The influence of economic growth on manpower absorption in Central Sulawesi

A N Bahasoan¹, C Anwar², R I Khaldun¹ and T H B Tahawa¹

¹Universitas Sulawesi Barat, Majene, Indonesia
²Universitas Tadulako, Palu, Indonesia

Email: awalnopriyanto@unsulbar.ac.id

Abstract. This study aims to determine the effect of economic growth on employment in the industrial sector of Central Sulawesi Province. This research used secondary data and data analysis method used in this research is Panel Data Regression. The data used in this research are time series data from 2013-2016. The results of this study indicated that economic growth has a positive and significant effect on employment in Central Sulawesi Province. The R-squared value of 0.9853 showed that about 98% of the variations in employment in Central Sulawesi Province in the 2013-2016 periods were affected by economic growth while the remaining 2% were influenced by other factors outside the estimation model.

1. Introduction

Indonesia is a developing country, a developing country that is very closely related to economic development [1]. Advancing or not economic development in Indonesia is certainly based on economic growth. Economic growth measures the achievement and development of an economy in one period of the next period to produce goods and services [2]. The level of economic growth can be achieved by a country by increasing aggregate output (goods and services) or Gross Regional Domestic Product (GRDP) every year [3].

Economic growth is one measure of the success of economic development in a region. If economic growth in an area increases, then there has been an increase in economic activity [4]. Increased economic growth is expected not only to be a measure of a country in its economic success, but also can overcome various development problems such as poverty alleviation, overcoming income inequality and providing jobs [5].

An indicator of a country's economic development lies in economic growth and employment opportunities. Human resources are the most important factor in economic growth. Economic growth does not solely depend on human resources, but rather emphasizes their efficiency [7]. According to the Adam Smith said that the effective allocation of human resources is the beginner of economic growth. After the economy grows, the accumulation of capital is only needed to keep the economy growing. In other words, effective allocation of human resources is a necessary condition for economic growth to expand employment opportunities [6].

In Cobb Douglas’s theory, it is explained that a country's economic growth comes from increasing labor, capital and technology input [7]. Therefore, a country's economic growth is often a top priority in the development process so it is expected to trigger growth in the absorption of production inputs, one of which is labor.
The problem that will always be faced by the labor sector is a workforce that is growing faster than employment opportunities. Based on the data it is known that the open unemployment rate in Indonesia in 2010 reached 8,319,779 inhabitants, in 2011 there were 8,117,631 people, in 2012 there were 7,310,000 people, 2013 and 2014 were 7,410,000 people and 7,240,000 people. Although the unemployment rate in the last five years has decreased, but the decline is not significant enough. Because until 2014, Indonesia’s open unemployment rate (TPT) was still around 5.94 percent [8].

Central Sulawesi is the largest province on Sulawesi Island with a land area of 61,841.29 km² (Based on Minister of Home Affairs Regulation No.18 of 2013) covering the eastern peninsula and part of the northern peninsula and the Togean Islands in Tomini Bay and Banggai Islands in Tolo Bay, with an area of 189,480 km². The economic growth of Central Sulawesi Province as one of the indicators of development success measured by using the Gross Regional Domestic Product (GRDP) for five years, namely in 2012-2016 has increased continuously from year to year. In 2012 the GRDP of Central Sulawesi Province from the total regency/city GRDP of IDR 62,447,773 then in 2013 it increased to IDR 68,717,871. From 2014 to 2016 the GRDP continued to increase. In 2014 the GRDP of Central Sulawesi Province amounted to IDR 72,516,631 to reach 92,879,709 IDR in 2016 [9].

The economy of Central Sulawesi rests on four regencies/cities. The regions are Palu City, Banggai Regency, Parigi Moutong Regency and Morowali Regency. This is because in the four districts / cities that has a higher GDP contribution compared to other districts / cities. During 2012-2016, Palu City was the largest contributor to the GRDP of the economy of Central Sulawesi Province with an average of IDR 12,147,072 or 15.97% of the total provincial GRDP. Banggai Regency was ranked second with an average GRDP of IDR10,434,273 or 13.72% of the total GRDP of Central Sulawesi and followed by Parigi Moutong District with an average GRDP of IDR 9,443,489 or 12.42% of the total Central Sulawesi GRDP, and most recently Morowali District with an average GRDP of IDR 7,927,408 or 10.43% of the total GRDP of Central Sulawesi. While other districts / cities are below the four districts / cities that have the largest GRDP. For the region that has the lowest GRDP, Banggai Laut Regency with an average of IDR 1,261,219 or only 1.66% of the total GRDP of Central Sulawesi Province.

