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**An Analysis of Employment and Growth  
in Java after the Economic Crisis  
1997/1998: Examining the Role of Farm  
Activities in West Java**

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# AN ANALYSIS OF EMPLOYMENT AND GROWTH IN JAVA

## AFTER THE ECONOMIC CRISIS 1997/1998:

### Examining the Role of Farm Activities in West Java

*Fajar Bambang Hirawan*\*

#### ABSTRACT

*In this paper, we examine the relationship between employment and economic growth in the most populated island in Indonesia, Java, specifically in West Java. When Indonesia suffered a dreadful economic crisis during 1997/1998, none of the regions or sectors survived its impact, especially farm and non-farm activities. The economy started to improve in the year 2000, but non-economic fundamental factors significantly impacted the economy at that time. The results of this paper indicate that employment has a relationship to economic growth. In West Java farm activities, which are agriculture, livestock, forestry, and fisheries (ALFF), have a negative correlation with economic growth. On the other hand, non-farm activities have a positive correlation with economic growth. The value of the coefficient of variation (CV) surprisingly signifies that employment and GDP relating to farm activities in West Java are more stable than non-farm activities after the economic crisis of 1997/1998.*

**JEL Classification:** C22, C40, J21, O11, O47

**Keywords:** Employment, Economic Growth, West Java, Farm, Non-Farm

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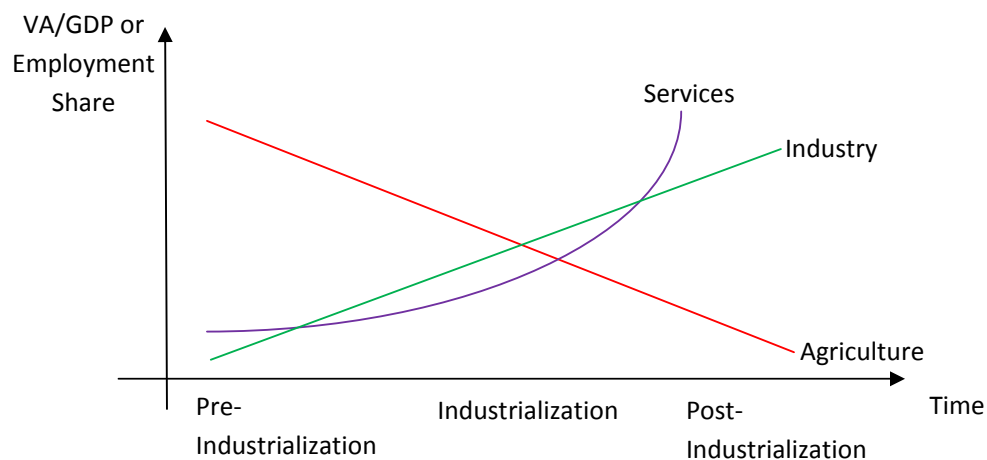
# 1. INTRODUCTION

## 1.1. Background

Several studies have investigated the relationship between employment and economic growth. At the end of 1940s, Verdoorn published a paper about the relationship between the growth of industrial output and labor productivity. It stated that there was a close relationship between them in the long run (Verdoorn, 1949). In the mid 1960s, Kaldor published a paper about the relationship between employment and economic growth. It stated that an increase in output growth of 1 percent will lead to an increase in productivity and employment growth of half a percentage point each (Kaldor, 1966).

Another famous economist who researched the relationship between employment and economic growth was Arthur Melvin Okun. His famous theory was related to the correlation between economic growth and the unemployment rate. In the 1960s and 1970s, Okun's law was clear, undisputed, and regarded as one of the most reliable macroeconomic relations at that time (Walterskirchen, 1999). Okun's law stated that an increase of the economic growth rate by 3 percent was expected to reduce the unemployment rate by 1 percentage point (Okun, 1962).

Figure 1. The Structural Transformation



The issue of employment and growth became more complex in the 1980s until the early part of the 21<sup>st</sup> century. Some economists have conducted research to examine the relationship between these factors not only in general, but also in specific terms, such as the correlation of farm and non-farm activities in relation to economic growth. This matter is probably influenced by the structural transformation theory, which was introduced by

Chenery and Syrquin in the 1970s (see Figure 1). The shifting from farm activities (agricultural sector) to non-farm activities (industry and services sector) began in all parts of the world since the industrialization era. The structural transformation describes not only the changing of GDP structure, but also the changing of employment share in the economy (Cecchi, 2008).

The structural transformation, which is also known as the Chenery and Syrquin growth pattern, consists of four processes, which are accumulation, allocation, demographic, and distribution (Chenery and Syrquin, 1975). This paper will to a greater extent focus on the demographic and accumulation processes, especially in relation to employment and economic growth.

