
The Influence of the Number of Workers, Technology, and Investment Realization on Economic Growth on the Island of Java in 2013-2022

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Abstract: This paper aims to determine the effect of the number of workers, technology and investment realization on economic growth in Java in 2023-2022. More than half of Indonesia's economy is still concentrated in Java by 57.70 percent. With growth between quarters (qtq) reaching 0.89 percent and between years (yoy) of 4.84 percent. The Java Island economy contributed 2.86 percent growth to national economic growth. Java is still relied on by the government to drive industrial growth in the medium and long term. The Solow growth model assumes that economic growth is influenced by changes in the factors of production of physical capital (savings and investment) and labor (population growth), while technology that describes the level of efficiency is an exogenous variable and is considered as a residual. Labor (TK) has a positive and insignificant effect on economic growth. This means that if TK increases, economic growth will increase. The greater the investment of a country, the greater the level of economic growth that can be achieved. The role of technological innovation in driving economic growth is very important and can have a significant impact. The data collection technique used by the author in this study is to use / utilize secondary data. The data is processed using EViews. The results of this study prove that the number of workers, technology, and investment realization have a positive and significant effect on economic growth.

INTRODUCTION

The process of development in Indonesia has undergone several significant changes, starting from the Old Order, New Order, Reform Order to Post Reform. Each stage requires careful planning so that the direction of development can be successful. Planning is a process of determining what is to be achieved in the future and determining the stages needed to achieve it. In terms of economic development, the role of the government can be examined from the

National Revenue and Expenditure Budget (APBN) at the central government level and the Regional Revenue and Expenditure Budget (APBD) at the local government level. The importance of economic growth according to Sukirno (2015) is that it is an indicator of successful development which will be followed by an increase in the welfare of the community.

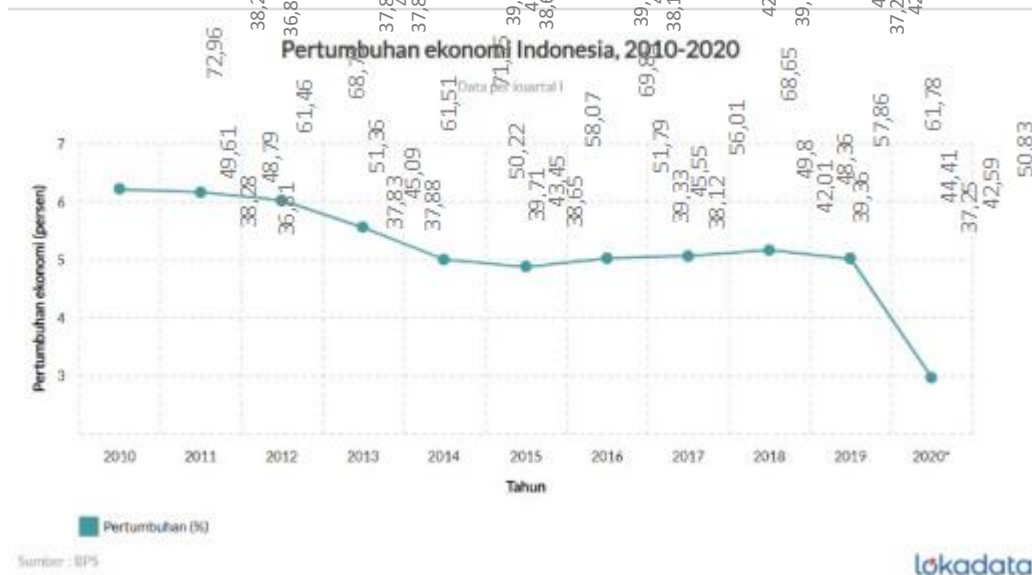


Figure 1.1 Indonesia's Economic Growth 2010-2020

Source: Lokadata

Indonesia's economic growth in 2020 was 2.97 percent. Over the past ten years, this economic growth has tended to decline. In 2010, economic growth was 6.22% and decreased in 2011 by 0.05% to 6.17%. In 2012 it decreased again to 6.03%. Then in 2013 it decreased drastically to 5.56 and continued to decline in 2014 and 2015 at 5.01% and 4.88%. This shows that economic conditions in 2015 were unstable because in that year the growth rate was the lowest for 10 years in the research data. In 2016 to 2018 economic growth increased steadily, showing Indonesia's development in producing good production output. The key to this increase is based on an increase in productivity, investment and the quality of human resources.

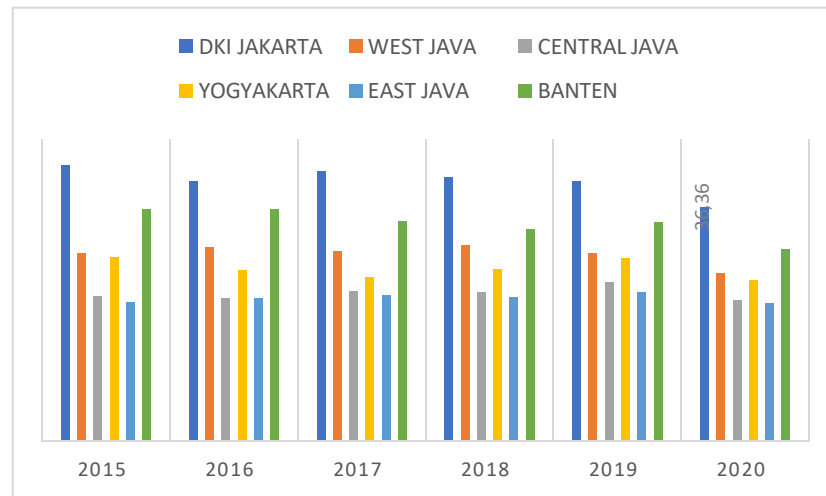


Figure 1.1 Percentage of formal workers in Java

Source: BPS (processed)

From 2015-2020, the highest percentage is DKI Jakarta and the lowest is East Java. The working relationship between informal sector businesses and their workers is based solely on mutual trust and agreement by receiving wages and/or rewards or profit sharing. (Sari, 2016).