In 2014, the number of people working in Central Sulawesi reached 1,293,226 people or 64.31 percent of the population of working age, with details of 841,606 male workers and 451,620 female workers. From the total working population compared to the total workforce, a job opportunity level will be obtained, which is 96.32 percent. Overall, the level of employment opportunities in Central Sulawesi is quite high. This means that the number of workers in Central Sulawesi Province in 2014 was absorbed in employment by 96.32 percent.

The unemployment situation in Central Sulawesi is 49,389 people. Viewed by sex, the unemployed male population is more than the 27,222 male populations and 22,167 female populations. If the unemployed population is calculated based on the total workforce, then the real unemployment rate will be obtained. The real unemployment rate in Central Sulawesi in 2014 was 3.68 percent, and non-full employment was 38.56 percent which is the classification of open unemployment and incomplete workers based on working hours of the main population activity. Based on this brief description, the authors are interested in conducting research on the Effect of Economic Growth on Labor Absorption in Central Sulawesi in 2013-2016 using panel data regression analysis.

2. Methods
This type of research is causal associative research that is research that aims to analyze the relationship between a variable with other variables [10]. In this study there are independent variables and dependent variables. This research was conducted to find out and prove the influence of Local Revenue and capital expenditure budget allocation as an independent variable on economic growth as the dependent variable.

The data analyzed in this study are secondary data that has been presented by a credible institution. This study uses pooled data, which is a combination of time series and cross-section data during the 2013-2016 period, such as: 1) Central Sulawesi Province labor force data (TPAK) in 2013-2016 obtained from the Central Statistics Agency of Central Sulawesi Province; 2) Data on Gross Regional
Domestic Product (GRDP) based on constant prices in 2010 was obtained from the Central Statistics Agency of Central Sulawesi Province. These research variables consist of independent variables (X) and the dependent variable (Y) which the variables that used in this study are economic growth (X) and labor force participation rate (Y). The Operational definitions and measurement variables can be seen in the following table 1.

**Table 1. Definition of operational variables**

| Variable                                      | Operational definition                                                                 | Scale |
|-----------------------------------------------|----------------------------------------------------------------------------------------|-------|
| Independent (X)                              | Economic growth can be interpreted as an increase in GDP regardless of whether the increase is greater or smaller than the rate of population growth or whether changes in economic structure occur or not. The amount of Economic Growth is measured by the following formula. | Ratio |
| Economic Growth                              | $G = \frac{GRDP_{(n+1)} - GRDP_{(n)}}{GRDP_{(n)}} \times 100\%$                          |       |
| $n$ = GRDP year to $n$                       |                                                                                       | Ratio |
| Dependent (Y)                                | TPAK is the ratio between the number of the workforce with the number of working age population or the number of workforce of 100 working age population (15 years and above). |       |

The data collection technique in this study is the documentation technique, where researchers conduct secondary data collection obtained by the Central Statistics Agency (BPS) of Central Sulawesi Province. In addition, researchers also conducted a literature study through books and journals relating to the problem under study.

The data analysis technique used in this study is linear panel data regression analysis. Regression using panel data consisting of cross section data and time series is called the panel data regression model [11]. This is caused by the heterogeneity between individuals can be accommodated properly, the combination of cross section and time series makes panel data more informative, more varied, reduces collinearity, increases the degree of freedom and is more efficient, repetition of time in the same cross section unit accommodates dynamic changes each cross section unit.

Using panel data, there are three analytical techniques that can be used, namely common effects, fixed effects, and random affects models. To choose the right model from the three analysis techniques, a test is needed to compare the common effect model with the fixed effect model, while to choose between the fixed effect model and the random effect model can be seen by comparing the amount of research time ($t$) with the amount individual $n$. This study uses panel data, so that the model testing is done three times as follows: 1) Pooled OLS; 2) Fixed effect; 3) Random effect.

