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HUMAN CAPITAL INVESTMENT ON INDUSTRIAL PRODUCTIVITY IN INDONESIA

Faisol* and Suhardi

Faculty of Economics, University of Nusantara PGRI Kediri
** Corresponding author. Tel.: +62-812-5933-217;* E-mail address: *faisol@unpkediri.ac.id*

ABSTRACT

The manufacturing industry is the largest sector in contributing to GDP in Indonesia. In the last four years showed that although the amount of output of manufacturing industry sector from year to year tends to increase, but the problem when viewed from the empirical data percentage of growth in the contribution of the manufacturing sector in Indonesia tend to be decreased. In long term is expected to increase the effectiveness of human resources, which in turn will lead to greater corporate performance is good performance of financial and non-financial performance, all of which will increase the gross domestic product as a measured key in rising per capita income of a country. The aim of this study is to test empirically the impact of human capital investment that is interpreted by education level and other variables both short and long term to productivity of Manufacturing Industry in Indonesia. This research data is secondary data published by World Bank and International Financial Statistic (IFS) for the period 1984-2014. The analyze method is using the Engle-Granger approach Co-integration and Error Correction Model (ECM). The first Stage test is Stationer test. The Co-integration test and ECM Test From the estimation results indicate that the relationship between Human Capital to the growth of manufacturing industry value added (IMVA). In the estimation equation of short-term and long-term human capital in the proxy with the level of education at the primary level (Pri) and secondary level (Sec) significant positive effect on the growth of value-added manufacturing industry in Indonesia. The long-term equation estimation results also show that the gross capital formation (GCF), labor force (LBF), enrollment in primary (Pri), and enrollment in secondary (Sec) variables have a positive effect on the productivity of Indonesia's manufacturing industry as reflected by Value added industrial manufacturing (IMVA). While the enrollment in tertiary and GDP variables have no significant effect on IMVA in the long term

Key words: Human Capital, Manufacture Industry, ECM

INTRODUCTION

Investment in human capital have great interest in studies of economic and economists to know this type of capital changes the level of productivity performance of the company in generating a sufficiently products. The previous study [1] expalined that in developing countries, human capital can improve the advancement of the industry's sustainable development, explained that the higher the training level, the higher will be the skills possessed by workers from any country, in turn, it will have implications for the overall economy. Other study also found that educational levels had a significant positive effect on TFP growth in Indian industries [2].

The manufacturing sector has a very important meaning for the government and society as a prime mover in the development of the economy. In addition, the sector development industry became important for a country because it is believed to boost economic growth. A high rate of economic growth is needed to realize a uniform and sustainable welfare. Manufacturing industry is the main driver of growth in developed and developing countries. Industrial manufacturing sector will encourage increased foreign exchange gains in domestic exports, creation new jobs, and improving the distribution of people's incomes [3].

The developing of manufacturing sector almost always gets the main priority development plan in developing countries (NSB) As noted in the 2015 Government Work Plan in RPJMN 2015-2019 aims to achieve sustainable growth and unable to escape from the development trap of middle income countries, being supported by: (i) macroeconomic stability, (ii) the real sector as driving motor with a focus on industrialization in the industrial sector, (iii) inclusive growth of all sectors, which is supported by community participation. Looking at these goals, then the manufacturing industry has an important role. Because of the manufacturing sector is considered as the leading sector that encouraged the development of other sectors, such as services and agriculture sectors. The experience of long-term economic growth in industrialized country and developing country showed that the industrial sector in general is growing faster compared agriculture sector. Based on this fact it is not surprising if the role of the manufacturing industry sector is increasingly important in economic development of a country, including Indonesia.

The role of industry sector in Indonesia is very strategic for several reasons. [4]. First, this sector is the largest contributor in for Gross Domestic Product. Based on BPS data (2015) shows that this sector in the GDP in 2014 reached about 22%, as illustrated in (figure 1)