The number of small sector workers is shown in the following data:

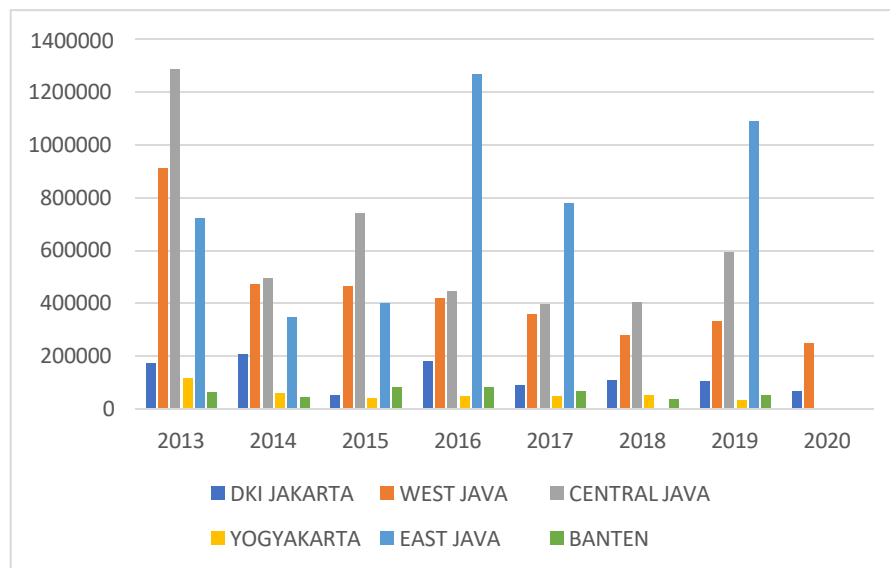


Figure 1.2 Total Micro Employment in Java

Source: BPS (processed)

The following is data on the Information and Communication Technology Development index for the last three years based on the research year.

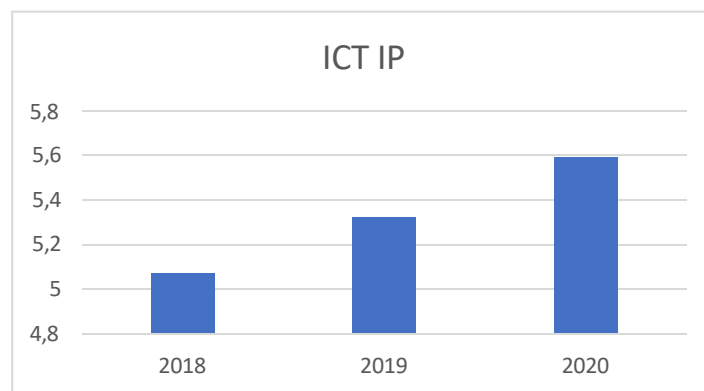


Figure 1.3 ICT Development Index

Source: BPS (processed)

. The condition of investment realization is illustrated in the following data.

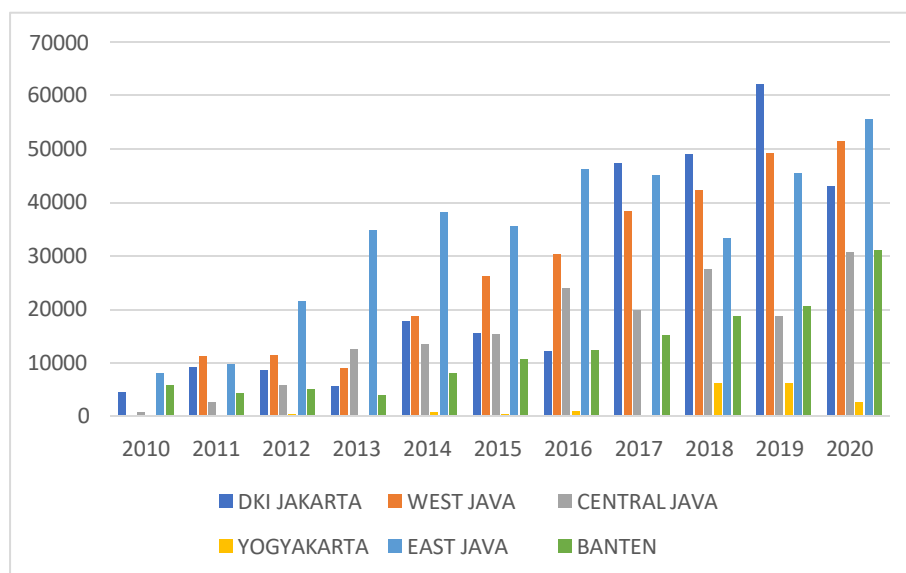


Figure 1.4 Investment Realization in Java Island

Source: BPS (processed)

Based on the data, investment continues to increase from each province every year. This shows that public awareness of saving funds for the community is increasing. Investment will result in increased production of goods and services in the economy. Investment plays an important role in Indonesia's economic recovery efforts amid the pandemic.

