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Investment Analysis of the Manufacturing Industry Sector During the Industrial Revolution 4.0 on Provincial PDRB in Indonesia

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ABSTRACT

During the ten-year period, the manufacturing industry sector has become a sector that contributes to economic growth in Indonesia. However, the distribution of GRDP in each island of Indonesia has not been maximized, this shows that the natural resources owned have not been utilized optimally, industries still tend to only supply raw materials which are then marketed abroad and in the end we buy them back at a higher price. The reason is that the application and use of advanced technology has not been maximized, especially at this time when the industry has entered the Industrial Revolution 4.0. This study aims to see the effect of advanced technology consisting of Internet Users, Software, Machinery and Equipment and Education Level on GRDP in Indonesia. The data used is secondary data from 2017-2021. The type of data in this study is panel data. The analysis technique in this study is the panel data regression technique with the Ordinary Least Square (OLS) method of the e-views 10 program. The results of this study indicate that machinery & equipment, internet users, software and education level together have a simultaneous relationship to the GRDP of Provinces in Indonesia. The variables Machinery and Equipment, Software and Internet Users have a positive and significant influence on the GRDP variable of Provinces in Indonesia. Meanwhile, the level of education has a negative influence on the GRDP of provinces in Indonesia.

Keywords: *Provincial GRDP in Indonesia, Manufacturing Industry, Software, Machinery and Equipment, Education Level and Internet Users*

INTRODUCTION

The success of a development or a government policy in a country is reflected in the state of economic growth in the country. National development is a series of sustainable development efforts covering all aspects of community life. The development carried out is not only aimed at pursuing high economic growth but must be accompanied to create a prosperous and prosperous society. This means that development must be felt by the entire community in the country itself.

Economic growth can be used to see the success of the development undertaken. Economic growth is a process of changing the economic condition of a country continuously towards a better state during a certain period which is reflected in an increase in per capita output and also an increase in people's purchasing power. Conventionally, the measurement of economic growth can use GDP and GRDP.

GDP (Gross Domestic Product) is used to look at economic growth within a country. When viewed from the business field GDP based on constant prices (figure 1.1) it can be concluded that during the period 2012-2022 the manufacturing sector has a greater GDP value than other economic sectors. This shows that the manufacturing industry is the leading sector that provides the largest contribution compared to other economic sectors. Leading sector means the sector that is the largest contributor to economic growth

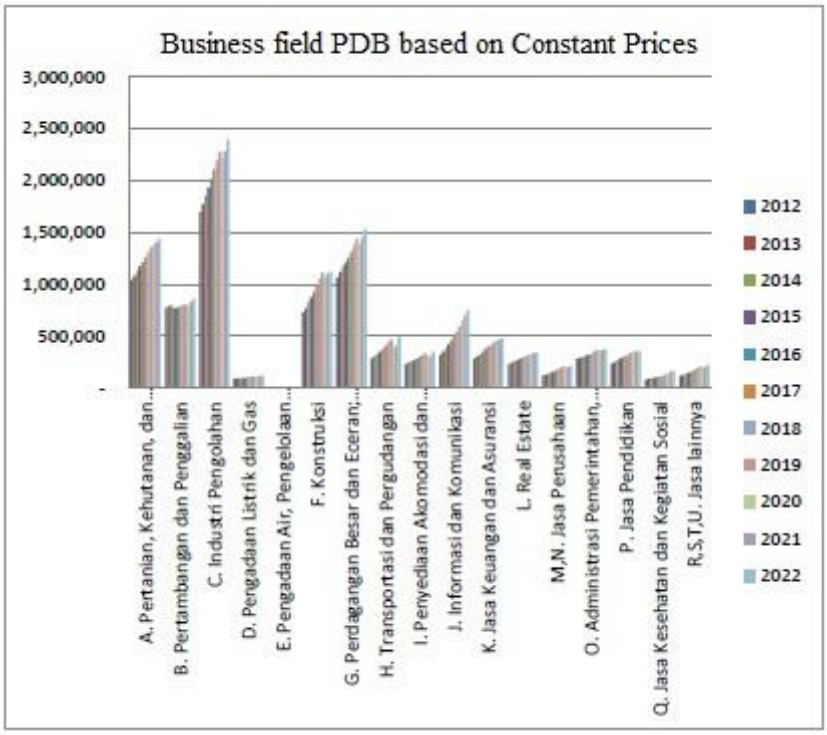
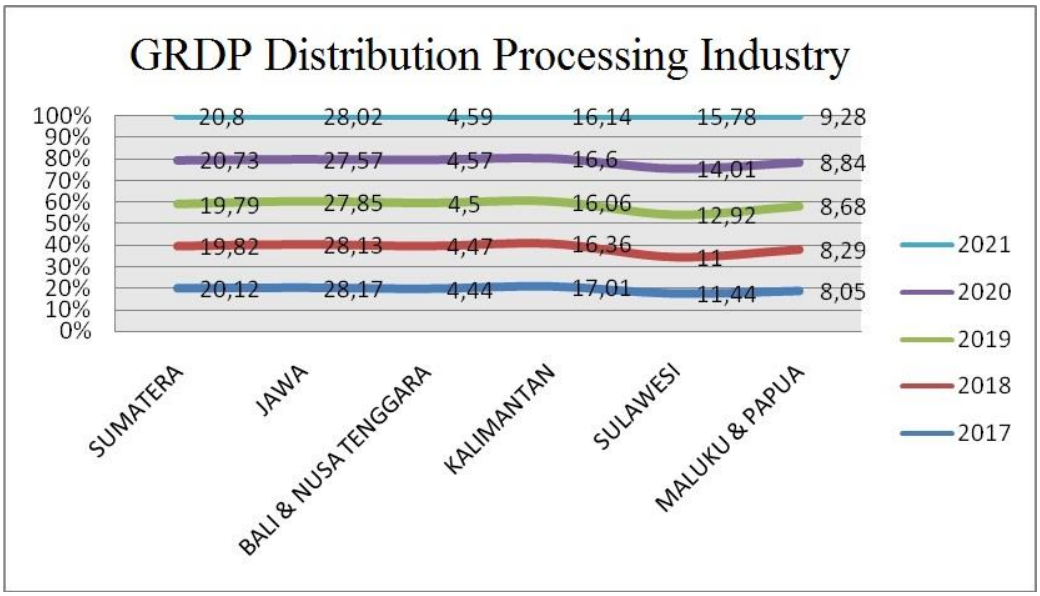