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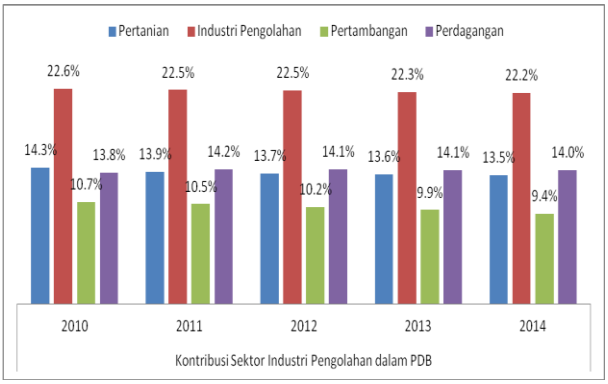
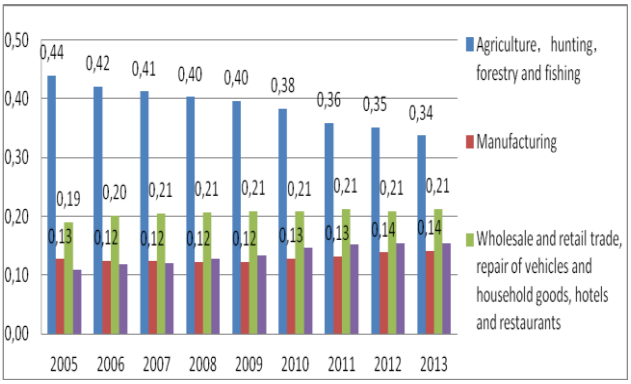


Source: BPS 2015

Figure 1. Share of Manufacturing Sector on GDP

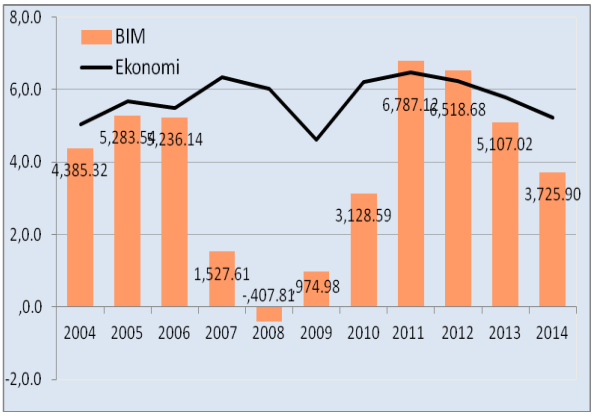


Source: BPS 2015

Figure 2. Share of Manufacturing Industries on Labor

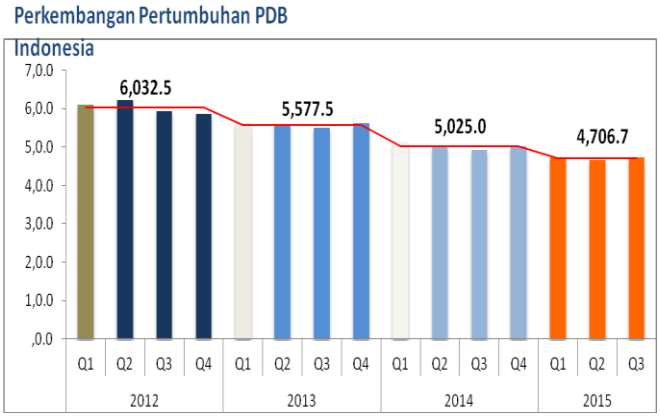
Second, The manufacturing sector is also one of the sectors that have employment which is quite large, BPS (2015) found 14% after agriculture, forestry and fisheries sector, wholesalers and retail, repair models and motor cycle, and communication sector and social services, as described in (Figure 2). Third, the manufacturing sector has Backward Linkage (degree of sensitivity) and forward linkage (power spread) higher with other sectors. The relationship of this sector with other sectors, both ahead and backward, is above average sector as a whole.

Problems, based on data from the World Development Indicators Online (2015), APO (2015) Large and Medium Industry Statistics, BPS, and from the Ministry of Industry provides overview of conditions related to the productivity of the manufacturing sector in Indonesia showed that the average growth of Indonesia's manufacturing sector, the period of 2009-2014, just under 6 percent. This figure is much lower than the growth of the manufacturing sector before the 1997 crisis that ranged from 10-15 percent (Figure 3). Furthermore, with the decline of the manufacturing sector, as well as a decline in national growth in the period 2012-2015 (Figure 4)



Source: Ministry of Industry; 2015

Figure 3. Growth Base Manufacturing Industry and National Economy



Source: CBS; 2015

Figure 4. The development of Indonesia's GDP growth

Previews studies stated, Kopera et al. (2010) analyzes the determinants of industrial growth in the Bulgarian economy. His research explains the determinants of growth in the industry is innovating behavior, deregulation and investment human capital, competitiveness, fiscal policy, inflation, trade openness and financial system. The results showed that the increasing of human capital investment encourage the potential market is increasing in some industrial sectors, and investment in human capital in technology resulted in the growth value added. This result in line with the study of determinants of total factor productivity in former Soviet Union economies: A stochastic frontier approach [5], then also supported by the study of human capital and the development of manufacturing sector in Malaysia the period 1982-2010 [1], in line with study of he role of human capital remains seen as a decisive literature in TFPG of the Indian manufacturing industry [2]