Residuals in the regression model with panel data generally result in difficulties in specification. The residual has three possibilities, namely: residual time series, residual cross section and residual merging between the two, thus there are also three approaches in using panel data [11], such as: 1) Common Effects Model, the simplest technique for estimating panel data is to simply combine time series data and cross section data without looking at differences between time and individuals; 2) Model Fixed Effects, the model that assumes the existence of intercept differences in the equation is known as the fixed effect regression model. The fixed effect model technique is a technique for estimating panel data by using dummy variables to capture the existence of intercept differences. The
The definition of fixed effect is based on differences in intercepts between samples, but the intercepts are the same over time, this model also assumes that the regression coefficients remain between samples and between times; 3) Random Effect Model, estimation using the random effect approach model by including dummy variables in the fixed effect model aims to represent our ignorance of the actual model, although it underlines the consequences of decreasing the degree of freedom which ultimately reduces the efficiency of the parameters, but this problem can be overcome by using the interruption variable (error terms) is known as the random effect method, although with the assumption in this model we will estimate panel data where the interruption variable may be interconnected between time and between individuals.

3. Results and discussion

Since Indonesia’s independence, BPS has conducted a population census five times. First time in 1961, but Central Sulawesi Province was not formed at that time. Then the second time in 1971 the population of Central Sulawesi was recorded 914 thousand inhabitants, in 1980 the number increased to 1.28 million people, then increased again to 1.71 million people in 1990, and in 2000 the population of Central Sulawesi reached 2.176 thousand soul. The average annual population growth rate during the 1971-1980 period was 3.87 percent and then decreased to 2.87 percent in the 1980-1990 periods and fell again to 2.52 percent in the 1990-2000 periods. The population growth rate continued to decline until the year 2010 where the 2000-2010 periods reached a growth rate of 1.95 percent with the population in 2010 reaching 2.64 million people. Then in 2015 the population of Central Sulawesi reached 2.88 million people. In 2015 there were more males than females, namely 1.47 million compared to 1.41 million with a sex ratio of 104.45. Central Sulawesi population data presented in the publication covered twelve districts and one city. Parigi Moutong Regency has the most population, which is 457,707 people or 15.91 percent of the total population of Central Sulawesi.

Based on their activities, population aged 15 years and over can be divided into workforce and non-workforce. In 2015 the total workforce of Central Sulawesi Province was 1.38 million people and not the workforce of 0.67 million people. Furthermore, there are 1.33 million people working in the labor force and 57 thousand unemployed people. Most of the population of Central Sulawesi works in the agriculture, services, trade / hotel and restaurant sectors, respectively 50.03 percent, 17.59 percent and 16.40 percent. If seen based on the employment status of 19.09 percent who work alone without the help of others, while with the status of workers/employees at 28.73 percent and as family workers (unpaid workers) at 18.16 percent. The number of job seekers registered at the Department of Labor is almost 13.49 thousand people. Most of the job seekers registered with a high school diploma of 51.45 percent, followed by university graduates or the equivalent of 26.89 percent.

In seeing the economic growth of a region through the Gross Regional Domestic Product of a regency/city in Central Sulawesi will give an overview of the conditions and economic situation of the region. Through GRDP 2006-2016 economic growth in the district/city can be illustrated that among the districts/cities, Banggai Regency is the regency that has the highest growth value among other regencies/cities of 14.60 percent, Morowali Regency which is 14.01 percent, North Morowali Regency is 11.98 percent, Palu City is 7.94 percent, Banggai Laut Regency is 7.79 percent, Poso Regency is 7.46 percent, Tojo Una-Una Regency is 7.26 percent, Tolitoli and Parigi Moutong districts are 7.13 percent, Sigi Regency is 6.99 percent, Donggala Regency is 6.80 percent, Buol Regency is 6.74 percent, and the last is in the lowest position in terms of namely Banggai Kepulauan Regency which is 3.43 percent.
Figure 1. Average regency/city economic growth in Central Sulawesi 2006-2016

3.1. Selection of the best model
The results of the regression analysis using e-views are as follows:

- The result of Common Effect regression
  \[ \ln(Y) = 67,814 + 0,369 \ln(X_1) \]
  (67.851) (6.991)*
  *Significant at \( \alpha = 1\% \)

- The result of Fixed Effect regression
  \[ \ln(Y) = 67,158 + 0,204 \ln(X_1) \]
  (112.708) (5.654)*
  *Significant at \( \alpha = 1\% \)

- The result of Random Effect regression
  \[ \ln(Y) = 67,238 + 0,412 \ln(X_1) \]
  (45,274) (4,731)*
  Significant at \( \alpha = 1\% \)

3.2. Significance test of the fixed effect model
This test aims to determine a better model, between the fixed effect or common effect models. The testing technique used is the Chow test with the following hypothesis: 1) \( H_0 \): Common Effect Model; 2) \( H_1 \): Fixed Effect Model; 3) if Chi Square > 0.05, Accept \( H_0 \), 4) if Chi Square < 0.05, Reject \( H_0 \).