To enrich study in this area, we can also use economic growth theory. This economic theory can be divided into two models, the Solow model and the endogenous model. In relation to the Solow model, output depends on capital stock (K) and the labor force (L). The Solow model also considers technological progress as an exogenous variable. The model can be described as the following.

$$Y = F(K, L) \quad (1.1)$$

To fully understand the process of economic growth, it is crucial to go beyond the Solow model and develop models that explain technological progress (A). This model is called endogenous growth theory. The endogenous model rejects the Solow's model assumption of exogenous technical change (Mankiw, 2003). The endogenous growth model can be written as the following.

$$Y = AF(K, L) \quad (1.2)$$

In third world countries, such as Indonesia, allocation of labor away from farm activities and increased labor productivity mainly in non-farm activities has occurred. Khan (2005) mentions the basic features of performance in growth and employment in several countries, including Indonesia. Based on his research, in the pre-crisis period, growth in Indonesia was high and employment was growing rapidly. In the post-crisis period, slow growth in the economy was observed, including slow employment growth. It has also influenced the

state of employment in Indonesia, especially the falling growth in the formal sector and shifting from farm to non-farm activities.

The previous knowledge leads into a good chance to do further study into the relationship between employment and economic growth. This case study is also essential to analyze detailed matters and to find an effective solution for creating a better economy. The island of Java, specifically West Java, is a good example to analyze because it provides researchers with sufficient data and also dynamic economic development compared to other regions or provinces.

## **1.2. Objectives**

Based on the previous background information, this paper attempts to answer the following questions:

1. What are the trends of employment and GDP by sector in Java, especially West Java, after the economic crisis 1997/1998?
2. What is the relationship between employment growth and GDP growth by sector in West Java after the economic crisis 1997/1998?
3. Which employment sector has a significant role in enhancing West Java's economic growth?
4. How stable is employment and GDP by sector in West Java after the economic crisis 1997/1998?
5. Which sector has good prospects for West Java's economy related to its employment and GDP stability?

## **1.3. Research Methods**

In this paper, I will apply both qualitative and quantitative methods. Various studies have been done on the subject of employment and economic growth. To deepen this study a literature study survey will be undertaken. Secondary data will be used for the quantitative method. This paper uses Indonesia's employment and GDP figures at a constant price 2000 quarterly data, specifically West Java, from the year 2001 until 2006. The data is sourced from the CEIC database. Since the study will be quantitative, basic statistics and econometric analysis will be applied using the software MINITAB 13.

### 1.3.1. Pearson's Correlation Coefficient

The correlation coefficient is used to measure the strength of a linear relationship between two variables. Before using this simple statistics approach, researchers should consider the assumptions that both variables are interval or ratio and normally distributed. Pearson's Correlation Coefficient is usually implied by  $r$  (rho). It can take on the values from -1.0 to 1.0, where -1.0 is a perfect negative (inverse) correlation, 0.0 is no correlation, and 1.0 is a perfect positive correlation. The formula of Pearson's Correlation Coefficient is shown here:

$$r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2 \sum_{i=1}^n (Y_i - \bar{Y})^2}} \quad (1.3)$$

The statistical significant of  $r$  can be tested using a t-test. The hypotheses for the test are  $H_0: r(\rho) = 0$  and  $H_1: r(\rho) \neq 0$ . A low probability value (p-value) for this test, related to the value of alpha ( $\alpha$ ), means that there is evidence to reject the null hypothesis in favor of the alternative hypothesis or that there is a statistically significant relationship between the two variables.

### 1.3.2. Coefficient of Variation

Coefficient of Variation (CV) was first used as a relative measure of variation. CV has been recommended by statisticians to solve the weaknesses of standard deviation. For analysis with sample data, we use  $S$  for standard deviation and  $\bar{X}$  for mean. For analysis with population data, we use  $\sigma$  for standard deviation and  $\mu$  for mean. The formula of CV can be shown as:

$$CV = \frac{\text{Standard Deviation } (S \text{ or } \sigma)}{\text{Mean } (\bar{X} \text{ or } \mu)} \times 100 \quad (1.4)$$

Ostle (1956) found that the CV is an ideal device for comparing the variation in two series of data which are measured in two different units. Lewis (1963) also noted that the CV may be used to compare the dispersion of series measured in different units and that of a series with the same units but running at different levels of magnitude. For economic purposes, CV can be used to examine stability or volatility and to forecast some economic indicators.