Based on the previous explanation , this study is done as the replication of several studies on human capital to the productivity in manufacturing industry which are [6], [2], [5], [7], in which several variables on research used in this study, in order to reexamine the growth industry of the manufacturing in Indonesia. The description mentioned above give a foundation and motivation as a topic of interest, for this study, associated with human capital investment and the productivity of the manufacturing in Indonesia. Based on the background above, the aim of this study is to test empirically the impact of human capital investment to Industrial productivity in Indonesia

LITERATURE REVIEW

Theory Kaldorian

Kaldor theory assumes that the manufacturing sector is the engine of growth for a region in enhancing the growth of other sectors as well as increasing economic growth [8]. It is in line with the study of manufacture industry serves as the main engine of growth and development [9]. According to Kaldor (1968) stated that a faster growth rate in the manufacturing industry to push on faster growth rate in the Gross Domestic Product. Furthermore, a faster growth rate in the manufacturing industry to push on faster growth rate in labor productivity due to increasing returns to scale, this is called Verdoon Law.

Concept of Education on Growth

According to Schultz (1993), human capital is defined as a key element in improving the company's assets and employees in order to increase productivity and maintain a competitive advantage. To maintain competitiveness in an organization, human capital becomes a tool used to improve productivity. It is developed a model of higher education to the growth. The Model has helped to shape the development of conceptual this paper. In his study to develop a conceptual model that shows that higher education can lead to growth through both the private and public channels (Figure 5). Pritave Benefit identified including expectations of better labor employment, higher wages and greater ability to store and invest. On the other hand, public benefits include increased tax revenues for government for social development, governance, security and research and development [10]

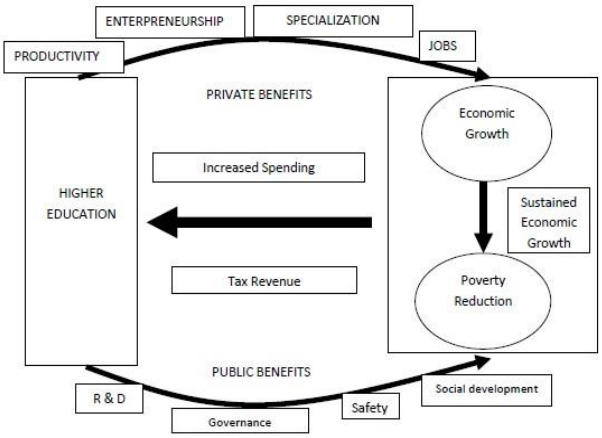


Figure 5. The concept of Education and Growth in various sectors

Bloom et al examined the conceptual model and empirical relationships by assessing the increase in labor productivity and output per worker as the rate of increase higher education in Africa.Thus, Africa appears to be 23 percent lower than the production possibility frontier, which is the highest productivity gap compared to all regions of the world. Their study investigated two different ways in which higher education can boost growth, namely; first, increase GDP through productivity; second, increase the speed at which a country adopts technology and raises its Total Productivity factor. The study found that a one-year increase in total education stocks in Africa would increase GDP by 0.24 percentage points per year; and one-year increase in higher education stocks will increase productivity and output by an added 0.39 percent per year. This resulted in a total increase of 0.63 per cent from the increasing high education.[10]

Several studies have been conducted on human capital and the implication on the performance of companies such as [6] which states that the investment of human capital in education and health to improve the economy through worker's productivity in Sabah, [2] which explains that the level of education has a significant positive effect on TFP growth industries of India, other studies that agreed [7][1] [11][12]

Investment Human Capital And Manufacturing Performance

The relationship between human capital and manufacturing's performance. Investment in human capital generally include training, education, knowledge and skills will enhance the effectiveness of human resources. Based on the literatures argue that human capital leads to greater company performance [13]. The performance can be seen in two different perspectives; financial performance and non-financial performance. Financial performance includes productivity, market share and profitability, whereas, non-financial performance includes customer satisfaction, innovation, workflow improvement and skills development. In detail is given in Figure 6

