Analysis of Factors Affecting Economic Growth in Indonesia

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Abstract

In these research intend to determine the factors that influence Indonesia's growth which includes human resources and technology using time series data from 2000 to 2019. To understand the connection between advances in human resources and technology on economic growth, the researcher uses autoregressive vector analysis. The researcher uses the variables of gross domestic product, health, capital, work participation, and internet users to represent technology. The results show that the quality of human resources will affect economic growth in Indonesia and as well provide a significant boost to the workforce and health. Where the labor force or work participation and health are considered the most important factors to increase human capital. This shows that investment in human resources is very important for economic growth. The output also show that technology has no effect on economic growth. This is due to increased economic growth, and decreased government spending on research and technology.

Introduction

The indicator of economic growth is a rise in the number of production of goods and services. The increase takes place from one time period to the next. In general, economic growth is quantifythrough a rise in Gross Domestic Product (Widarni & Bawono, 2021). Economic growth in a country can be influenced by various factors. Economic growth is not always influenced by traditional factors such as labor and capital only. There are other factors that allow economic growth to be able to develop more rapidly, including technological developments (Stoica, Roman, & Rusu, 2020). Technological development ranks third As a component affecting

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economic growth and labor or human resources ranks second As a component affecting economic growth (Astuti & Prabowo, 2021).

Human resources as human capital play a crucial part in economic development, thru the accumulation of thought and trained employees gradually. Because these human resources will later create, innovate, and produce. HR must have the ability to be aware and able to make the best use of resources (Widarni & Wilantari, 2021). In developing nations like Indonesia, education is one of the factors that has an important role and needs to be developed in order to encourage economic growth (Sulisnaningrum, Widarni, & Bawono, 2022). A country's economy will reach a high level of productivity along with the rise in the number of educated workers because educated workers are considered more efficient in carrying out tasks that require a high level of knowledge and critical thinking (Sawitri & Widarni, 2021). Meanwhile, skills and knowledge could be enhanced through education and good health conditions. Education and health are basically an investment in order to realize the level of productivity of human resources in carrying out their work so that they positively influence on economic growth (Widarni & Bawono, 2021).

Human Resources is one of the factors that positively influence on economic development through innovation (Sulisnaningrum, 2021). This can be seen from how much the company can recruit and retain a talented and energetic workforce to support organizational goals. A reliable and proficient workforce will be able to contribute to the innovation strength of a company so that the business is able to develop (Puspaningtyas & Harnani, 2021). However, the demand to find, develop, and maintain quality human resources is inseparable from environmental changes and technological developments (Nugroho, Bandono, & Suharyo, 2021). As a result, it is crucial to consider how human resource development and economic growth are related (Ahmed, Asghar, Malik, & Nawaz, 2020).

One of the most significant influences economic growth in the nation economy or community is an investment in human resources. In addition to training and education, a variety of social and health services also contribute to the development and maintenance of human capital. (Wanger & Aras, 2022; Mora & Afriani, 2021). In the economic world, technology is used as a medium to expand market networks, increase product sales, communicate with consumers to increase their loyalty to marketed products (Rosário & Raimundo, 2021). Advances in information technology can help a country in developing its economy. With the existence of information technology, the state can expand the reach of its product exports, so that consumers will also increase so that it affects sales and can also increase profits (Litvinenko, 2020).

Literature Review

Science, industry, communications, agriculture, and other fields have all experienced significant shifts as a result of the development of various types of technology (Charania & Li, 2020). In developing countries, population activities in daily life also play an important role. to deal with problems that need to be solved. So that the economy of a nation can continue to improve and achieve maximum results as desired, many developed and developing countries compete with each other in technological development. Moreover, this would not be possible without the cooperation of capital and labor in technological progress (Sader, Husti, & Daroczi, 2022).

Human resources are an important aspect in achieving development with the role of education in it (Bombiak & Marciniuk-Kluska, 2018). The theory of economic growth explains that technological advancement accelerates economic growth in a sustainable period and the labor with a good educational background will find it easier to improve their economy (Ahmad, Jiang, Majeed, Umar, Khan, & Muhammad, 2020). Therefore, human capital is a source of sustainable growth that helps in technological progress. Increasing production capacity will also increase the rate of sustainable growth and this can be realized by investing in tangible and intangible assets (Hao, Umar, Khan, & Ali, 2021).