Figure 1 GDP in 2023 based on Business fields in Indonesia

Manufacturing industry is an activity that converts a raw item using the help of tools, additives (chemicals) into semi-finished goods or finished goods that are of higher value and can be used according to the end user (consumer).Kiki Asmara (2018) states that the processing/manufacturing industry sector plays an important role in the economic line in a country because it is believed that the manufacturing industry sector is able to encourage and move the economy which can ultimately increase economic growth. During the Covid 19 pandemic, the manufacturing industry still contributes greatly to Indonesia's economic growth. According to the data, in the third quarter of 2021, the manufacturing industry grew by 3.68% and contributed 0.75% to Indonesia's economic growth. This is what proves that the manufacturing industry can be a driver of the national economy.

In 2018, Bank Indonesia reported that Indonesia had a current account deficit of 2.98%. The current account deficit is expected to be due to the sluggishness of the manufacturing sector (industry). The low competitiveness of the manufacturing industry and the alleged inefficiency of the manufacturing sector are the causes of Indonesia's manufacturing industry not showing optimal performance. Various actors assess the lack of activity of Indonesia's complex manufacturing industry. The activity of the complex manufacturing industry means that the goods produced by the Indonesian manufacturing sector have the added value is limited because it tends to be simple in the sense that the Indonesian manufacturing industry has not used innovation and applied advanced technology. Indonesia as an archipelago is endowed with a myriad of abundant natural resources from

Sabang to Merauke. This should be used to improve the performance of the economic sector in Indonesia which can ultimately increase Indonesia's economic growth. The nature of the development undertaken by the government of Indonesia, in addition to improving people's living standards but also for equity that is able to reach out to remote areas in Indonesia. To determine the level of economic growth in a particular region used data on Gross Regional Domestic Product (GRDP) in accordance with the boundaries of the administrative area of government.



Source: BPS Indonesia, data processed (2023)
Figure 2 GRDP distribution based on processing industry Islands of Indonesia in 2017-2021

The low distribution of GRDP in each island shows that the performance of the manufacturing industry has not been maximized in certain areas. This means that the productivity of the manufacturing industry is still centered on the island of Java. This certainly shows that Indonesia has not been able to maximize its natural resources, still tend to only as a supplier of raw materials and then sold out of the country to produce finished products with added value and marketed back to Indonesia. Since the beginning of 2023, the government has echoed the term downstream industry. Downstream is the process of transformation of a raw material or natural resource into a finished product that has added value. Downstream aims to increase the selling price of a product. For Indonesia, of course, downstream aims to maximize the profits of the manufacturing industry sector by reducing production costs. Of course, this downstream process is inseparable from the use of technology used in industry.

In the new growth theory, the role of technological progress has become very important in maintaining long-term economic growth. It is believed that with a touch of technology, it means that there are improvements in the way of production, thereby increasing productivity and efficiency (Nur, 2020). These technological advances will encourage specialization and savings in production costs on a large scale (Parera, 2018). Development undertaken by the government can also be mentioned as a form of government investment in technological infrastructure that supports the economic growth of a country.

Currently, Indonesia has entered the empowerment of the role of digital integration in the industrial sector known as the industrial Era 4.0 (Murti S. d., 2019). The Industry 4.0 Era is a transitional industrial era, which in this era empowers the role of

manufacturing digitization in the supply network which involves the integration of information from various sources and locations to physically drive manufacturing and distribution. The integration of Information Technology and technology is characterized by connectivity between physical to digital and physical roles. IR 4.0 applies the Internet of Things (IoT) and physical technologies to analysis, manufacturing, robotics, advanced computing, artificial intelligence, cognitive technologies, advanced materials, and augmented reality in carrying out the business operations cycle.

In Indonesia, the era of Industrial Revolution 4.0 has existed since 2011 marked by increased connectivity, interaction and boundaries between humans, machines and other resources are increasingly converging through technology and communication. The Era of the Fourth Industrial Revolution has clearly become a major leap in the industry, where information and communication technology is not only utilized in the production process, but also throughout the industrial value chain in order to achieve high efficiency and better product quality. Currently, all countries in the world are increasingly competing in the use of technology in every industrial sector. For this reason, the national industrial sector must immediately make improvements, especially in the aspect of mastering technology which determines competitiveness in the industrial era 4.0. If not, Indonesia's manufacturing industry will not be able to compete with the manufacturing industry of other countries in the world.