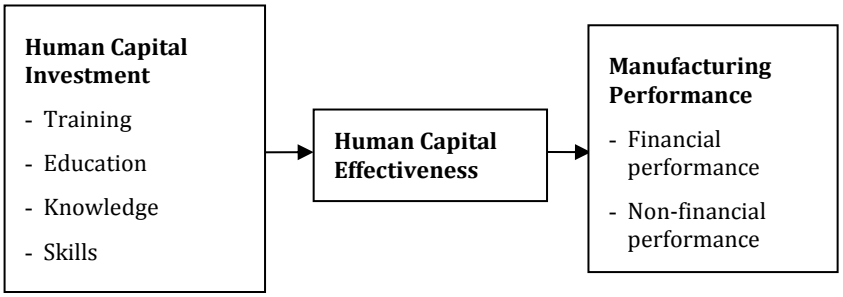


Figure 6 Concept of Human Capital and Firm Performance [13]

Empirical Evidence of Human Capital and Industry growth

The previous studies conducted the impact of human capital on the growth of the industry in the time series of data Negeria the period 1980 – 2010 [12] . The research used data from the Central Bank of Nigeria, International Financial Statistics (IFS) in 2011 and the World Bank African Development Indicators (WDI) 2011. The results show that the human c apital interpreted enrollement primary education, secondary education enrollment, tertiary education enrollment effected positively to the value added of the manufacturing sector. Others researches [1][2]

(Simon, 2012) in his study examined the relationship between Human capital investment and industrial productivity in Nigeria in the period 1978 – 2008 [14]. The results showed that government spending on education has long-term positive relationship with index of industrial productivity while public spending in healthy field and the formation of gross capital shows a long-term negative relationship. This result related to [15].

The other studies about Human Capital and Growth had examined in the Malaysian Manufacturing Sector 1981-2010 period. The result showed that the total labor productvity (LP), the number of manufacturing sector employment (EMP), and the total expenditure on education and Health (GEDH) has significant positive effect on the growth of the Malaysian manufacturing sector [1]. This finding highlight the importance of human capital in which a variable workforce has the highest elasticity in contributing to the share of gross domestic product (GDP) of the manufacturing sector. This is followed by labor productivity and human capital investment in education and health. An increase in the number of job creation is expected to increase production output to meet the demand of local communities and export. In addition, increased labor productivity reduces production and investment costs in education and health programs helping to strengthen the skills, knowledge and abilities of individual workers in this sector.

(Kopera et al, 2010) analyzes the determinants of industrial growth in the Bulgarian economy. His research explains the determinants of growth in the industry is innovating behavior, deregulasi and investment in human capital, competitiveness, fiscal policy, inflation, trade openness and financial system. The result showed that the increase in human capital investment encourages an increasing potential market in some industrial sectors, and human capital investment in technology results in value added growth.

The study of Human Capital Spillovers, Productivity and Growth in the manufacturing sector tested in Pakistan. The finding showed that productivity is still a major supporting factor in the growth of value added in the manufacturing sector, contributing 65% of the total value added growth, while the contribution from human capital is 35% [7]

RESEARCH METHOLODY

Data Sources and Reserch Variables

The type of data used in this study is secondary data obtained from several sources, namely IFS, WDI and books that become references. This research data use annual data period 1984 - 2014.

Variables used in this research are Industrial Manufacture Value Added, Phyisical capial, labor, and Human Capital. Each represented by a proxy that is most relevant to examine the impact of human capital on the growth of industry-manufacturing, Real Interest Rate and Economic Health put the model as a contribution to the study and illustrated in (table 2 and figure 7) the following:

Table 2. Interpretation of independent variables and sources of data

Variables	Sources of Variables	Proxy Measurement	Apriori Expectation
Physical Capital	IFS (2015)	Gross capital formation	Positive
Labor	IFS (2015)	Labor force	Positive
Human capital	WDI (2015)	Primary enrollment	Positive
Human capital	WDI (2015)	Secondari enrollment	Positive
Human capital	WDI (2015)	Tertiary emrollment	Positive
Interest rate	WDI (2015)	Real interest rate	Negative
Economic Health	WDI (2015)	Gross Domestic Product	Positive

Conceptual Framework

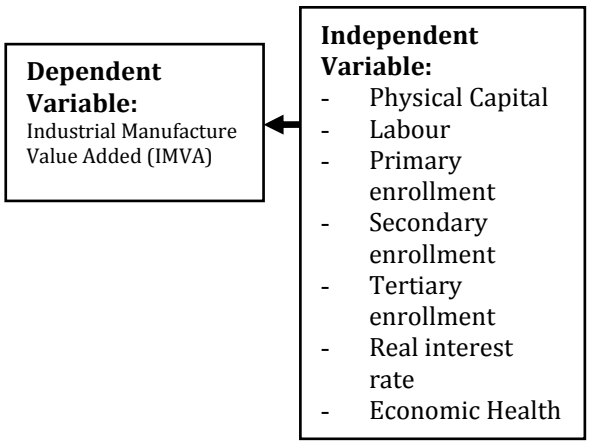


Figure 7. The framework on dependent variable and the independent variables.