Future income and consumption will be impacted by human capital investment since it will improve access to education, health care, and training. A person's with high level of education will encourage the individual to earn higher wages as well. When individuals earn high salaries, their health will also be better maintained. They are able to buy nutritious food in an attempt to improve endurance and productivity at work (Baharin, Aji, Yussof, & Saukani, 2020).

Renelt (1992) found a positive correlation between economic expansion and school participation. Hanushek & Kimko (1993) also found that the level of economic growth and productivity in a country is influenced by the quality of education. In line with this finding, Colas & Ge (2019) stated that the expansion rate of GDP per capita was significantly influenced by the average length of time men and women attended higher education.

Human capital is defined as "individuals' self-investment in order to boost productivity (Eigbiremolen & Anaduaka, 2014). In addition, " a medley of aspects including training, education, experience, intellect, activity, and professional skills, beliefs, furthermore initiatives which impact values of the inferior products of workers" has been defined as the concept of human capital (Frank & Bemanke, 2007). Policymakers are encouraged must give greater skillful consideration with people resource advancement the outcome of this shift in its international economy further knowledge-based sectors (Mohamed, Ari, Al-Sada, & Koç, 2021).

The Dukec & Mirosla study (2017) concludes that farmer groups managed by farmers with higher education levels have a much higher level of productivity. However, research conducted by Qutb (2017) measuring labor productivity using a proxy for total productivity factor making use of the Autoregressive Distributed Lag (ARDL) method reveals so the standard of human resource schooling as a whole only slightly increases with the quality of education in higher education. Similarly Bokana & Akinola (2017) find that for high human resource education to have a positive effect on productivity growth, state policies must be implemented effectively.

Government investing in health similarly education this an asset since it's similar to investment in land and buildings, when it does, pay off in the future. A person's health and knowledge will increase as a result of spending on education, training, and health care, thereby increasing people's welfare, productivity and future income. Human productivity, which in turn affects production, is affected by health and education. Economic expansion will also increase when overall production increases. Therefore, economic expansion is influenced by health and education, two important components of human capital (Rajan, 2020).

Basic concepts of human capital, that's a more refined version from theory of only somewhat productive, has emerged as the most common approach to understanding how wages are determined. The opinions on human capital theory education with learning like an expenditure at competencies with skills. This theory states that the knowledge and skills of individuals determine their income in the labor market (Eigbiremolen & Anaduaka, 2014). Moreover, it is argued that based on realistic expectations, people choose the education and training they get in order to increase their output from returnat asset. This implies believe capital resources in people can contingent on a prices of learning new talents and the anticipated benefits on those investments (Widarni, Irawan, Harnani, Rusminingsih, & Alim, 2022).

H1 : Human Resources have a significant affecting on economic growing

H2 : Technology have a significant affecting on economic growing

Research Method
In research using the Vector Autoregressive (VAR) to grasp the connection's cause of the factors needed for2000 through 2019 is a twenty year period. Vector Autoregressive (VAR) consists of a set of similarity that depicts every factor like a linear model of the constant and the variable's lag (past) value and the lag values of other variables in a system. Vector Auto Regression (VAR) is often employed to forecast a set of time series variables examine the dynamic influence of the system's interference elements of variables.

The data utilized in this research is primary data found at the World Bank. We use the variables of Economic Growth Data (GDP), Gross Fixed Capital Data, Labor Force Data, Technology Data and Government Expenditure Data for Health. To evaluate the causal relationship between human capital, labor, the Multiple-variable regression analysis below was used to examine the relationship among technology and economic progress in Indonesia:

$GDP_t = \beta_0 + \beta_1 GFC_{t1} + \beta_2 LFC_{t2} + \beta_3 CHE_{t3} + \beta_4 IU_{t4} + e_t$ eql 1

$GFC_t = \beta_0 + \beta_1 GDP_{t1} + \beta_2 LFC_{t2} + \beta_3 CHE_{t3} + \beta_4 IU_{t4} + e_t$ eql 2

$LFC_t = \beta_0 + \beta_1 GDP_{t1} + \beta_2 GFC_{t2} + \beta_3 CHE_{t3} + \beta_4 IU_{t4} + e_t$ eql 3

$CHE_t = \beta_0 + \beta_1 GDP_{t1} + \beta_2 GFC_{t2} + \beta_3 LFC_{t3} + \beta_4 IU_{t4} + et$ eql 4

$IU_t = \beta_0 + \beta_1 GDP_{t1} + \beta_2 GFC_{t2} + \beta_3 LFC_{t3} + \beta_4 CHE_{t4} + et$ eql 5

Description :

GDP : Gross Domestic Bruto

GFC : Gross Fixed Capital

LFC : LabouR Force Participation

CHE : Current Health Expenditure

IU : Internet User

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E : error term

t : time series

β : the magnitude of the effect of causality

eql : equation

Each variable in this study will be combined using vector calculations, and each variable will take turns acting as the dependent variable and the variable free.