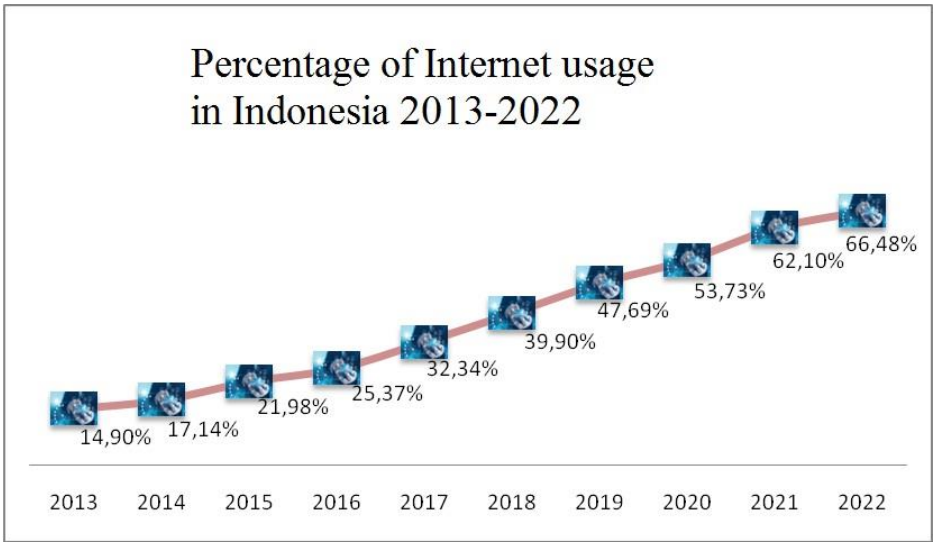
For Indonesia, the 4IR phenomenon provides an opportunity to revitalize Indonesia's manufacturing sector and become one of the ways to accelerate the achievement of Indonesia's vision to become the 10 largest economies in the world (Making Indonesia 4.0).

The implementation of 4IR is also expected to increase productivity which will increase global competitiveness and can increase GDP, especially in the manufacturing industry sector. So that in the end with the increasing growth of the manufacturing sector will encourage the growth of other economic sectors. Such as encouraging the growth of the agricultural sector, by providing raw materials for industry, as well as the service sector, namely through financial institutions by providing additional capital or marketing institutions in marketing the products produced so that ultimately it will encourage the increase in the industrial sector (Nurhayani, 2022).

When we draw the common thread of the industrial revolution from the Industrial Revolution I to the industrial revolution to IV that the industrial revolution is a rapid change in the production process, which was originally done by humans can now be done by machines. The changes that occurred in each phase of the Industrial Revolution had a different impact based on its use. This means that every revolution that occurs has an impact on the renewal of the machines and equipment used in the industrial sector. Starting from the invention of the steam engine in the first industrial revolution and then the emergence of machines and electrical power equipment in the Second Industrial Revolution. Furthermore, in the third revolution, also known as the digital revolution, where production processes that were originally analog become computerized. It was in this third revolution that the personal computer emerged, and the beginnings of the internet, and industrial machinery and equipment began to automate production to take over global supply chains. Until the Industrial Revolution 4.0 era of connectivity, where there are no more boundaries between technology and humans. The movement of change that occurred from the first industrial revolution was always triggered by the development of technology to give birth to the era of the Industrial Revolution 4.0, where the Industrial Revolution 4.0 not only opened interaction widely but also disrupted various areas of human life. One of the technologies that are part of the Industrial Revolution 4.0 is IoT (Internet of Things). IoT is a computing

concept that refers to a network of physical devices, vehicles, equipment and other physical objects that are interconnected with the internet network that allows users to obtain information and share data.

The level of internet usage in Indonesia itself has increased significantly. Internet users in Indonesia in 2017 reached 143.26 million of the total population of Indonesia, which at that time amounted to 265 million people. The development of the internet network is expanding to all corners of the country every year, this is what then causes people who access the internet in the country to increase every year.



Source: Statistik Telecommunications Indonesia
Figure 3 level of Internet usage in Indonesia in 2013-2022

In the era of Industrial Revolution 4.0, the Internet is no longer just connecting millions of people around the world but has expanded to become the basis for online trade and transportation transactions. Where with the existing connectivity on the internet industry players can easily reach consumers from all corners of the country. And for consumers the purchase of goods transactions no longer have to come into place but only with a smart phone and internet connection the desired product can be obtained easily and effectively (save time). By 2030 many world studies estimate that IoT could contribute $14.2 trillion to the global economy (Savitri, 2019).

Computing on a network of physical objects can run in accordance with the desired function and purpose of both machines and equipment and the internet is inseparable from the function of software or software. Software or programming languages are commands given to run by The Associated machine to produce output as expected. This Software is a chip that is implanted into a computer that is connected to related machines in the industrial production process. Software is one of the elements of information technology that currently plays a role in the Industrial Revolution 4.0.

The Industrial Revolution 4.0 not only talks about the production of goods or services but also the quality of human resources that are able to master technological developments. Especially now the population in Indonesia is dominated by the productive age group between 15-64 years. It can be a strength for Indonesia that the productive age group can support the growth in industrial innovation in Indonesia. Quality and resilient human resources can be realized through a quality level of education that is a barometer of a country's development (UGM, 2019).

It is undeniable that the scientific and technological progress of a nation or country is synonymous with the high level of public

education in general. In human capital theory, the economic growth of a country is also influenced by the contribution of Education. through improved work skills and work productivity. Quality human resources are in line with a quality education system as well. Education is an investment in human resources in supporting economic growth that is built and developed from an economic structure to bring about quality education (Ulfa Hanifah, 2023). Especially in the current 4.0 Revolution, the government predicts that Indonesia needs 17 million workers who are able to master information technology. Because, adequate technology will not be useful if it is not accompanied by the ability (skill) to use/utilize it. Therefore, it is important for the Indonesian people to constantly improve their learning ability, skills in accordance with the needs in the era of the Industrial Revolution 4.0 so that each individual has a stronger competitiveness.