Specification of Research Model

Economically, the model observed is as follows:

$$IMVA = f(GCF, LBF, Pri, Sec, Ter, rint, GDP) \qquad (1)$$

With the description as follows:

IMVA	is	Industrial Manufacture Value Added
GCF	is	gross capital formation,
LBF	is	the labor force,
PRI	is	the primary enrollment,
SEC	is	secondary enrollment,
TER	is	tertiary enrollment,
RINT	is	real interest rate,
GDP	is	gross domestic product

Economic model in equation (1) formulated back into the equation Error Eorrection Term forming econometric model as follows:

$$DIMVA = \beta_0 + \beta_1 DGCF_t + \beta_2 DLBF + \beta_3 DPri_t + \beta_4 DSec_t + \beta_5 Ter_t + \beta_6 DRINT_t + \beta_7 DGDP_t + \beta_8 GCF_{t-1} + \beta_9 LBF_{t-1} + \beta_{10} Pri_{t-1} + \beta_{11} Sec_{t-1} + \beta_{12} Ter_{t-1} + \beta_{13} RINT_{t-1} + \beta_{13} DP_{t-1} + \beta_5 ECT + e \qquad (2)$$

Where:

DIMVA=is the manufacturing industry's growth differentiation t p eriod
DGCF =is the gross capital formation differentiation period t
DLBF = differentiation of labor force is the period t
DPri = the differentiation of the primary enrollment period t
DSec = the secondary differentiation of the t enrollment period
DTer = the differentiation of the terrestrial enrollment period t
DRINT = diferentiation real interest rate period t
GDP = gross domestic product period t
GCFt-1 = the gross capital formation period t-1
LBFt-1 = the power force period t-1
Prit-1 = the primary enrollmen t period t-1
Sect-1 = the secondary enrollment period t-1
Ter t-1 = the tertiary enrollment period t-1
Rintt-1 = the real interest rate period t-1
GDP t-1 = goss domestic product period t-1
ECT = the error correction term
e = an error

RESEARCH ANALYSIS

Before doing the regression with ECM test, the necessary needs to be done first is to know whether the variable used has been stationary or not. If the data is not stationary, it will obtain false regression (spurious), the phenomenon of autocorrelation and also not be able to generalize the results of the regression for a different time. In addition, if the data to be used has been stationary, then it can use the OLS regression, but if it is not stationary, the data needs to be viewed stationerity through integration degree test. Furthermore, non-stationary data at the level is likely to be cointegrated, so cointegration testing is necessary. Then if the data has been cointegrated, then ECM can be done. To determine whether the time series data used stationary or not stationary, used the unit root test (unit roots test). Unit root test in the research model is based on Augmented Dickey Fuller test (ADF), with the hypothesis s sa follows:

H0: there is a unit root (data not stationary)

H1: there is no unit root (data stationary)

The results of the t statistic estimation methods will be compared to the McKinnon critical value at a critical point of 1%, 5% and 10%. If the value of t-statistic is less than the critical value, H0 McKinnon accepted, meaning that the data contained unit root or data is not stationary. If the value of t-statistic greater than the critical value McKinnon then H0 is rejected, meaning that there are no data or data stationary unit root. This test is done to find out on the degree or order different how the data being studied will be stationary. This test is performed on unit root test, if it turns out the data is not stationary on the first degree (Insukrindo, 1992), the test is performed on the first different form. The following tests are testing stationary with ADF test on the first diferensi level. Testing the stationarity on each variable can be seen in Table 3.

Table 3. Augmented Dickey Fuller Test Results at the level

Variable	The value of ADF t-statistics	MacKinnon Critical Value			Prob	Information
		1%	5%	10%		
Y	-0.497383	-3.670170	-2.963972	-2.621007	0.8783	Not Stationary
X1	-0.490309	-3.670170	-2.963972	2.963972	0.8798	Not Stationary
X2	-1.019859	-3.679322	-2.967767	-2.622989	0.7326	Not Stationary
X3	-1.727816	-3.670170	-2.963972	-2.621007	0.4076	Not Stationary
X4	-0.205565	-3.670170	-2.963972	-2.621007	0.9274	Not Stationary
X5	0.331859	-3.670170	-2.963972	-2.621007	0.9761	Not Stationary
X6	-4.324843	-3.670170	-2.963972	-2.621007	0.0019 *	Stationary *
X7	-0.051956	-3.670170	-2.963972	-2.621007	0.9460	Not Stationary

Description *, **, *** stationary data at trust level 1%, 5%, 10%

Table 3 shows that there are six variables that are not stationary at the current level, the variable Y (IMVA), X1 (GCF), X2 (LBF), X3 (PRI), X4 (SEC), X5 (TER) and X7 ((GDP) in both the real level of 1 percent, 5 percent, or 10 percent. The sixth variable has a value of ADF t-statistics smaller than the MacKinnon critical value. Based on the results, do back the next ADF test on the level of first-differenc that can be seen in Table 4.