Results and Discussion

The data stability test or unit root test is the first action in testing data the statistics analysis using the VAR method. The data stationarity test is very important when analyzing time series data. A Augmented Dickey-Fuller exam may be used to ascertain if a circuit is anchored or not. Its mistaken concept is checked in seeing if The potential of autocorrelation exists if the series is steady, which it is. When the stationary exam, the findings following obtained:

Table 1. Augmented Dickey-Fuller Unit Root Test on GDP, GFC, LFC, CHE, IU in Indonesia

Variable	Unit Root	Include in the examination Equation	Probability	Description
Gross Domestic Product (GDP)	Level	Intercept	0.1464	
	First diff	Intercept	0.0001	Stationary
Gross Fixed Capital (GFC)	Level	Intercept	0.0522	
	First diff	Intercept	0.0002	Stationary
Labor Force Participation (LFC)	Level	Intercept	0.1515	
	First diff	Intercept	0.0061	Stationary
Current Health Expenditure (CHE)	Level	Intercept	0.0574	
	First diff	Intercept	0.5413	
	Second diff	Intercept	0.0048	Stationary
Internet User (IU)	Level	Intercept	1.0000	
	First diff	Intercept	0.9860	

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	Second diff	Intercept	0.0000	Stationary

From Table 1 its outcomes of the stationary exam show that probability prices on the GDP, GFC, and LFC variables have a probability value smaller than the alpha level of 0.05 in the unit root first difference, while for variables CHE and IU have a smaller probability value at the level of at alpha 0.05 in the unit root second difference. From these results, the next step can be done by describing vector analysis.

Then determine the optimal lag length test. This approach is very sensitive to the amount of lag used. Determination of the optimal lag length is carried out to determine whether between variables have an effect in a long time (length of period) on endogenous variables in the previous time.

Table 2. Value at Lag 0 to 1 GDP, GFC, LFC, CHE, and IU data in Indonesia

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-127.7710	NA	1.756854	14.75234	14.99966*	14.78644
1	-97.33052	40.58735*	1.095108*	14.14784*	15.63179	*

FromTable 2 shows that the optimal lag value is at lag "1". LR, FPE, AIC, SC, HQ all have results with a lag level of "1". The author will not use a lag above "1", because if it is forced, the test will be disrupted. These results allow for the conclusion that no influence exists of endogenous variables in the previous time on all factors. And then based at the ideal latency level of "1," the FPE criteria are best met.

The next step is the analysis of the model with Vector AutoregressionThe multivariate forecasting model. VAR (Vector Autoregressive) could be used to construct a forecasting methode using time series data which are correlated and evaluate the dynamic impact of unforeseen occasion that disturb the methode.

Table 3. Vector Analysis

	D(GDP)	D(GFC)	D(LFC)	D(CHE)	D(IU)
D(GDP(-1))	-0.214168	0.330013	0.462504	0.071629	-1.249634
	(0.29351)	(2.32858)	(0.40607)	(0.07230)	(0.98794)
	[-0.72967]	[0.14172]	[1.13898]	[0.99073]	[-1.26489]

D(GFC(-1))	-0.026148	-0.367199	-0.135732	-0.000376	0.050647
	(0.04035)	(0.32009)	(0.05582)	(0.00994)	(0.13580)
	[-0.64810]	[-1.14718]	[-2.43167]	[-0.03787]	[0.37294]
D(LFC(-1))	0.163305	2.192003	0.061495	-0.036430	0.107634
	(0.15162)	(1.20290)	(0.20977)	(0.03735)	(0.51035)
	[1.07705]	[1.82227]	[0.29316]	[-0.97542]	[0.21090]
D(CHE(-1))	0.952636	10.14475	2.200964	-0.597177	3.000452
	(1.08103)	(8.57643)	(1.49560)	(0.26628)	(3.63870)
	[0.88123]	[1.18286]	[1.47163]	[-2.24263]	[0.82459]
D(IU(-1))	-0.057688	-0.303732	0.246114	-0.021408	0.854264
	(0.07245)	(0.57482)	(0.10024)	(0.01785)	(0.24388)
	[-0.79620]	[-0.52840]	[2.45526]	[-1.19949]	[3.50286]
C	0.114008	0.272904	-0.868442	0.114008	0.589312
	(0.05860)	(1.88734)	(0.32912)	(0.05860)	(0.80073)
	[1.94556]	[0.14460]	[-2.638 66]	[1.94556]	[0.73596]
R-squared	0.373046	0.299407	0.342582	0.534911	0.610568
Adj. R-squared	0.111815	0.007493	0.068658	0.341123	0.448305
Sum sq. resids	0.304141	5.012571	315.4968	56.79021	9.594268
SE equation	0.159201	0.646308	5.127514	2.175435	0.894160
F-statistic	1.428031	1.025668	1.250647	2.760298	3.762828