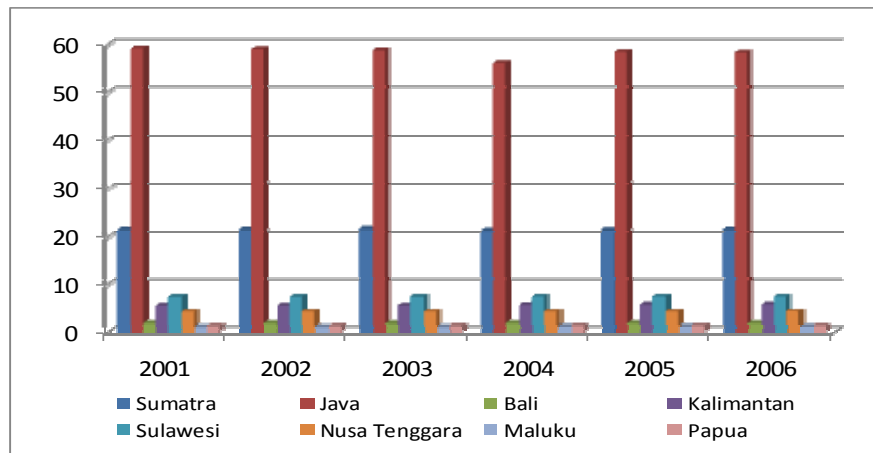
## 2. THE ECONOMIC CONDITION AFTER THE ECONOMIC CRISIS 1997/1998

### 2.1. Indonesia and Java

#### 2.1.1. Population

Indonesia is one of the most populated countries in the world, the figure being around 225 million. The distribution of population is a problem for developing countries like Indonesia. Based on Figure 2, Java is the most populated island in Indonesia. More than 50-60 percent of the Indonesian people live in Java.

Figure 2. The Proportion of Population in Indonesia 2001-2006 (in percent)



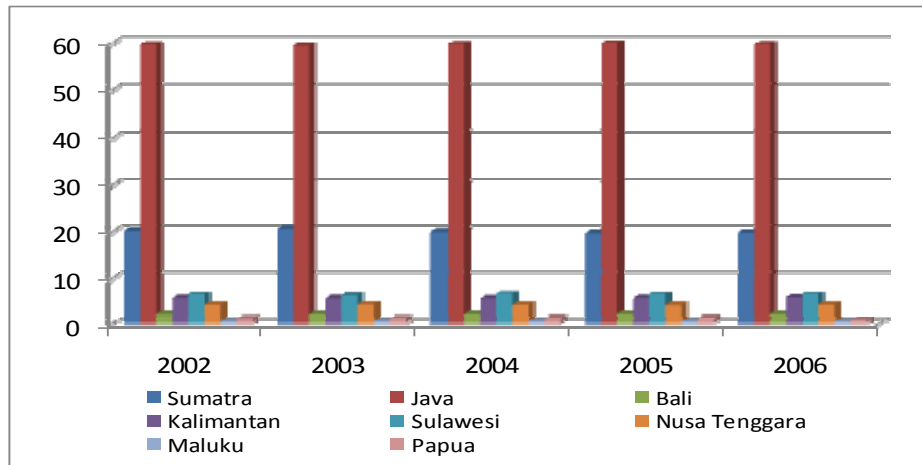
Source: CEIC database

The second most populated island in Indonesia is Sumatra, the third and the fourth being Sulawesi and Kalimantan. The population in Sumatra is around 20 percent. The least populated islands in Indonesia are mostly located in the eastern most regions, such as Papua and Maluku.

#### 2.1.2. Employment

The general demographic condition in Indonesia can be shown to some degree by employment figures. Based on Figure 3, the proportion of employment in Indonesia is similar with the proportion of population. The proportion of employment on the island of Java, of course, is the largest compared to the other islands. Maluku, on the other hand, is the province, which has the smallest level of employment.

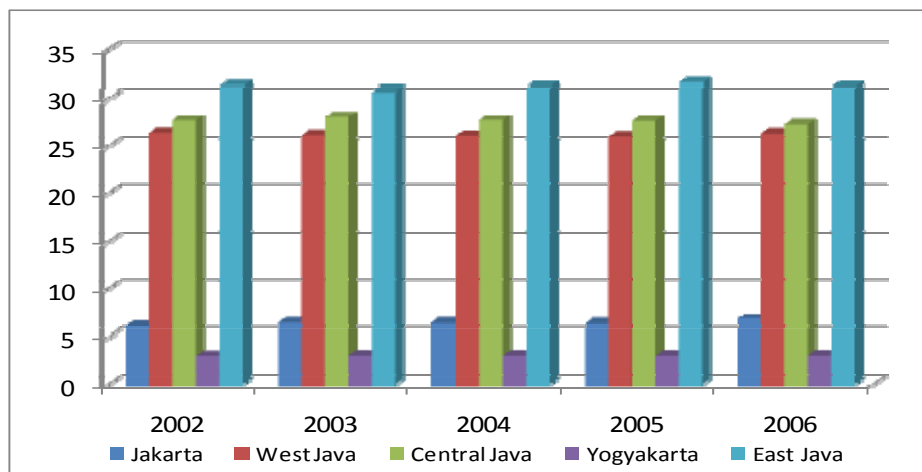
Figure 3. The Proportion of Employment in Indonesia 2001-2006 (in percent)