Table 2. Chow test result

| Effects Test            | Statistic  | d.f.  | Prob.  |
|------------------------|------------|-------|--------|
| Cross-section F        | 11.580199  | (9,29)| 0.0000 |
| Cross-section Chi-square| 60.988782  | 9     | 0.0000 |
Based on the Chow test processing output, the probability value of Cross section F and Chi square is 0.00 which is smaller than alpha 0.05. The results reject Ho, so the best fixed effect model.

3.3. Model significance test: fixed effect or random effect
This test aims to determine a better model, between the fixed effect model or the fixed effect or random effect model. Testing is done by using the Hausman test. The hypotheses of the Hausman Test are as follows: 1) Ho: Random Effect Model; 2) H1: Fixed Effect Model; 3) if Chi Square > 0.05, Accept Ho; 4) if Chi Square < 0.05, Reject Ho.

Table 3. Result of hausman test

| Correlated Random Effects - Hausman Test |
|------------------------------------------|
| Pool: POOL01                              |
| Test cross-section random effects         |
| Test Summary                              | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob.   |
| Cross-section random                      | 0.750463          | 1            | 0.0363  |

Based on the hausman test processing output, the Chi square probability value is 0.03 which is smaller than alpha 0.05. The results reject Ho, so the best fixed effect model. From some of the results in the above test it can be concluded that the best model in this study is the Fixed Effect Model with the following equation:

\[ \ln (Y) = 67,158 + 0.204 \ln (X1) \]
\( (112,708) \quad (5,654) \ast \)

\* Significant at \( \alpha = 1\% \)

3.4. Model conformity test
The coefficient of determination (R2) measures how far the model’s ability to explain the variation of the dependent variable. The coefficient of determination between zero and one. A small R2 value means the ability of the independent variables to explain the variation of the dependent variable is limited. A value close to one means that the independent variables provide almost all the information needed to predict the dependent variables. The panel regression results of the effect of economic growth on employment in Central Sulawesi, an R2 of 0.78. This result showed that 78% of the variation in employment (Y) can be explained by economic growth (X).

3.5. Economic analysis
The theory of neoclassical economic growth refers to the framework of analysis of economic growth according to the classical view. According to the Solow-Swan theory, economic growth depends on the availability of factors of production such as population, labor, capital accumulation and technological progress [12]. The Solow-Swan neoclassical model generally takes the form of a production function, which can accommodate various possible substitutions between capital and labor. According to this theory the capital-output ratio can change. In other words, to produce a certain number of outputs, different combinations of capital and labor can be used. If more capital is used less labor is needed and vice versa. Consistent economic growth in the long run will affect the economy as a whole, so that it will have a domino effect on employment. All sectors will absorb available labor in the economy with the aim of increasing economic output. The Solow-Swan model always assumes a relationship between capital and labor and the output of goods and services. However, this model can be modified to include technological advances which are exogenous variables. According to Gregory Mankiw explains that labor efficiency reflects public knowledge about production methods, when
technology advances, labor efficiency increases. The efficiency intended here is to increase labor productivity, not replace labor with equipment that has advanced technology in the future. The issue faced in the Indonesian economy now is the industrial revolution 4.0. On the one hand, this industrial era through connectivity and digitalization has been able to improve manufacturing chain efficiency and product quality. However, on the other hand, this industrial revolution will also eliminate 800 million jobs worldwide until 2030 because it is taken over by robots. This could be a threat to Indonesia as a country that has a workforce and high unemployment. For this reason, the government needs to respond appropriately to these changes through the development of strategies that are able to increase the competitiveness of national industries while creating wider employment opportunities. The challenge facing the government is how to maintain the current momentum of economic growth when entering into economic digitalization. One of them is by increasing human resources through education and training as much as possible from now on.

4. Conclusion
Based on the results of the panel data regression test in this study, the best model in this study is the fixed effect model with the equation \( \ln(Y) = 67.158 + 0.204 \ln(X1) \). This equation indicates a positive relationship between employment and economic growth in Central Sulawesi Province in the period 2013-2016. Statistically if economic growth rises by 1%, there will be employment in Central Sulawesi Province by 0.2 percent, and vice versa (ceteris paribus). This mechanism will occur, if economic growth runs consistently in the long run, so that it will affect employment. This mechanism is one of the solutions to reduce unemployment in the Province of Central Sulawesi and is a challenge for local government.

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