Table 4. Augmented Dickey Fuller Test Results on First Difference.

Variable	The value of ADF t-statistics	MacKinnon Critical Value			Prob	Information
		1%	5%	10%		
Y	-4.772082	-3.679322	-2.967767	-2.622989	0.0006 *	Stationary
X1	-4.787766	-3.679322	-2.967767	-2.622989	0.0006*	Stationary
X2	-9.782099	-3.679322	-2.967767	-2.622989	0.0000 *	Stationary
X3	-6.653805	-3.679322	-2.967767	-2.622989	0.0000 *	Stationary
X4	-4.135912	-3.679322	-2.967767	-2.622989	0.0033 *	Stationary
X5	-7.260181	-3.679322	-2.967767	-2.622989	0.0000 *	Stationary
X6	-9.740227	-3.679322	-2.967767	-2.622989	0.0000 *	Stationary
X7	-5.423851	-3.679322	-2.967767	-2.622989	0.0001 *	Stationary

Description *, **, *** stationary data on trust level 1%, 5%, 10%

Unit root test at first difference level was done as a consequence of non-fulfillment of stationaryity assumption at level. In Table 4 shows that of all the variables, both the dependent variable and the independent variables on the degree of a stationary or I(1)/first difference. This can be seen from the value of ADF t-statistics greater than the critical value of MacKinnon. This means that no hypothesis is rejected, it means that all the variables stationary on real level of 1%, 5% and 10%.

Engle-Granger Cointegration Test

Cointegration test is used to give an early indication that the model used has a long relationship. Engle-Granger Cointegration used to estimate the long-term relationship between productivity growth in the manufacturing industry with gross capital formation, labor force, and enrollment in primary, in secondary enrollment, enrollment in tertiary, interest rate, and gross domestic product. The initial stage of Engle-Granger Cointegration is to regress the equation with OLS between the independent variable toward the dependent variable. Then after regressing equation obtained the residual. The ADF test on the residual must be stationary at the level or I (0) so that it can be said that the variable used tends to balance in the long run although at the level level there are non-stationary variables. The results of residual test with ADF listed in Table 5.

Table 5. Augeyed Test Results Dickey Fuller Residual Equations at the level

Variable	The value of ADF t-statistics	MacKinnon Critical Value			Prob	Information
		1%	5%	10%		
ECT	-6.106786	-3.670170	-2.963972	-2.621007	0.0000	Stationary

Resource: From the author's own data

Table 5 shows that the value of the ADF t-statistics greater than MacKinnon critical values on the real level of 1 percent, 5 percent, or 10 percent, so the residuals regression equation stationary at current level. This indicates that there is a relationship of cointegration between the variables used, so that the next can be done estimation of Engle-Granger Cointegration to identify long-term relationship between the gross capital formation, labor force, enrollment in primary, enrollment in secondary, enrollment in tertiary, interest rate, and gross domestic product with the growth of Industrial Manufacturing Value Added (IMVA). The result of Engle-Granger Cointegration (long-term) can be seen in Table 6.

Table 6. Engle_Granger Cointegratiion Test Result (Long Term)

Variable	Coefficient	T-statistics	Prob
D X1	1.003600	467.0729	0.0000
D X2	7.73E-07	7.144629	0.0000
D X3	0.001464	6.587334	0.0000
D X4	0.000468	-2.308780	0.0303
D X5	-0.004209	-0.434535	0.6679
D X6	-0.000239	-4.679298	0.0001
D X7	-0.002841	-0.635076	0.5316
C	-14.09855	-322.5903	0.0000
R-squared		0.999976	
Adjusted R-squared		0.999969	
Prob (F-statistic)		0.000000	

The equation of the long-term estimation result is as follows:

DIMVA=-14.09855 + 1.003600X1t + 7.73070X2t + 0.001464X3t + 0.000468X4t – 0.004209X5t – 0.000239X6t – 0.0028417t

Based on the long term equation, it is known that the variable gross capital formation (X1), labor force (X2), enrollment in primary (X3), and enrollment in secondary (X4) have a positive influence significantly toward IMVA (Industrial Manufacturing Value Added). For variable real interest rate (X6) a significant negative effect. It can be seen from the probability for each variable that has a value smaller than the real level used. While the variables of enrollment in tertiary (X5) and gross domestic product (X7) show do not significant.