The higher the level of education that is carried out, it is believed that the easier a person is to absorb developing technology. Currently, Indonesian people who have higher education are very few in number. Of course, this has an impact on the development of Science and technology in place, because there is no interaction and low competition climate in the community in developing and implementing scientific and technological advances, especially in the current Industrial Revolution 4.0.

The sustainability phase of the industrial revolution should be viewed as something that is capable of being a great leap forward for the industrial sector, where information and communication technology is fully utilized. Not only in the production process but also throughout the industrial value chain which is then expected to give birth to digital innovation in order to achieve high efficiency and better product quality in competing. The Industrial Revolution 4.0 is not only limited to the production of goods but also human quality. Human resources are required to be capable and skilled in entering a new round of global competition. Competition in the Industrial Revolution 4.0 is not only between humans and humans but has expanded into competition between humans and robots and artificial intelligence. In the end, the implementation of industrial digitalization 4.0 is expected to provide Indonesia's economic growth for the better.

LITERATURE REVIEW

Indonesia's Economic Growth

Economic growth as a long-term increase in a country's ability to provide an increasing number of different types of economic goods to its population (Parera, 2018). According to Untoro dalam (Syahputra, 2017) economic growth is the development of economic activities that cause goods and services produced in the community to increase and the prosperity of the community to increase in the long term. Meanwhile, the definition of economic growth quoted from the Gramedia Blog page defines economic growth as a process of continuous change towards better conditions in a country's economy.

Industry Definition

The word industry itself comes from the latin “Industria” which means activity and craft. Most people define industry as an activity to process raw materials into semi-finished goods or into finished goods. But in principle, the understanding of the industry is very broad. Industry is not only the activity of processing raw materials into finished materials but also includes all human activities in a particular field that is productive and commercial.

The Industrial Revolution

Revolution means a fairly fundamental change in a field, while industry means the activity of processing goods using suggestions and equipment. So it can be interpreted as a fairly fundamental change in the activities of processing goods using advice and equipment.

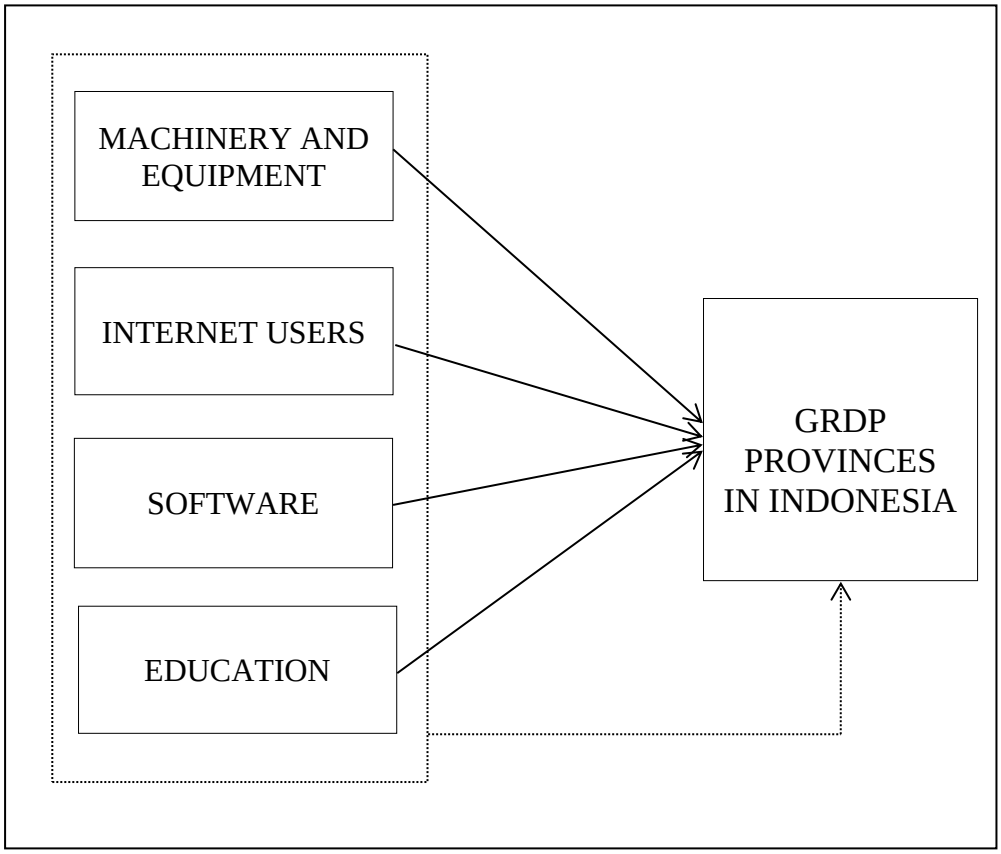


Figure 4. Conceptual Framework

Hypothesis

Based on the background of research and the relationship between variables, the research hypothesis :

1. It is suspected that the machinery and equipment have a positive effect on provincial GRDP in Indonesia during the Industrial Revolution 4.0
2. It is suspected that Indonesian Internet users have a positive effect on provincial GDP in Indonesia during the Industrial Revolution 4.0
3. It is suspected that the software has a positive effect on provincial GRDP in Indonesia during the Industrial Revolution 4.0
4. It is suspected that the level of Education of the Indonesian people has a positive effect on provincial GDP in Indonesia during the Industrial Revolution 4.0
5. It is suspected that machinery and equipment, software, Internet use and education levels have a simultaneous significant effect on provincial GDP in Indonesia during the Industrial Revolution 4.0.