Log likelihood	11.18483	-14.03509	-51.31488	-35.88182	-19.87804
Akaike AIC	-0.576092	2.226121	6.368320	4.653536	2.875338
Schwarz SC	-0.279302	2.522911	6.665111	4.950326	3.172128
Mean dependent	0.043691	0.076435	-0.113338	2.537335	-0.143333
SD dependent	0.168925	0.648743	5.313153	2.680057	1.203832

The connection of GDP with GDP is highly bad on its own, with the t-statistic -0.64810 greater than the coefficient -0.214168. Then, connection of GDP with GFC nothing notably favorable because a t-statistic 0.14172 is smaller than the coefficient 0.330013. while the GFC variable with GDP has a significant negative relationship because the t-statistic -0.64810 is greater than the coefficient -0.026148, this implies that the greater the GFC, a lower a GDP will be. Relation of GDP with LFC is positive significants by a t-statistic mark from 1.13898, which is larger than the coefficient of 0.462504. This means that the higher the GDP (economic growth), the more LFC (labor) is used. Next connection about GDP variable with CHE is remarkably favorable by a t-statistic of 0.99073, and that's superior to the coefficient of 0.71629. It follows given the higher the GDP (economic growth) variable, the higher the CHE (human capital) needed. Last, relation of GDP with IU is extremely unfavorable by a t-statistic from -1.26489 which is greater than the coefficient of -1.249634. This means that the higher the GDP (economic growth rate) the lower the IU (government spending on research and technology). Next is Granger analysis of causality. The Granger test evaluates whether a causal or reciprocal relationship between two study variables relationship by determining if they quantitatively influence either in a two-way or reciprocal interaction with each other, a one-way relationship, or not at all. (no mutual impact).
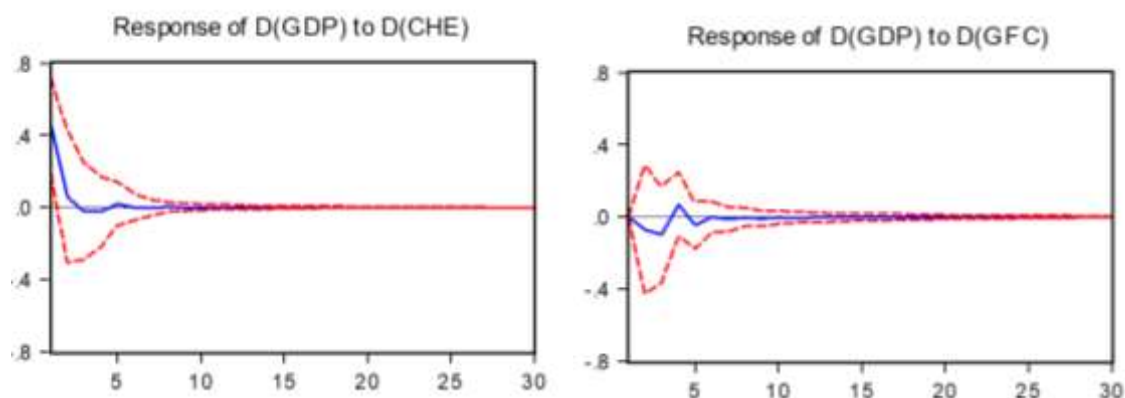
Table 4. Causality Analysis Granger

Null Hypothesis	Obs	F-Statistic	Prob.
GDP does not Granger Cause CHE	19	0.42371	0.5243
CHE does not Granger Cause GDP		1.15762	0.2979
GFC does not Granger Cause CHE	19	0.80078	0.3841
CHE does not Granger Cause GFC		0.02718	0.8711
IU does not Granger Cause CHE	19	0.15985	0.6946
CHE does not Granger Cause IU		0.07264	0.7910
LFC does not Granger Cause CHE	19	2.78517	0.1146