A positive coefficient values of 1.00 on gross capital formation indicates if there is an increase of one unit (billion) in the capital productivity or value added growth in the manufacturing industry will increase by 1.00 units (billion rupiahs), and vice versa. This positive relationship between the variables of gross capital formation in the manufacturing industry value added occurs because of the increased capital will have implications on the increase in industrial output obtained from the quantity of the industrial products.

A positive coefficient value of 7.73 of on labor indicates if there is an increase of one unit (million people) on the IMVA labor force will increase by 7.73 units (industrial products), and vice versa. This positive relationship between labor force variable with IMVA occurs because on the one hand the increase in the workforce reflect the increase in product variation results from the industry. On the other hand the increase in the number of workers in the manufacturing industry also reflects the many jobs that would then create an assortment of value-added output of industrial added. Primary and enrollment in secondary show the impact significant positive, if there is an increase by one unit

The value of a positive coefficient of human capital variable approximated by enrollment in (million) at enrollment in primary and in secondary then IMVA will be increased by the value of the coefficient of human capital variable in this study, and vice versa. The value of a negative coefficient of -0.00023 of real interest rates indicate if there is an increase implanted at one unit (percent) at interest IMVA growth rate it will decrease by the value of the variable coefficients, and vice versa.

From Table 6 it can be seen that the value of R-squared of 0.99, which means that the value indicates the equation of growth in value added of manufacturing industries (IMVA) in the long term can be explained by the variable gross capital formation (X1), labor (X2), enrollment in primary (X3), enrollment in secondary (X4), enrollment in tertiary (X5), interest rate (X6) and GDP (X7) at 99 percent. Long-term equation IMAV has a probability of F-statistic values for 0000 are smaller than the real level of 5 per cent used in this study. it shows that all of the exogenous variables (independent) significantly affects the endogenous variable (dependent) together.

Estimation Error Correction Model (ECM)

The excess owned by ECM is entering all forms of error to be corrected is by recycling errors that formed in previous periods, trends and avoid spurious regression. In addition, the properties statistic of the ECM approach that is desired from the model in giving the meaning are capable of providing independent variable on the dependent variable in the short-term relationship or long term. Error Correction Model (ECM) is used to look at the behavior of the short-term from the regression equation to estimate the dynamics of Error Correction Term (ECT). The use of estimation methods ECM can incorporate the effects of short-term and long-term fluctuation and the time lag of each independent variable. In this study, the estimation of ECM for growth in the productivity of the manufacturing industry is done by restricting the variables that affect to the productivity growth of manufacturing industry. The estimation result of ECM can be seen in Table7.

Table 7. Results of Estimation of ECM for Manufacturing Industry valude Added

Variable	Coefficient	t-statistics	prob
c	0.151045	0.880927	0.3932
DX1	0.986882	138.7305	0.0000
DX2	2.83E-06	-4.107735	0.0011
DX3	0.003108	4.114553	0.0011
DX4	0.001041	-2.788987	0.0145
DX5	0.000277	0.021575	0.9831
DX6	-0.000478	-3.545755	0.0032
DX7	0.031799	2.754873	0.0155
DX1 (-1)	1.016957	-177.0284	0.0000
DX2 (-1)	2.72E-06	4.542802	0.0005
DX3 (-1)	0.002098	-2.726545	0.0164

Variable	Coefficient	t-statistics	prob
DX4 (-1)	0.000793	2.374137	0.0324
DX5 (-1)	0.011723	-0.971502	0.3478
DX6 (-1)	-0.000819	5.959239	0.0000
DX7 (-1)	0.017966	1.643819	0.1225
ECT (-1)	-0.726253	-4.672818	0.0004
R-squared	0.9999 56		
Adjusted R-squared	0.999906		
Prob (F-statistic)	0.000000		

Resource: From the author's own data

Based on the results of ECM estimation to see short term balancing that Capital (X1) in an industry in the first lag (the previous period) indicate the consistent direction with the theory and statistically significant. This condition indicates that the capital increase of production in one unit of capital (billion rupiah) to the first lag will give the effect of increasing value-added in productivity of 1.001 (billion rupiah). The same manner to Labor (X2) and Education at the level of primary and secondary positive effect significantly to the growth of value added of manufacturing industry in the short term. In the contrary, on education variable on tertiary level has a positive effect and not significant to the industrial added value in the first lag in the short term.

