for all provinces (N = 34 provinces) in the reform period included the presence of a new province, North Kalimantan. Hence, the total observation is 134 which are from (34 x 4 = 134). This study conducts an empirical analysis on the following variables, namely the real Regional Gross Domestic Product (GRDP) per worker in each province in Indonesia and school enrolment rates for primary, secondary and tertiary education. The composition of three educational proxies namely; (i) primary education (the ratio of enrolment in primary education in all genders, primary education is the ratio of education at the elementary and junior high school (ii) secondary education / secondary

education (ratio of enrolment of students in senior high school in all genders) and (iii) tertiary education (student enrolment ratio in tertiary institutions) Table 3 below provides a description of the statistical description of the research variables used.

Table 3. Statistical Descriptions of the Data

Variable	Average (2015-2018) Values			
	Mean	Std Dev	Min	Max
Labor Productivity (Thousand) (GDP) Regional/L	391,203.2	561,187.6	26,638	2,600,000
Primary Qualification (per cent) (PE)	94.8	3.62	78.14	99.72
Secondary Qualification (per cent) (SE)	73.6	5.99	61.96	88.39
Tertiary Qualification (per cent) (TE)	29.9	7.09	12.73	56.81

Variable	Mean Values by Year			
	2015	2016	2017	2018
Labor Productivity (Thousand) (GDP) Regional/L	342,726.09	372,350.79	406,616.32	443,119.71

Primary Qualification (per cent) (PE)	94.43	94.62	95.02	95.14
Secondary Qualification (per cent) (SE)	73.08	73.44	73.89	74.34
Tertiary Qualification (per cent) (TE)	25.06	25.86	26.77	30.3

Model of Specifications

The model in this study refers to the theory of [9, 20]which explain the effect of human capital on labor productivity. To estimate the effect of human capital on productivity, the Cobb-Douglas function is used, so that it can be interpreted directly. Many have used the model such as [1, 2, 5, 25]. The simple Cobb-Douglas production function can be stated as

$$Y_t = AK_t^\alpha L_t^\beta \quad (1)$$

It is explained that K is the stock of physical capital, L is the amount of labor and $\alpha + \beta = 1$, while A is the efficiency parameter and t is time. From the model, it is then developed into estimates in this study;

$$\ln\left(\frac{GDP_{it}}{L_{it}}\right) = \beta_0 + \beta_1\ln(PE_{it}) + \beta_2\ln(SE_{it}) + \beta_3\ln(TE_{it}) + e_{it} \quad (2)$$

GDP / L is the regional Gross Domestic Product per worker. PE is the number of workers with primary education, SE is the number of workers with secondary education and TE is the number of workers with tertiary education. Subscripts i indicate the number of states (i = 1, 2, ... N) and t indicates the number of years (t = 1, 2, ... T).

IV. RESULT

Descriptive statistics in table 3 illustrate the statistical values for the data used in this study. The table emphasizes the explanation that the average labor productivity in Indonesia is Rp. 391,203,200. Labor productivity during the last four years, especially in the period of President Joko Widodo's leadership has continued to increase. This condition can be caused by a large influx of investments from abroad such as from China and Saudi Arabia. The condition of productivity is in line with the increase in education enrolment at every level. This is evidence that an increase in the education budget by 20 per cent follows a large amount of the total state budget and the total regional budget that has been implemented.

Then, econometrically, the results of data processing that is shown in table 4 estimate the procedure for estimating the Fixed Effect Model. Through the classic assumption test, all tests have fulfilled BLUE (Best Linear Unbias Estimator), both normality (P = 0.2065> 0.05), autocorrelation (each variable has a correlation coefficient < 0.8), heteroscedasticity (all variables have a probability> 0.05) and non-collonierity (Durbin-Watson value (1.9248) >dU(1.6584) or dL(1.7702) at degrees k = 4 and n = 134), so that the conditions of all classical assumptions have been met. Analysis result of the model in the specification equation (2) and illustration of labor productivity in Indonesia has been shown in table 4, where labor productivity in Indonesia is affected by educational enrolment at all levels.

Table 4. Estimation Result

ln (GNP Regional /L) as the Dependent Variable

Variable	Coefficient
Constant	-36.03***
(Std Error)	(4.716)
lnPE	6.169***
(Std Error)	(1.011)
lnSE	4.242***
(Std Error)	(0.525)

lnTE	0.578***
(Std Error)	(0.061)
Log likelihood	259.805
Prob (F-statistic)	0.000

Note:*** significant at level 1%.

Based on table 4, the positive significant effect of primary education is 6.16 per cent on the productivity of Indonesian labor. Estimates in this study indicate that the labor market supply for primary education is still dominant compared to secondary education (4.24 percent) and tertiary (0.578 percent). Decreasing elasticity occurs at each level of education. The effect will be on labor productivity when looking at the regression coefficients. The results of data analysis in table 4 above show that the null hypothesis which says that education does not affect labor productivity in Indonesia is rejected. This fact shows that the performance of the government in the reform era under the leadership of President Joko Widodo was able to streamline the education budget as a driver of increasing labor productivity. This study is relevant to the situation in East Africa described by [6, 7, 8, 10,12, 27] The findings in this study differ from the findings of a study conducted by who looked at education in Indonesia with time series data from 1984-2014, which explained that various levels of education in Indonesia failed to find a significant effect on economic growth in Indonesia.