MATERIAL AND METHODS

This research is an investment in the manufacturing industry sector during the Industrial Revolution 4.0 and its influence on economic growth in Indonesia during the period 2017 - 2021. Variables used, namely the level of education, empowerment of machines and equipment built, software made, the number of internet users and the level of mastery of technology. The population in this study is the observation of all provinces in Indonesia, which will then be classified based on the availability of variable data in this study. So that the number of samples in this study is 23 provinces.

The type of data used in this study is quantitative data, namely secondary data obtained from various related agencies such as BPS and other sources, namely journals and research results related to this research topic. In this study, the data type used is panel data, which is a combination of time

series and cross section data. Time series data covers the period 2017-2021 due to the availability and consistency of data in that period. The selected Indonesian provinces in the cross section data as many as 23 provinces that meet the criteria have complete and consistent data for all variables used in this study. The variables used in this study are the economic growth of Indonesia, the level of education, the empowerment of new machinery and equipment, software made and the level of mastery of technology. The method of analysis used in this study is Ordinary Least Square (OLS). OLS method is a regression method that minimizes the number of errors (errors) squared. The data processing carried out in the study using the help of processing tools from Data Processing EViews version 10.

The analysis technique used in this study to answer the problem / hypothesis is a regression analysis of panel data. The first step is to determine the panel data regression model. Determination of the panel data regression model can be done by considering the purpose of analysis or by looking at the possibility of data used as the basis for modeling. Some econometrics experts said that if the panel data research has a larger number of stone (t) compared to the number of individuals (i) then it is recommended to use the Fixed Effect method. Conversely, if the panel data has a number of time (t) is smaller than the number of individuals (i) then it is recommended to use the Random Effect method. The selection of the most appropriate model can be carried out several tests.

RESULTS AND DISCUSSION

RESULTS

Panel Data Regression Analysis

Regression testing of panel data in this study using e-views 10. The first step is the estimation of panel data regression using Common Effect Models (CEM), Fix effect Model (FEM) approach. Here are the results of panel data regression estimation:

Table 1 Panel Data Regression Estimation

Variable	*Fixed Effect Model*		*Common Effect Model*		*Random Effect Model*	
	Coefficient	*Prob.*	*Coefficient*	*Prob.*	*Coefficient*	*Prob.*
C	21.75037	0.0000	22.26368	0.0000	25.86966	0.0000
MP	0.009061	0.0005	0.007812	0.0016	9.08E-05	0.3777
PI	0.045606	0.0038	0.031468	0.0007	0.005649	0.0000
PL	0.288280	0.0001	0.330817	0.0000	0.000964	0.7835
TP	-0.011453	0.2086	-0.009021	0.3036	0.001731	0.4982

Source: process data using Eviews 10 (2024)

After being able to estimate the next panel data regression test to select the best panel data regression model in this study. Panel data regression model selection can be done through CHOW Test, Hausman test and LaGrange Multiplier (LM) Test.

Chow Test Results

Chow test aims to determine whether the panel data regression model with the most appropriate Common Effect Model used in estimating the panel data than the Fixed Effect Model. The hypothesis formed in the Chow Test as follows:

H0: Common Effect Model is better than Fixed Effect Model

The Fixed Effect Model is better than the Common Effect Model.

If the chi-Square cross section probability value > 0.05 then H0 is accepted and Ha is rejected and vice versa if the chi-Square cross section probability value < 0.05 then H0 is rejected and Ha is accepted. The following are the results of the Chow Test in this study:

Table 2 Chow Test Results

Effects Test	*Statistic*	*d.f.*	*Prob.*
Cross-section F	3717.215502	(22,87)	0.0000
Cross-section Chi-square	787.396693	22	0.0000

Source: process data using Eviews 10 (2024)

Based on the results of the Chow Test in the table above, the chi-Square cross section probability value of 0.000 means less than 0.05 (0.000< 0.005), it can be concluded that H0 is rejected and Ha is accepted. Interpretation of the results of the Chow Test is that the Fixed Effect Model is better used to estimate the panel data than the Common Effect Model. Next we will proceed to the Hausman test.

Hausman Test Results

The purpose of this Hausman test is to determine the best model between Random Effect Model and Fixed Effect Model that will be used in panel data modeling. The hypothesis formed in the Hausman Test as follows:

H0: Random Effect Model is better than Fixed Effect Model

Ha: Fixed Effect Model is better than Random Effect Model.

Criteria in making conclusions on the Hausman test is that if the value of the probability of random cross section > 0.05 then H0 accepted and rejected and vice versa if the value of the probability of random cross section < 0.05 then rejected and Ha H0 accepted. The following are the results of the Chow Test in this study:

Table 3 Hausman Test Results

Test Summary	*Chi-Sq. Statistic*	*Chi-Sq. d.f.*	*Prob.*
Cross-section random	27.876391	5	0.0000

Source: process data using Eviews 10 (2024)

Based on the results of the Hausman test in the table above random cross section probability value of 0.000 means less than 0.05 (0.000< 0.005), it can be concluded that H0 rejected and Ha accepted. Interpretation of Hausman test result is that Fixed Effect Model is better used to estimate panel data than Random Effect Model. Because of both the CHOW Test and the Hausman test selected Fixed Effect Model, there is no need to test the Lagrange Multiplier (LM) Test.