LITERATURE REVIEW

Concepts Examined

a. Number of Workers

Samuelson and Nordhaus (2001) mentioned that labor input consists of quantity and skill of labor. Many economists believe that the quality of labor input, namely skills, knowledge and labor discipline, is the most important element in economic growth. The results of research by Ardyan and Mulyo (2012) show that there is a positive relationship between the working labor variable and economic growth. Labor is the population of

working age (15-64 years) who are ready to do work to produce goods or services to meet their own needs or the needs of society. Each sector experiences a different growth rate as well as the ability of each sector to absorb labor. The difference in growth rates results in two things. First, there is a difference in the rate of increase in labor productivity in each sector. Second, sectoral changes gradually occur, both in labor absorption and in its contribution to national income (Simanjuntak, 2005:5). Labor absorption in general will increase if it is supported by sectors in the region, there are many sectors that can increase labor absorption such as investment, wages, and exports.

b. *Technology*

In the implementation of eGovernment, there are important indicators, which include: 1). Infrastructure data, 2). Legal infrastructure, laws and regulations including various licenses to support eGovernment. 3). Institutional infrastructure, 4). Human infrastructure, 5). Technology infrastructure, 6). Leader thinking strategy, (Indrajit, 2002: 25). At the stage of e-Government development, taking key features and combining them with internal e-Government elements, the stages of transformation towards e-Government are formulated, consisting of the following four stages: (a) Initiation, (b) Interaction, (c) Transaction, (d) Transformation (Setiawan, 2019). Technology is the overall means of providing goods necessary for the continuity and comfort of human life. The use of technology by humans begins with converting natural resources into simple tools. The prehistoric discovery of the ability to control fire has increased the availability of food sources, while the creation of the wheel has helped humans travel, and control their environment. Recent technological developments, including the printing press, telephone and the Internet, have minimized physical barriers to communication and allowed humans to interact freely on a global scale.

c. *Investment Realization*

According to Sukirno (2000), investment activities carried out by the community will continuously increase economic activity and employment opportunities, increase national income and improve the level of public prosperity. This role stems from three important functions of investment activities, namely (1) investment is one component of aggregate expenditure, so that an increase in investment will increase aggregate demand, national income and employment opportunities; (2) the increase in capital goods as a result of investment will increase production capacity; (3) investment is always followed by technological development; (4) investment is always followed by investment; (5) investment is always followed by investment; (6) investment is always followed by investment; (7) investment is always followed by investment. (Nizar et al., 2013). According to Sumanto (2006), investment is a commitment of a number of funds in a period to get expected income in the future as compensation for the units invested. Meanwhile, Husnan in Anoraga and Pakarti (2006) defines investment as the use of money with the intention of generating income. Investment is the investment of capital in the company, with the aim that the wealth of a corporation or company increases. Investment is also defined as goods purchased by individuals or companies to increase their capital stock (Mankiw, 2000). Investment based on economic theory means the purchase (and production) of capital goods that are not consumed but used for future production.

d. *Economic Growth*

Solow's model of economic growth illustrates the correlation of interactions between capital or capital growth, labor development and technological improvements in an economy, and their effect on the economy's output. The first stage is done through examining how the demand for goods sets the capital pool. This stage assumes that technology and labor force are constant. In subsequent descriptions, these assumptions will be removed one by one, such as the removal of the assumption that the state of the labor force is different, and the removal of the assumption of technological change. According to the Solow growth model, the goods supply function is based on a production function with output dependent on the supply of capital and the availability of labor force. $Y = f(K, L)$ The Solow growth model assumes that the production function has constant returns to scale (CRS). $Y = f(K, L, E)$ Where E is a new variable, namely labor efficiency. L represents the number of effective workers. The new production function shows that the amount of output (Y) depends on the number of capital units (K) and the number of effective workers (L). Classical theories of economic growth assume a perfectly competitive economy where the "invisible hand" maximizes national output. The "trickle-down" doctrine then explains how the benefits of growth affect everyone in society equally. For classical economists, capital accumulation is the basis for economic growth. Therefore, the emphasis is on mobilizing savings to generate sufficient capital for investment that can be used to accelerate economic growth (Todaro, 1994).

e. *Java Island*

Java is the most populous island in the world. There are more than 149 million people living in the region. Java is inhabited by more than 56% of the total population in Indonesia. Thus, more than half of Indonesia's population resides in Java. Therefore, it is not impossible when Indonesia's economic structure is spatially dominated by the group of provinces in Java with a contribution to GDP of 58.7%.

2.1. *Theoretical Framework*

The framework in this study is that the economic growth of provinces in Java Island by three economic development variables. Namely the Number of Workers (X_1), Technology (X_2), and Investment Realization (X_3). The number of workers and Investment Realization as an indicator of economic growth. While UMP affects labor productivity. Based on the literature review, it is suspected that the number of workers, technological developments, and investment realization affect economic growth on the island of Java in 2013-2020.