V. CONCLUSION

This study investigates the effect of specific human capital with various educational attainments on labor productivity in Indonesia. Based on the latest data in the reform era and an analysis conducted by using panel data with the FE model, it was reported that all levels of education had a significant positive impact on increasing labor productivity in Indonesia. However, the influence of higher education has not been as strong as that of primary and secondary education. In order for the Indonesian workforce to be more competitive at the tertiary level of education, the government needs to

encourage improvement in the quality of tertiary education and make it a priority when spending the 20 percent education budged. Government spending in each province must be used efficiently to ensure that tertiary education meets national and international quality standards. This research recommends that the Indonesian government continue to maintain the equitable distribution of the education budget in each province for the needs of primary education, secondary education, and tertiary education. Especially for tertiary education, extra handling of education quality is needed so that labor produced from the education process is able to compete in the national and international labor market and the government should make efforts to inhibit the flow of foreign workers into Indonesia, to provide opportunities for college graduates to increase productivity.

REFERENCES

1. N. Aggrey, L. Eliab, and S. Joseph, "Human capital and labor productivity in East African manufacturing firms." Current Research Journal of Economic Theory, 2(2), 48–54, 2010.
2. M. N. M, Arshad, and Z. A. Malik, "Quality of Human Capital and Labor Productivity: a Case of Malaysia," International Journal of Economics, Management and Accounting, 23(1), 37–55, 2015.
3. G. S. Becker, "A Theory of the Allocation of Time," The Economic Journal, 75(299), 493, 1965.
4. E. S. Brezis, and G. Brand, "The Effects of Education on Labor Productivity: Differences between tradable and non-tradable industries," preliminary version, 2016.
5. O. Essardi, and R. Razzouk, "Human Capital and Economic Growth in Morocco: Evidence from Bayesian Model Averaging," International Business Research, 10(12), 167, 2017
6. M. Forbes, "The Effects of Education and

Health on Wages and Productivity," Staf Working, Australian Goverment, productivity Commision 2010, ISBN 978--1-74037-309-8

7. A. de la Fuente, "Human Capital and Productivity," 52 Suppl Graduate School of Economics Barcelona 901–907, 2011.

8. K. S. Chakraborty, R. Krishnankutty, "Education and Economic Growth in India," Economic Policy, (2116), 0–33, 2012.

9. R. E. Lucas, "On the mechanics of economic development" Journal of Monetary Economics, 22(1), 3–42, 1988.

10. B. Maitra, "Investment in Human Capital and Economic Growth in Singapore," Global Business Review, 17(2), 425–437, 2016.

11. G. N. Mankiw, D. Romer, and D. N. Weil, "A Contribution To the Empirics of Economic Growth," The Quarterly Journal of Economics, 107(2), 407–437, 1992.

12. D. Mendy, "Do Education Levels Matter on Indonesian Economic Growth" Economics & Sociology, 11(3), 133–146, 2018.

13. M. P. Todaro and S. C. Smith, "Pembangunan Ekonomi Ed.1, (11th ed.; N. I. S. AdiMalulana, ed.). Retrieved from www.erlangga.co.id. Indonesia, 2009.

14. J. A. Mincer, "Schooling, Experience, and Earning," Columbia Univesity Press, pp. 1–4, 1974.

15. E. W. Nafziger, "Economic Develpoment," Cambridge University Press, 2012 ISBN 978-0-521-76548-0.

16. NoorazeelaZainolAbidin, IshakYussof, Rahmah Ismail, Z. A. karim. (2018). Pengaruh Modal ManusiaTerhadapPertumbuhanProduktivitiF aktorKeseluruhan di Negara ASEAN + 3 Terpilih. JurnalEkonomi Malaysia, 52(3), 55–70.

17. Nowak, A., &Kijek, T. (2016). The effect of human capital on labor productivity of farms in Poland. Studies in Agricultural Economics, 118(1), 16–21.

18. Olimpia, N. (2013). Human Capital: Cause And Effect Of The Economic Growth. An Empirical Analysis. Annals of Faculty of Economics.

19. Qutb, R. (2017). How Education does at all Levels Influence Total Factors Productivity Growth ? International Research Journal of Finance and Economics, (159).

20. Romer, P. 11, Barro, R., Becker, G., King, R., Krugman, P., Meltzer, A., … Poterba, J. (1989). Nber Working Paper Seri Human Capital And Growth: Theory And Evidence. (3173).

21. Romer, P. M. (1990). Endogenous Technological Change. Journal of Political Economy, 98(5), S71-102.

22. Schultz, T. P. (1988). Education Investmen and Return. In H. C. and T. N. Srinivasan (Ed.), Handbook of Development Economics: Vol. I. Elsivier Science Publisher.

23. Schultz, T. W. (1961). Investment Human Capital. The American Economic Review, 51(1), 1–17.

24. Stokey, N. L. (1988). Learning by Doing and the Introduction of New Goods. Journal of Political Economy, 96(4), 701–717.

25. Vinayagathasan, S. V. T. (2015). Dynamic Relationship between Human Capital and Economic Growth in Sri Lanka: A Co-Integration Analysis. Growth, 2(2), 20–29.

26. Welch, F. (1964). Education in Production. Journal of Political Economy, (1960), 35–59.

27. Widyastuti, A. (2012). Analisishubunganantaraproduktivitaspekerja dantingkatpendidikanpekerjaterhadapkesejah teraankeluarga di jawatengahtahun 2009. Economics Development Analysis Journal Ekonomi Pembangunan, FakultasEkonomi,, UNS, 1(2), 2252–6560.