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CHE does not Granger Cause LFC		0.34561	0.5648
GFC does not Granger Cause GDP	19	4.53771	0.0490
GDP does not Granger Cause GFC		0.82651	0.3768
IU does not Granger Cause GDP	19	0.09545	0.7613
GDP does not Granger Cause IU		2.28705	0.1500
LFC does not Granger Cause GDP	19	0.82144	0.3782
GDP does not Granger Cause LFC		0.11192	0.7423
IU does not Granger Cause GFC	19	1.17285	0.2949
GFC does not Granger Cause IU		0.45606	0.5091
LFC does not Granger Cause GFC	19	1.09862	0.3101
GFC does not Granger Cause LFC		2.97309	0.1039
LFC does not Granger Cause IU	19	0.05197 0.8225	IU
does not Granger Cause LFC		0.06660	0.7996

The output results show the variables GDP, GFC, CHE, LFC, and IU there is no relationship between variables. This is shown in the results of a significance value that is more than equal to 0.05. However, a causal relationship (a two-way relationship that influences each other) was found in the GFC variable with the GDP variable only with a significance level of less than the same as the alpha of 0.05.

Response of D(GDP) to D(CHE)   Response of D(GDP) to D(GFC)

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Figure 1. Impulse Response Function

According to the IRF above, at the beginning of the period until the 7th period, the GDP response was still fluctuating, since the shock occurred in the CHE variable. Furthermore, after the 7th period, the fluctuations began to decrease, that is to say, GDP is no longer as volatile as the previous period, in other words, the graph shows stability. Furthermore, the GDP response to LFC is seen at the beginning of the period until the 5th period, the GDP response is very volatile since the shock occurred in the LFC variable. Furthermore, in the 6th period and so on, the fluctuations begin to decrease or are no longer volatile and show stability.
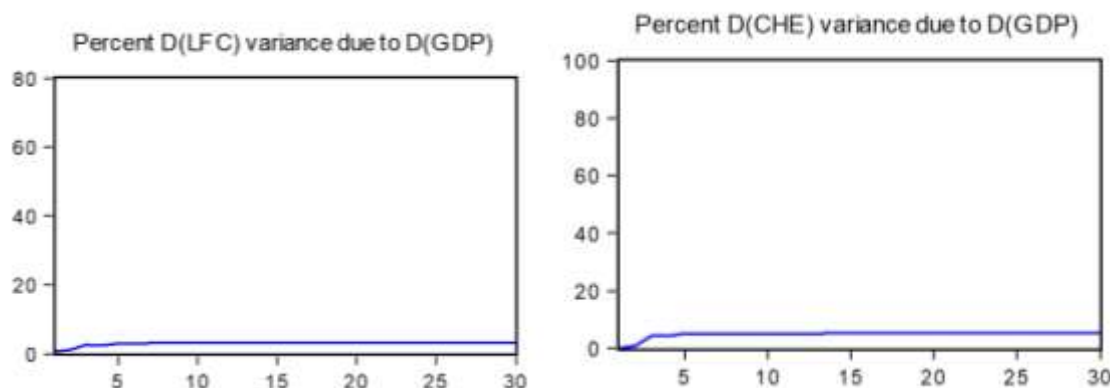

Figure 2. Variance Decomposition

LFC to GDP shows that in period 1 to period 5, LFC has increased although not so sharply in influencing GDP. However, after the 5th period, LFC tends to be more stable in influencing GDP. Meanwhile, CHE on GDP in periods 1 to 2 increased then stabilized in periods 3 and 4. However, in periods 5 to 6, it increased even though it had no significant effect on GDP. After that period, both tend to be stable until the 30th period.

Conclusion

The labor force or work participation has a tremendous impact on economic expansion and strengthens human capital. The labor force or work participation is the main factor forming human capital or Human Resources, causing economic expansion. Meanwhile, Economic expansion has a detrimental impact at the government's gross fixed capital. So that with high economic growth will suppress the decline in gross fixed capital issued by the government. Then the technology variable has no significant impact at economic growth at Indonesia. Based on the outcomes of the analysis, a lower the level by economic growth, the higher the role of technology. Impulse response on GDP towards CHE and LFC looks very volatile at the beginning of the period until the 5th period only. Then in the next period the GDP response to CHE and LFC was considered relatively stable, meaning that there were no more shocks. Then the outcomes from analysis of decomposition and variability demonstrate that the influence of LFC and CHE on GDP tends to fluctuate not so sharply from the first period and tends to be stable after arriving in the 5th period onwards.

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