Table 4 Fixed Effect Models

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	21.75037	0.755281	28.79771	0.0000
MP	0.009061	0.002527	3.585613	0.0005
PI	0.045606	0.015431	2.955404	0.0038
PL	0.288280	0.069273	4.161523	0.0001
TP	-0.011453	0.009053	-1.265149	0.2086
R-squared	0.532833	***Mean dependent var***		26.24783
Adjusted R-squared	0.497575	***S.D. dependent var***		1.027960
S.E. of regression	0.728638	***Akaike info criterion***		2.279749
Sum squared resid	56.27677	***Schwarz criterion***		2.494569
Log likelihood	-122.0855	***Hannan-Quinn criter.***		2.366943
F-statistic	15.11245	***Durbin-Watson stat***		0.379948
Prob(F-statistic)	0.000000			

Source: process data using Eviews 10 (2024)

Multicollinearity Test

Research that has more than one number of variables must be done multicollinearity test,

especially in regression panel data with fixed effect estimation classical assumption model that must be met is multicollinearity test. This test is to see whether the independent variables have a linear relationship in the regression equation, where when the independent variables are interconnected it will be difficult to obtain the effect between the independent variable and the dependent variable. Multicollinearity test can be seen from the correlation values that occur between variables. Criteria in decision making on multicollinearity test is if the correlation value of each independent variable > 0.8 multicollinearity occurs, and vice versa if the correlation value of each independent variable < 0.8 then multicollinearity does not occur. The following multicollinearity test results in this study:

Table 5 Multicollinearity Test Results

	PDRB	**MP**	**PI**	**PL**	**TP**
PDRB	1.000000	0.535437	0.297424	0.653007	-0.107491
MP	0.535437	1.000000	0.019781	0.571427	-0.107102
PI	0.297424	0.019781	1.000000	0.143991	0.257337
PL	0.653007	0.571427	0.143991	1.000000	-0.153902
TP	-0.107491	-0.107102	0.257337	-0.153902	1.000000

Source: process data using Eviews 10 (2024)

Multicollinearity test results in the table above shows that the correlation value between each variable < 0.8. This shows that there is no strong correlation between each independent variable in other words shows that the model does not exist multicollinearity problem.

Heteroscedasticity Test

Heteroskedasticity test was conducted to test whether in the regression model occurs variance inequality of residual, this test uses the glacier test with the following hypotheses:

H0: no symptoms of heteroskedasticity in the regression model

H1: symptoms of heteroscedasticity in the regression model

The decision taken is that if the significance value is greater than alpha 0.05 then H0 is accepted and vice versa if the significance value is smaller than 0.05 then H0 is rejected. The following are the results of heteroskedasticity testing in this study

Table 6 Heteroscedasticity Test Results

Dependent Variable: RESABS	
Method: Panel Least Squares	
Date: 07/26/24 Time: 10:05	
Sample: 2017 2021	
Periods included: 5	
Cross-sections included: 23	
Total panel (balanced) observations: 115	
R-squared	0.047031
Adjusted R-squared	0.003317
S.E. of regression	0.014614
Sum squared resid	0.023280
Log likelihood	325.8640
F-statistic	1.075873
Prob(F-statistic)	0.377811

Source: process data using Eviews 10 (2024)

From the test results above, it can be concluded that the value of each variable in the study prob > 0.05 means that accept the null hypothesis and the p value of the test f: 0.377811 > 0.05 or accept H0 then the model

in this study there is no heteroscedasticity problem so that the model is qualified.

Panel Data Regression Equation

Regression Model aims to see the relationship between the dependent variable with the independent variable. In this study the regression model used is a regression model of panel data with fixed effect model estimation, the selection of this model has been done Chow test and Hausman test. The purpose in making a regression model is to process, discuss the samples obtained and to assess the hypotheses made. The results of panel data regression estimation with fixed effect model approach in this research are presented in the table below

Table 7 Results Of Data Regression Estimation Panel Fixed Effect Model

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	21.75037	0.755281	28.79771	0.0000
MP	0.009061	0.002527	3.585613	0.0005
PI	0.045606	0.015431	2.955404	0.0038
PL	0.288280	0.069273	4.161523	0.0001
TP	-0.011453	0.009053	-1.265149	0.2086

Source: process data using Eviews 10 (2024)

Y = 21.75037 + 0.009061 MP + 0.045606 PI + 0.288280 PL - 0.011453 TP + [CX=F]

The following explanation of the regression equation above:

- The constant of 21.75037 explains that if the machine and equipment (MP), Internet use (PI), software (PL), Education Level (TP) does not change or the value is equal to 0, then the average value of provincial GDP in Indonesia rose by 21.75037 percent.
- Variable regression coefficient of machinery and equipment (MP) of 0.009061 then each increase in MP by 1 trillion, it will menaikanPDRB provinces in Indonesia by 0.009061 percent, assuming other independent variables remain or equal to zero.
- Variable regression coefficient of Internet use (PI) of 0.045606 then each increase of PI by 1 percent, it will menaikanPDRB provinces in Indonesia by 0.045606 percent, assuming other independent variables remain or equal to zero.
- Software variable regression coefficient (PL) of 0.288280 then each increase in PL by 1 percent, it will increase the GDP of Provinces in Indonesia by 0.288280 percent, assuming other independent variables remain or equal to zero.
- Variable regression coefficient of Education Level (TP) of -0.011453 then each increase of TP by 1 percent, it will reduce the GRDP of Provinces in Indonesia by 0.011453 percent, assuming other independent variables remain or equal to zero.

Hypothesis Test Results

Hypothesis test is useful to test the significance of regression coefficients obtained. Hypothesis decision is done by comparing t statistics against T tables or probability values to the level of significance set.

1. F test, aims to see the relationship of independent variables simultaneously (together) with the dependent variable. This F test can be done by comparing the F count with the F table or by looking at the probabilities. Here are the test results:

Table 8 F Test Results

Weighted Statistics			
R-squared	0.532833	***Mean dependent var***	26.24783
Adjusted R-squared	0.497575	***S.D. dependent var***	1.027960
S.E. of regression	0.728638	***Durbin-Watson stat***	0.379948
F-statistic	15.11245		
Prob(F-statistic)	0.000000		

F Table

The formula for finding F tables is as follows $Df_{(n1)} = k - 1$, where k is the number of independent variables used in the determination (k =4)

$Df_{(n1)}$ =3

$Df_{(n2)} = n - k$, where n is the number of observations in the study (n =115)

$Df_{(n1)} = 111$

So the value of F table is 2.6863845.