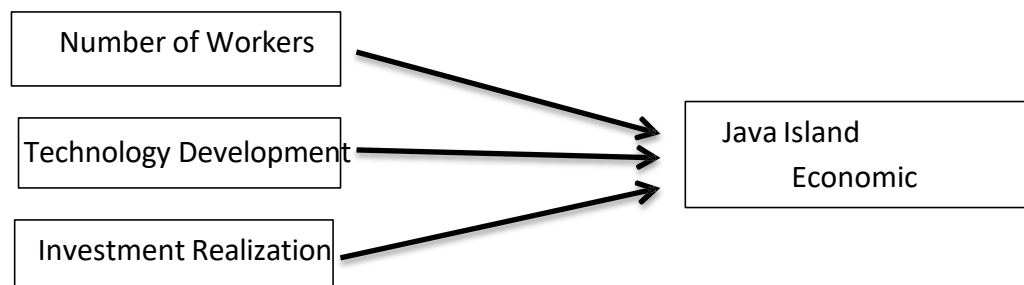


Figure 2.1 Framework of Thought

2.2. Research Hypothesis

-Hypothesis 1

H0: The number of workers affects economic growth

Ha: Total labor does not affect growth economy

-Hypothesis 2

H0: Technology affects economic growth

Ha: Technology does not affect economic growth-Hypothesis 3

H0: Investment realization affects economic growth

Ha: Investment realization does not affect economic growth

METHOD

3.1 Unit of Analysis, Population, and Sample

The title of the research conducted by the author is "The Effect of Total Employment, Technology, and Investment Realization on Economic Growth in Java in 2013-2022" taking the unit of analysis in the form of economic growth on the island of Java, and the population in this study is all data on the number of workers, ICT IP, and investment realization.

3.2 Data Collection Technique

In collecting data, the technique used by researchers in this study is documentation technique. To obtain data on the number of workers and economic growth from the Central Statistics Agency (BPS), ICT IP data from the Ministry of Information and Communication (Kominfo) and investment data obtained from the Investment Coordinating Board of the Republic of Indonesia (BKPM) Indonesia. So the total data needed in the study are Total Workforce, ICT IP, Investment Realization, and Economic Growth.

and Economic Growth in Java for 2013-2022.

3.3 Operational Variables

In this study, three dependent variables and one independent variable were used.

a. Number of Workers

According to Alam (2014) labor is the population aged between 17 years and 60 years who work to make their own money. (Ayu, 2014). According to Labor Law Number 13 of 2003, the so-called labor is every person who is able to do work in order to produce goods and / or services both to meet their own needs and for the community. (MINISTRY OF INDUSTRY, 2003).

b. Technology

Technology is the overall means of providing goods necessary for the survival, and comfort of human life. The use of technology by humans began with the conversion of natural resources into simple tools. The prehistoric discovery of the ability to control fire increased the availability of food resources, while the invention of the wheel

helped humans travel and control their environment. Recent technological developments, including the printing press, telephone and Internet, have minimized physical barriers to communication and allowed humans to interact freely on a global scale. (Fahira, 2021).

c. **Investment Realization**

Investment realization is the activity of placing capital in the form of money or other valuable assets into an object, institution, or party. Investment realization can be measured by the amount of investment that has been realized in a certain period, such as quarterly or annually.

3.4 Data Analysis Technique

To test "The Effect of Total Workforce, Technological Development, and Investment Realization on Economic Growth in Java in 2013-2023" the data analysis technique uses multiple linear regression analysis on the EViews program. The explanation will be divided into four stages, namely:

a. **Data Preparation/Data Tabulation**

The data used in this study is panel data. The time unit used is annual in the 2010-2020 period. The variables of this study are Economic Growth in Java (Y) as the dependent variable. Total Labor (X1), Technology (X2), and Investment Realization (X3) as independent variables.

b. **Multiple Linear Regression Model Estimation**

This study wants to see the effect of Total Labor (X1), Technology (X2), and Investment Realization (X3) on Economic Growth in Java (Y), so that the regression model formed is as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \text{ Where:}$$

Y = ADHK GRDP

= Constant

$\beta_1, \beta_2, \beta_3, \beta_4$ = Regression Coefficient

β_1 = Total labor

β_2 = Technology

X3 = Investment Realization

ε = Error Term

c. **Classical Assumption Testing**

1. **Normality Test**

The normality test aims to determine whether the data used for research has a normal distribution or not (Ghozali, 2013). Testing residuals that are normally distributed or not uses the Jarque-Bera Test. The decision whether the residuals are normally distributed or not is simple by comparing the calculated JB (Jarque-Bera) probability value with an alpha level of 0.05 (5%). When the Prob. JB calculated is

greater than 0.05, it can be concluded that the residuals are normally distributed. Conversely, if the value is smaller then there is not enough evidence to state that the residuals are normally distributed.

2. *Multicollinearity Test*

Multicollinearity test is a form of assumption testing to prove whether there is a linear relationship between one independent variable and another independent variable. In multiple linear regression analysis, there will be two or more independent variables that are expected to affect the dependent variable. The multicollinearity test aims to test whether there is a correlation between the independent variables in the regression model. A good regression model should not have a correlation between independent variables. The assessment criteria if the value is below 0.8, then the data is free from multicollinearity, but if the value is greater than 0.8 then the data is affected by multicollinearity problems.

3. *Heteroskedasticity Test*

The heteroscedasticity test aims to test whether in a linear regression model there is an inequality of variance from the residuals of one observation to another. Heteroscedasticity occurs when the residual values and predicted values have a correlation or relationship pattern. This relationship pattern is not only a linear relationship, but different patterns are also possible. A good regression model is one that has homoscedasticity or no heteroscedasticity.

4. *Significance Test*

a. F test

The F test is a statistical test that aims to determine the effect of all independent variables simultaneously on the dependent variable. In EViews, the F test output can be seen in Prob(F-statistic). Compare Prob(F-statistic) with the significance level ($\alpha = 5\%$ or 0.05).