Then, the variable of real interest previous period (first lag) in the short term has a consistent direction with theory, and has adversely impacted significantly on the value-added productivity of the manufacturing industry. This indicates that the increase of the interest rate of one percent on the first lag will degrade the value added of manufacturing industry amounted to 0.0019 percent, ceteris paribus. Variable GDP (X7) showed no significant effect on the value added of manufacturing industry in the previous lag in the short term.

Error Correction Term (ECT) determines how quickly equilibrium is reached again or in other words a mechanism to return the long-term balance. The value of coefficient of ECT -0726 showed that 72.6 percent of imbalance or disequilibrium period previously corrected in the period now.

The estimation results of equation short term shows the value of R-Square of 0.99, which means that 99% of the growth model of value-added manufacturing industry can be explained by changes in capital, labor, education at the level of primary, secondary, tertiary, interest rates and GDP in the previous period.

Diagnostic Test/Classical Assumption Test

a. Autocorrelation test

Autocorrelation used in this research was conducted through Breusch-Godfrey Serial Correlation LM Test. The existence of autocorrelation can be seen by comparing the probability value Obs*R squared in Breusch-Godfrey Serial Correlation LM Test with significance level used in this study. Probability Obs*R-squared of 0.2773 which is greater than the real level of 10 per cent so that the null hypothesis is accepted which indicates that the short-term model that estimated free from problems of autocorrelation. The test result of autocorrelation can be seen in Table 8.

Table 8. Results autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.560967	Prob. F (2,12)	0.5849
Obs * R-squared	2.565021	Prob. Chi-Square (2)	0.2773

Resource: From the author's own data

b. Normality test

Test of Normality is one of the statistical assumptions in which error term normally distributed. The result obtained showed that the probability of Jarque-Bera at 0.3355 bigger of the real level of 10 percent so that the null hypothesis is accepted that indicates that the error term in short term model normally distributed. Normality Test Results can be seen Figure 9 .

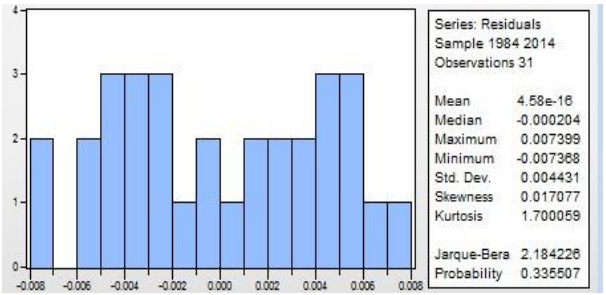


Figure 9. Normality Test Results Error Correction Model (ECM)

c. Heteroskedasticity test

The presence of heteroscedasticity problem in this study can be seen by comparing the value of the probability Obs*R-squared in the White Heteroscedasticity Test with significance level used in this study. The results showed that the economic growth model free from the problem of heteroscedasticity as a probability value Obs*R-squared of 0.7627 which is greater than the real level of 10 per cent so that the null hypothesis is accepted. This results indicate that the equation of short-term dynamic ECM free from heteroscedastisity problem. The test results can be seen in Table 9.

Table 9. Results of Heteroscedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.529323	Prob. F (15,14)	0.8831
Obs * R-squared	10.85674	Prob. Chi-Square (15)	0.7627
Scaled explained SS	3.170003	Prob. Chi-Square (15)	0.9994

Resource: From the author's own data

CONCLUSION

Based on the analysis and discussion it can be concluded:

1. From the estimation results indicate that the relationship between human capital toward the growth of manufacturing industry value added (IMVA). In the estimation of short and long term equation, human capital in the proxy with the level of education at the primary level (Pri) and secondary level (Sec) have significant positive effect on the growth of value-added manufacturing industry in Indonesia. This result is in line with the previous study such as [7]
2. From the estimation long term equation, it can be seen that the variable of gross capital formation (GCF), labor force (LBF), enrollment in primary (Pri), and enrollment in secondary (Sec) have a positive influence on the productivity of the manufacturing industry of Indonesia. It is reflected by value-added of manufacturing industries (IMVA), While enrollment in tertiary variables and GDP are not significant effect on IMVA in the long term.
3. In Equation short term and long term, it can be seen that the real interest rate variable (rint) has a significant negative effect on the growth of Indonesia's manufacturing industry value added, while the GDP variable has a positive effect but not significant to IMVA Indonesia in the short term.

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