F Count = 15.11245

H0: absence of simultaneous relationship between education level, machinery & equipment,
software, internet use and technology mastery of GRDP Provinces in Indonesia.

H1: simultaneous relationship between education level, machinery & equipment,
software, internet use and technology mastery of GRDP Provinces in Indonesia.

Based on the results of the F test in Table 4.9 above shows the probability value of F statistic 0.000000 < 0.05. With a comparison of F count and F table is 15.11245 >2.6863845. So the conclusion is that H0 is rejected and H1 is accepted, meaning that there is a simultaneous relationship between machinery & equipment, software, internet use and education level to provincial GRDP in Indonesia.

T test

T test is a test performed by testing each independent variable with the dependent variable. In testing the t test is used to determine the magnitude of the influence of each independent variable. In this test using the method of one side (one tails) with a degree of significance of 10% (③=0.10), with a T-table value of 1.28922. There are two ways that can be used, first by comparing the T-table and t-calculate and the second to see the probability. If the value of t-calculate > t-table and probability value < 0.10 then H0 is rejected and Ha is accepted and vice versa. If the value of t-calculate < t-table and the probability value > 0.10 then H0 is accepted and Ha is rejected.

H0: the independent variable has no effect on the dependent variable

Ha: the independent variable has a positive and significant effect on the dependent variable.

The results of the t-Test in this study are presented in Table 4.11 below:

Table 9 t test results

Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
PDRB	21.75037	0.755281	28.79771	0.0000
MP	0.009061	0.002527	3.585613	0.0005
PI	0.045606	0.015431	2.955404	0.0038
PL	0.288280	0.069273	4.161523	0.0001
TP	-0.011453	0.009053	-1.265149	0.2086

Source: process data using Eviews 10 (2024)

Based on the results of the t test in Table 4.10 above can be concluded as follows:

a) variable machinery and equipment (MP) against GRDP provinces in Indonesia

The results of the test obtained a t-count value of 3.585613> t-table (3.585613>1.28922) with a Prob value of 0.0005< 0.10 so that H0 is rejected, and Ha is accepted meaning that the machine and equipment variables (MP) have a positive

and significant effect on GRDP provinces in Indonesia.

b) Internet user variable (PI) on provincial GRDP in Indonesia

The results of the test obtained a t-count value of 2.955404> t-table (2.955404>1.28922) with a Prob value of 0.0038< 0.10 so that H0 is rejected, and Ha is accepted meaning that the internet user variable (PI)has a positive and significant effect on GRDP provinces in Indonesia.

c) Software variables (PL) on GRDP of Provinces in Indonesia

The results of the test obtained a t-count value of 4.161523> t-table (4.161523>1.28922) with a Prob value of 0.0001< 0.10 so that H0 is rejected, and Ha is accepted meaning that the software variable (PL) has a positive and significant effect on GRDP provinces in Indonesia.

d) variable level of Education (TP) on GRDP of Provinces in Indonesia

The results of the test obtained a t-count value of -1.265149< t-table (-1.265149<1.28922) with a Prob value of 0.2086> 0.10 so that H0 is accepted, and Ha is rejected meaning that the variable level of Education (TP) has no significant effect on GRDP provinces in Indonesia.

Coefficient Of Determination (R2)

Coefficient of determination (R2) is done to see how much variation the independent variables together are able to give an explanation to the dependent variable. The value of R2 is between 0 and 1 ($0 \leq R2 \leq 1$). This means that the higher the value of R2 or even the value of 1, the independent variables provide almost all the information needed to predict the variation of the dependent variable. Here is the result of the coefficient of determination (R2).

Table 10 Results Of Coefficient Of Determination (R2)

R-squared	**0.532833**	**Mean dependent var**	**26.24783**
Adjusted R-squared	0.497575	S.D. dependent var	1.027960
S.E. of regression	0.728638	Durbin-Watson stat	0.379948
F-statistic	15.11245		
Prob(F-statistic)	0.000000		

Source: process data using Eviews 10 (2024)

Based on the data in Table 4.12 shows the value of the coefficient of determination or r-Squared (R2) is equal to 0.532833 or 53.28%, it can be interpreted that the dependent variable in the form of GRDP provinces in Indonesia can be explained by all the independent variables in the study, namely machinery and equipment (MP), software (PL), internet use (PI) and the level of Education(TP) is equal to 53.28%, while the remaining 46.72% is influenced by variables not studied in this study.

DISCUSSION

The Relationship Between The Number Of Machines And Equipment In The Revolution 4.0 To The GRDP Of Provinces In Indonesia

Based on the results of research using fixed effect model estimation has a probability value of 0.0005 with an alpha level of 10% and the value of the coefficient has a value of 3.585613 meaning that the number of machines and equipment significantly positive effect on GRDP provinces in Indonesia and if the number of machines and equipment increased by 1 rupiah will increase GRDP by 3.585613 rupiah. The results of this study are in line with the results of previous studies. Research conducted by Erni Setiawati et al states that technology is a financial capital that has financial value can be all machines or equipment used in the production process to produce other goods, an important factor to move the industry. The notch of manufacturing machinery is indisputable for the purpose of improving the efficiency, quality and productivity of the industry. Each type of machine plays a unique role to achieve optimal results in each

production process. The use of effective production equipment and the selection of appropriate machinery, industrial manufacturing companies can maintain and improve quality, reduce production time, maintain operational efficiency and reduce production costs drastically. Technological advances that are the result of innovation and renewal of new techniques will make changes in production processes and methods that have an impact on increasing productivity (the scale of production produced is greater). In other words, the more sophisticated machines and equipment used not only minimize errors but also reduce product waste, and also benefit industrial companies in terms of efficiency and quality. Especially in the Industrial Revolution 4.0 where every machine and equipment has been automated, so it can make it easier in terms of maintenance (no need to be done manually for maintenance scheduling) to the number of productions to be produced.