The hypothesis in the F Test is as follows:

H_0 = not significant H_a = significant

Prob(F-statistic) decision making is as follows:

If Prob(F-statistic) $> \alpha$, then H_0 is accepted and H_a is rejected If Prob(F-statistic) $< \alpha$, then H_0 is rejected and H_a is accepted.

b. Test t

The t test is a statistical test that aims to determine the effect of independent variables individually (partially) on the dependent variable. The t test output in EViews can be seen in the prob. Compare the problem with the significance level ($\alpha = 5\%$ or 0.05). The hypothesis in the t test is as follows:

H_0 = not significant H_a = significant

Prob. decision making is as follows:

If Prob. $> \alpha$, then H_0 is accepted and H_a is rejected If Prob. $< \alpha$, then H_0 is rejected and H_a is accepted c. Coefficient of Determination The Coefficient of Determination test is a test to determine how much influence all independent variables have on the dependent variable. The output of the coefficient of

determination test can be seen in R- squared and Adjusted R-squared. The use of Adjusted R-squared is carried out if the regression model research undergoes modifications such as adding and / or subtracting independent variables. The coefficient of determination is useful for predicting and seeing how much the influence of variable X simultaneously (together) on variable Y contributes.

RESULT AND DISCUSSION

Description of Research Data

The data used in this study is secondary data which is *panel* data or a combination of time series and cross section data from 2013 to 2022. This study uses three independent variables, namely the number of workers, technology and investment realization, and one dependent variable, namely economic growth in Java. In this study, the data processing tool used evIEWS 12. The purpose of this study is to determine whether the independent variables affect the dependent variable.

YEAR	PROVINCE	X1	X2	X3	Y
2013	DKI Jakarta	10,83	2,17	17,65	14,08
2014	DKI Jakarta	10,55	2,22	18,30	14,13
2015	DKI Jakarta	11,07	1,97	18,09	14,19
2016	DKI Jakarta	11,65	2,00	17,99	14,25
2017	DKI Jakarta	11,75	1,94	18,60	14,31
2018	DKI Jakarta	11,03	1,97	18,64	14,37
2019	DKI Jakarta	11,57	1,98	18,66	14,42
2020	DKI Jakarta	11,42	2,01	18,41	14,40
2021	DKI Jakarta	11,64	2,04	18,49	14,43
2022	DKI Jakarta	11,75	2,03	18,81	14,49
2013	West Java	11,71	1,53	18,61	12,71
2014	West Java	11,78	1,57	18,61	12,77
2015	West Java	12,16	1,40	18,57	12,82
2016	West Java	12,20	1,51	18,57	12,87
2017	West Java	12,14	1,68	18,59	12,92
2018	West Java	12,15	1,73	18,68	12,98
2019	West Java	12,20	1,77	18,77	13,03
2020	West Java	12,12	1,79	18,65	13,00
2021	West Java	12,07	1,81	18,77	13,04
2022	West Java	12,19	1,82	19,02	13,09
2013	Central Java	13,55	1,42	16,80	13,90
2014	Central Java	13,66	1,43	16,85	13,95
2015	Central Java	13,63	1,48	17,17	14,00
2016	Central Java	13,79	1,41	17,51	14,06
2017	Central Java	13,85	1,61	17,86	14,11
2018	Central Java	13,75	1,64	17,98	14,17

2019	Central Java	13,92	1,71	17,93	14,21
2020	Central Java	13,86	1,75	17,77	14,19
2021	Central Java	13,95	1,76	18,14	14,23
2022	Central Java	14,13	1,76	18,44	14,28
2013	DI Yogyakarta	14,00	1,83	13,52	13,50
2014	DI Yogyakarta	14,18	1,80	14,36	13,55
2015	DI Yogyakarta	14,42	1,72	14,38	13,60
2016	DI Yogyakarta	12,03	1,81	14,00	13,65
2017	DI Yogyakarta	14,22	1,84	13,67	13,70
2018	DI Yogyakarta	14,22	1,90	15,82	13,75
2019	DI Yogyakarta	14,20	1,93	15,69	13,81
2020	DI Yogyakarta	14,19	1,96	14,86	13,78
2021	DI Yogyakarta	14,22	1,97	14,95	13,81
2022	DI Yogyakarta	14,26	1,98	15,22	13,86
2013	East Java	11,70	1,47	18,29	11,23
2014	East Java	11,75	1,48	18,01	11,28
2015	East Java	11,45	1,31	18,15	11,33
2016	East Java	11,70	1,45	18,15	11,38
2017	East Java	11,91	1,64	18,06	11,43
2018	East Java	12,03	1,65	17,81	11,49
2019	East Java	12,42	1,70	17,89	11,56
2020	East Java	12,39	1,75	18,20	11,53
2021	East Java	12,17	1,77	18,22	11,58
2022	East Java	12,32	1,78	18,55	11,63
2013	Banten	13,89	1,59	17,95	13,99
2014	Banten	13,99	1,64	17,50	14,05
2015	Banten	14,23	1,46	17,72	14,10
2016	Banten	13,90	1,57	17,87	14,16
2017	Banten	14,19	1,70	17,96	14,21
2018	Banten	14,10	1,76	17,96	14,26
2019	Banten	14,19	1,77	17,73	14,32
2020	Banten	14,11	1,79	17,98	14,29
2021	Banten	14,10	1,81	17,91	14,33
2022	Banten	14,64	1,84	18,25	14,38

Results

1. Descriptive Analysis

Descriptive analysis is a statistical analysis method that has the aim of providing a description of the research subject based on variable data obtained from certain subject groups .