The Relationship Between The Number Of Internet Users During Revolution 4.0 To The Provincial GDP In Indonesia

Based on the results of research using the estimation of fixed effect model has a probability value of 0.0038 with an alpha level of 10% and the value of the coefficient has a value of 2.955404 meaning that the number of internet users significantly positive effect on GRDP provinces in Indonesia and if the number of internet users increased by 1 rupiah will increase GRDP by 2.955404 rupiah. The results of this study are in line with several previous studies in which the variable level of internet users has an influence on economic growth. Eni Setyo Purwanti et al (2022) stated that technological advances measured by the level of internet users can increase economic efficiency and lower production costs so that the output produced is maximized. In the era of the Industrial Revolution 4.0 almost everyone from various backgrounds and jobs has a smartphone connected to the internet.The producers can take advantage of the internet to obtain information about the breeding process to produce the best raw materials to appropriate processing techniques to reduce production errors so that the products produced have the best quality. In this era also known as digital marketing, a technique to market products online (digital) which is also supported by the ease of payment services through bank transfer, internet banking, etc. So from the consumer side, consumers will save time and cost to obtain an item needed.

The Relationship Between The Amount Of Software In Revolution 4.0 To The Provincial GRDP In Indonesia

Based on the results of the study using the estimation of fixed effect model has a probability value of 0.0001 with an alpha level of 10% and the value of the coefficient has a value of 4.161523 meaning that the amount of software significantly positive effect on GRDP provinces in Indonesia and if the amount of software increases by 1 rupiah will increase GRDP by 4.161523 rupiah. The results of this study are in line with research conducted by Berlilana et al which examined the influence of information technology 4.0 Industrial Revolution on the development of MSMEs in the industrial sector Processing, where the results show that the use of Information Technology, one of the elements is software, can improve product marketing efficiency so as to increase turnover for the MSME. Basically, software is a programming language that aims to execute commands in accordance with the programming that has been made. But the software is not only limited to programming commands to run a tool/machine / equipment in the production process but can be an application that can reach consumers throughout the province (e-commerce). In the era of the Industrial Revolution 4.0, we can see that many applications are obtained to connect between sellers and buyers, especially to make it easier for buyers to obtain a good/service.

Relationship Between Education Level In Revolution 4.0 And Provincial GDP In Indonesia

Based on the results of research using the estimation of fixed effect model has a probability value of 0.2086 with an alpha level of 10% means that the level of Education does not significantly affect the provincial GDP in Indonesia. The results of this study are different from some previous studies in which the level of Education has an effect on economic growth (GRDP). However, the results of this study are the same as the research conducted by Ulfa Hanifah et al on the level of education as measured by the workforce with higher education has a negative relationship effect argues that the absorption of labor with the level of college education has not been maximized, so that the current condition of the level of college education still contributes to the unemployment rate in Indonesia.

Simultaneous Relationship Between The Number Of Machines And Equipment, The Number Of Software, The Number Of Internet Users And The Level Of Education In The Revolution 4.0 To The GRDP Of Indonesian Provinces

Based on the results of the F test in Table 4.9 shows the probability value of F statistic 0.000000 < 0.05. With a comparison of F count and F table is 19566.57>2.4542134. So the conclusion is that H0 is rejected and H1 is accepted, meaning that there is a simultaneous relationship between machinery & equipment, software, internet use and education level against Indonesian provincial GRDP. In addition, the value of the coefficient of determination or r-Squared (R2) is equal to 0.532833 or 53.28%, it can be interpreted that the dependent variable in the form of GRDP provinces in Indonesia can be explained by all the independent variables in the study, namely, the number of machines and equipment (MP), the amount of software (PL), the amount of internet use (PI) and the level of Education (TP) is equal to 53.28%, while the remaining 47.72% is influenced by variables not studied in this study.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the results of the study, it can be concluded as follows:

1. Variable machinery and equipment (MP) have a significant positive influence on GRDP provinces in Indonesia
2. Internet user variable (PI) has a significant positive effect on provincial GDP in Indonesia.
3. Software variables (PL) have a significant positive influence on the GRDP of Provinces in Indonesia.
4. Variable level of Education (TP) has a negative influence significantly on the GDP of Provinces in Indonesia.
5. There is a simultaneous relationship between machinery & equipment, internet use, software, and education level to Indonesia's economic growth (GRDP).

Recommendations

Suggestions researchers from research that has been done are as follows:

1. The results of this study are expected to be an addition to science and add information on the influence of manufacturing industry investment on provincial GDP in Indonesia.
2. For the government as a stakeholder of policy and decision can be additional information to take new policies that can affect the development of the current industry, especially the level of education for the people in Indonesia, where based on the results of research that the level of Education has no effect on provincial GRDP, so it needs to re-evaluate how the availability of jobs based on this level of Education.
3. This study has limitations on the availability of data for some provinces that do not provide the necessary data, so this study took a case study only for 23

provinces that have the data needed in this study, so that for further research, researchers hope to be able to re-examine the variables used with the available literature studies.

4. This study uses the variable level of college education, for further research could use the level of high school education in order to better research results.

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