Y	X1	X2	X3
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Mean	13.44953	12.88671	1.742766	17.55941
Median	13.88479	12.40576	1.762159	17.98969
Maximum	14.48511	14.64007	2.222459	19.02465
Minimum	11.23370	10.55414	1.311032	13.52304
Std. Dev.	1.024542	1.189389	0.203255	1.419699

2. Model Selection Test

a. Chow Test

The chow test is used to determine which model is better between the Common Effect Model and the Fixed Effect Model. The hypothesis in the chow test is as follows:

Ho: Common Effect Model Ha: Fixed Effect Model

Criteria: If the Significant value > 0.05 then Ho is accepted If Sig value < 0.05 then Ha is accepted.

Redundant Fixed
Effects Tests
Equation: Untitled
Test cross-section fixed
effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1073.256345	(5,51)	0.0000
Cross-section Chi-square	279.931429	5	0.0000

Based on the chow test results in the table using evIEWS 12, it shows that the significance value is 0.0000. So that a decision can be made that H₀ is rejected and H₁ is accepted. Furthermore, it can be said that the Fixed Effect model is better than the *Common Effect Model*. This is indicated by the significance value of 0.0000 < 0.05 . Therefore, the *Fixed Effect Model* is considered better.

b. Hausman Test

The Hausman test is used to determine which model is better between the *Fixed Effect Model* and the *Random Effect Model*. The hypothesis in the Hausman test is as follows:

Ho: Random Effect Model Ha: Fixed Effect Model

The criteria used in this test are if the significance value > 0.05 then the selected model is the Random Effect Model. Meanwhile, if the significance value < 0.05 then the selected model is the Fixed Effect Model. The following is a table of calculation of the hausman test results shown in the table below:

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	11.944227	3	0.0076

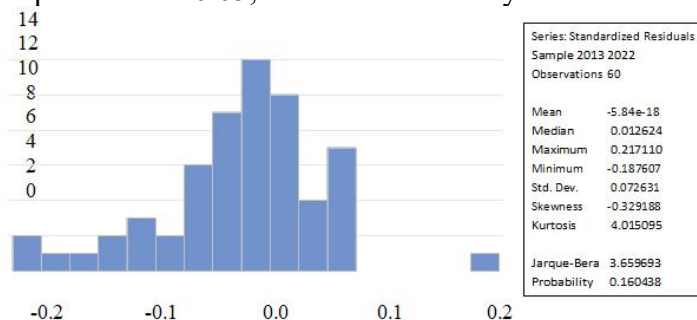
Based on the Hausman test shown in the table, the significance value is 0.0076 (smaller than 0.05) so that statistically H_0 is rejected and H_a is accepted, so the appropriate estimation model used is the *Fixed Effect Model*.

3. Classical Assumption Test

The assumption test is carried out to assess whether the data used is suitable for analysis, this is important so that bias does not arise. To carry out the classic assumption test, researchers use the following test:

a. Normality Test

The normality test is carried out as a prerequisite for conducting data analysis. The normality test is needed to test variables by assuming that the residual values are normally distributed. To see the results of the normality test, this study used the Jarque-Bera test. The basis for determining whether the data is normal or not if the value of the probability of Jarque Bera is greater than the alpha level of 0.05, the data is normally distributed.



The normality test results show that the Jarque Bera data is 0.160438. So it can be concluded that the data is normally distributed in this study because the probability is $0.160438 > 0.05$.

b. Multicollinearity Test

Multicollinearity test is conducted to test whether the regression model found a correlation between independent variables or not.

	Number of Workers	Technology	Investment
Number of Workers	1.00000	-0.167371	-0.511203
Technology	-0.167371	1.00000	-0.135999

Investment	-0.511203	-0.135999	1.00000
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Based on the test of the correlation coefficient value above, each variable has a coefficient value <0.8 , it can be concluded that the model does not experience multicollinearity problems.

c. Heteroscedasticity Test

This test is used to determine whether the residuals have a homogeneous (constant) variety or not. This test is carried out with the aim of testing whether in the regression model there is an inequality of variance from residuals between one observation to another. The prerequisite that must be met is that the probability value > 0.05 then the data is free from symptoms of heteroscedasticity. Meanwhile, for a probability value <0.05 , the data is said to contain symptoms of the classic assumption of heteroscedasticity.

Dependent Variable: RESABS

Method: Panel Least Squares

Date: 05/16/24 Time: 19:36

Sample: 2013 2022

Periods included: 10

Cross-sections included: 6

Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.026282	0.205243	5.00031	0.129
			4	0
X1	0.353312	0.242960	1.45420	0.151
			2	5
X2	0.031126	0.038423	0.81008	0.421
			6	7
X3	-	0.011728	-	0.990
	0.000135		0.01146	9
			9	

Effects Specification

Cross-section fixed (dummy variables)

Root MSE	0.030936	R-squared	0.578
			587
Mean dependent var	0.054002	Adjusted R-squared	0.512
			484
S.D. dependent var	0.048058	S.E. of regression	0.033
			555
Akaike info criterion	-	Sum squared resid	0.057
	3.813766		424
Schwarz criterion	-	Log likelihood	123.4
	3.499614		130
Hannan-Quinn criter.	-	F-statistic	8.752
	3.690884		695

Durbin-Watson	1.216636	Prob(F-statistic)	0.000
stat			000

1. Hypothesis Test

a. Regression Estimation Results

Based on the chow test and hausman test, the appropriate panel data regression model to use in this study is the Fixed Effect Model. The regression results using the Fixed Effect Model are as follows:

Dependent
Variable: Y
Method: Panel Least Squares
Date: 05/16/24 Time: 15:44
Sample: 2013
2022
Periods
included: 10
Cross-sections included: 6
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.709686	0.477827	20.3205	0.0000
X1	0.087962	0.030022	2.92992	0.0051
X2	0.471413	0.089453	5.26996	0.0000
X3	0.101640	0.027304	3.72254	0.0005

Effects Specification

Cross-section fixed (dummy variables)

Root MSE	0.072023	R-squared	0.9949
Mean dependent var	13.44953	Adjusted R-squared	0.9941
S.D. dependent var	1.024542	S.E. of regression	0.0781
Akaike info criterion	-	Sum squared resid	0.3112
Schwarz criterion	-	Log likelihood	72.709
Hannan-Quinn criter.	-	F-statistic	1262.1
	2.000780		47

Durbin-Watson stat	0.907444	Prob(F- statistic)	0.0000 00
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Based on the table above, the panel data regression results are obtained as follows: $Y = 9.709686 - 0.087962 (X1) + 0.471413 (X2) + 0.101640 (X3) + e$

Description:

Y = Economic growth

X1 = Total Labor X2 = Technology

X3 = Investment Realization

From the regression equation above, it can be interpreted as follows:

1. If the Number of Workers, Technology and Investment Realization remain (constant) then the constant has 0 will cause Y, namely employment to be 9.709686.
2. If X1 (Total Labor) increases in number, then economic growth will increase by 0.087962, assuming technology and investment realization are fixed or constant.
3. If X2 (Technology) there is an increase in IP-ICT by one percent, economic growth will increase by 6124.168, assuming the amount of labor and investment realization is fixed or constant.
4. If X3 (Investment Realization) there is an increase in investment realization by one unit, economic growth will increase by 0.101640 with the assumption that the number of workers and IP-ICT are fixed or constant.

b. Partial Regression Coefficient Test (t test)

The t statistical test is basically carried out to see how far the influence of one independent variable individually explains the variation in the dependent variable. The hypothesis is intended to determine whether an independent variable has a partially significant effect on the dependent variable.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.709686	0.477827	20.32051	0.0000
X1	0.087962	0.030022	2.929920	0.0051
X2	0.471413	0.089453	5.269967	0.0000
X3	0.101640	0.027304	3.722546	0.0005

Source: Eviews 12

Based on the results of the data processing above, the probability value is <0.05 , which indicates that the independent variables in this study, namely the Number of Workers, Technology, and Investment Realization, have a significant effect on Economic Growth in Java.

1) Effect of Total Labor on Economic Growth

The test results using panel data show that the number of workers has a positive influence on economic growth. The number of workers obtained a probability value smaller than the significance level set ($0.0051 < 0.05$) with a coefficient of 2.929920. This indicates that the

variable number of workers has a positive influence on economic growth and is significant with 5% significance. Based on the hypothesis, there is strong evidence to conclude that the number of workers has a positive and significant influence on economic growth. In other words, the

labor variable plays an important role in explaining variations in economic growth in the regression model used and the hypothesis is accepted.

2) Effect of IP-ICT on Economic Growth

The test results using panel data show that technology has a positive influence on economic growth. Technology obtained a probability value smaller than the specified significance level ($0.0000 < 0.05$) with a coefficient of 5.269967. This indicates that the variable amount of technology has a positive effect on economic growth and is significant at 5% significance. Based on the hypothesis, there is strong evidence to conclude that technology has a positive and significant influence on economic growth. In other words, the technology variable plays an important role in explaining variations in economic growth in the regression model used and the hypothesis is accepted.

3) Effect of Investment Realization on Economic Growth

The test results using panel data show that investment realization has a positive influence on economic growth. The number of workers obtained a probability value smaller than the significance level set ($0.0005 < 0.05$) with a coefficient of 3.722546. This indicates that the investment realization variable has a positive influence on economic growth and is significant with 5% significance. Based on the hypothesis, there is strong evidence to conclude that investment realization has a positive and significant influence on economic growth. In other words, investment realization variable plays an important role in explaining the variation of economic growth in the regression model used and the hypothesis is accepted.

c. F test

The f test is conducted to test all independent variables in the model have a joint or simultaneous influence on the dependent variable. The calculation of the f test is seen from the comparison of the calculated prob f value with the alpha error level (0.05). If the prob fcount value is < 0.05 then the regression model is estimated feasible, while if the prob fcount value is > 0.05 then the regression model is estimated not feasible. The following are the results of the f test tested by the researchers

Root MSE	0.072023	R-squared	0.994974
Mean dependent var	1.344.953	Adjusted R-squared	0.994186
S.D. dependent var	1.024.542	S.E. of regression	0.078120
Akaike info criterion	-2.123.662	Sum squared resid	0.311239
Schwarz criterion	-1809511	Log likelihood	7.270.987
Hannan-Quinn criter.	-2.000.780	F-statistic	1.262.147
Durbin-Watson stat	0.907444	Prob(F-statistic)	0.000000

Based on the results of the Eviews output above, the probability value of the F- statistic is 0.000000 which is smaller than the significance level of 0.05 so that H_0 is rejected. This shows that the variables of Total Employment, Technology and Investment Realization together (simultaneously) have a significant influence on Economic Growth, so that the regression model can be used to predict the dependent variable.

d. Determination Test (R²)

The coefficient of determination is a test used to measure the ability of the model to explain variations in the dependent variable. The coefficient of determination is in the range between zero and one. If the coefficient of determination is small, the ability of the independent variable variation is very limited in explaining the dependent variable. However, if the coefficient of determination is close to one, it means that the independent variables provide almost all the information needed in estimating the variation in the dependent variable (Basuki, 2017). The coefficient of determination (Adjusted R-Square) is essentially to measure how far the model's ability to explain variations in the dependent variable. An adjusted Rsquare value that is close to one means that the ability of the independent variables to provide almost all the information needed to predict the dependent variation. The coefficient of determination can be seen in the following table.

Root MSE	0.072023	R-squared	0.994974
Mean dependent var	1.344.953	Adjusted R-squared	0.994186
S.D. dependent var	1.024.542	S.E. of regression	0.078120
Akaike info criterion	-2.123.662	Sum squared resid	0.311239
Schwarz criterion	-1809511	Log likelihood	7.270.987
Hannan-Quinn criter.	-2.000.780	F-statistic	1.262.147
Durbin-Watson stat	0.907444	Prob(F-statistic)	0.000000

Source: Eviews 12 processed by researchers

Based on the table above, the Adjusted R-Square (R²) number is 0.994974. This shows that the independent variable can explain the dependent variable by 99.49% while 0.51% is influenced by other variables. While the Adjusted R-squared value is 0.994186 which means that the dependent variable of economic growth can explain the dependent variable of the number of workers, technology and investment realization by 99.41% while the other 0.59% is influenced by other factors outside the regression model.

Discussion

1. Effect of Total Labor on Economic Growth

Based on the results of data processing, it can be seen that the Total Labor variable has a positive effect on economic growth in Java. Based on the results of the t test, the number of workers has a probability of 0.0051 which is less than the alpha value of 0.05 or the 5% level limit of significance. The positive value of the coefficient and t test shows a positive relationship between the variables of this study. Therefore, it can be concluded that partially the number of workers has a positive and significant influence on Economic Growth in Java Island in 2013-2022. Then based on the results of the t test processing, the hypothesis stating that the number of workers has a positive and

significant effect on economic growth is accepted. The regression coefficient result is 2.929920 which can be interpreted that if the number of workers increases by 1 unit, then economic growth will increase by 2.929920 with the assumption that technology and investment realization remain. According to Solow's theory, if labor increases, it will increase output in economic growth. The role of labor as one of the factors of production will affect national income. The most important factor of labor is not in terms of quantity but quality. If the quality of labor is better, there will be an increase in production.

2. *The Effect of Technology on Economic Growth*

Based on the results of data processing, it can be seen that the technology variable has a positive effect on economic growth in Java. Based on the results of the t test, the number of workers has a probability of 0.0000 which is less than the alpha value of 0.05 or the 5% level limit of significance. The positive value of the coefficient and t count shows a positive relationship between the variables of this study. Therefore, it can be concluded that partially technology has a positive and significant influence on Economic Growth in Java Island in 2013-2022. Then based on the results of the t test processing, the hypothesis stating that the number of workers has a positive and significant effect on economic growth is accepted. The regression coefficient result is 5.269967 which can be interpreted that if technology increases by 1 unit, then economic growth will increase by 5.269967 with the assumption that the amount of labor and investment realization remains the same.

According to Solow's theory, if labor increases, it will increase output in economic growth. The role of labor as a factor of production will affect national income. The most important factor of labor is not in terms of quantity but quality. If the quality of labor is better, there will be an increase in production.

Technological advances enable the production of more and more efficient output on which a country's prosperity depends (Harvard RCC, 2020). Robert Solow argues that Economic Growth is a series of activities based on four main factors, namely humans, capital accumulation, modern technology and output. With good technological knowledge described through ICT IP, it will increase labor productivity which can increase economic growth.

3. *Effect of Investment Realization on Economic Growth*

Based on the results of data processing, it can be seen that the investment realization variable has a positive effect on economic growth in Java. Based on the results of the t test, the number of workers has a probability of 0.0005 which is less than the alpha value of 0.05 or the 5% level limit of significance. The positive value of the coefficient and t test shows a positive relationship between the variables of this study. Therefore, it can be concluded that partially technology has a positive and significant influence on Economic Growth in Java Island in 2013-2022. Then based on the results of the t test processing, the hypothesis stating that investment realization has a positive and significant effect on economic growth is accepted. The regression coefficient result is 3.722546 which can be interpreted that if technology increases by 1 unit, then economic growth will increase by 3.722546 with the assumption that the amount of labor and technology remains the same.

The Harrod-Domar theory views that capital formation is considered as expenditure that will increase the ability of an economy to produce goods and or services, as well as expenditure that will increase the effective demand of the entire community. Increased investment will ensure the continuity of economic development, absorb labor and reduce poverty, so that there is an overall and equitable improvement in the level of people's welfare. In economic theory, investment has a very important role, namely to increase economic growth. According to Paul M. Jhonson, investment is all income spent by companies or government institutions on capital goods that will be used in productive activities.

CONCLUSION

Based on the discussion that has been presented in the previous chapter, the conclusions in this study are as follows:

1. The number of workers has a positive effect on economic growth. This means that if the labor force increases, it can be said that economic growth will increase.
2. Technology has a positive effect on economic growth. This means that if ICT IP increases, it can be said that economic growth will increase.
3. Investment Realization has a positive effect on economic growth. This means that if investment increases, it can be said that economic growth will increase.
4. The results showed simultaneously or together that the economic growth variable can be explained by the independent variables consisting of the number of workers, technology, and investment realization of 99.46% partially affecting economic growth.

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