Source: CEIC database

Based on Figure 4, relating to the island of Java, the proportion of employment in East Java was higher than in the other provinces. From the year 2002 until 2006, East Java contributed 30-33 percent of employment in Java. Second and the third place were Central and West Java with 25-28 percent employment.

Figure 4. The Proportion of Employment in Java 2002-2006 (in percent)



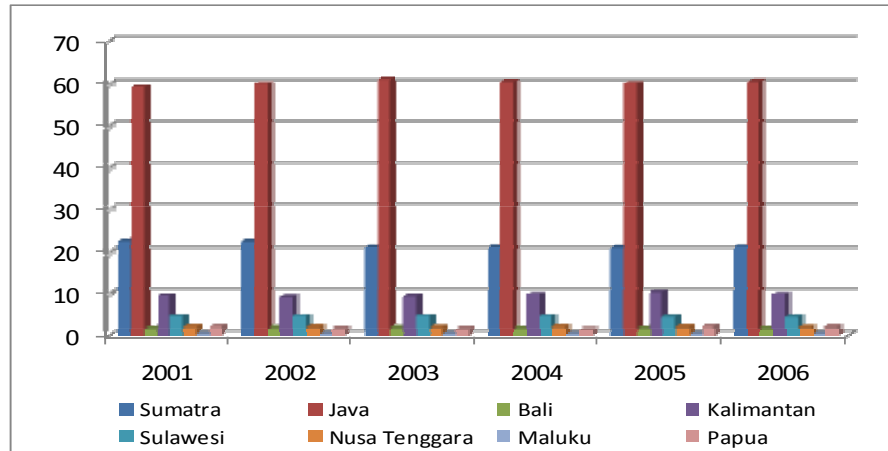
Source: CEIC database

### 2.1.3. Gross Domestic Product

GDP is a conventional indicator, which is still used for giving us a preview of macroeconomic conditions, economic growth, as well as economic performance of a country or region. Based on Figure 5, the island of Java continues its dominance as the

biggest contributor to GDP. It contributed more than 50 percent of national GDP from the year 2001 until 2006. As usual, Sumatra and Kalimantan took roles as the second and the third biggest contributors towards national GDP.

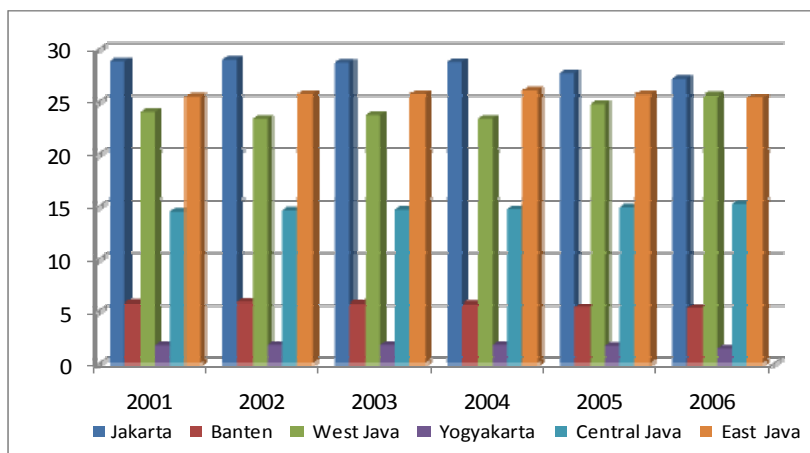
Figure 5. Indonesia’s GDP Contribution by Region 2001-2006 (in percent)



Source: CEIC database

Looking only at Java’s GDP, the biggest contributor in Java towards GDP is the capital city of Indonesia, Jakarta (see Figure 6). Jakarta alone contributed more than 25 percent of GDP. East and West Java played their part as the second and third largest contributors towards Java’s GDP.

Figure 6. GDP Contribution in Java 2001-2006 (in percent)



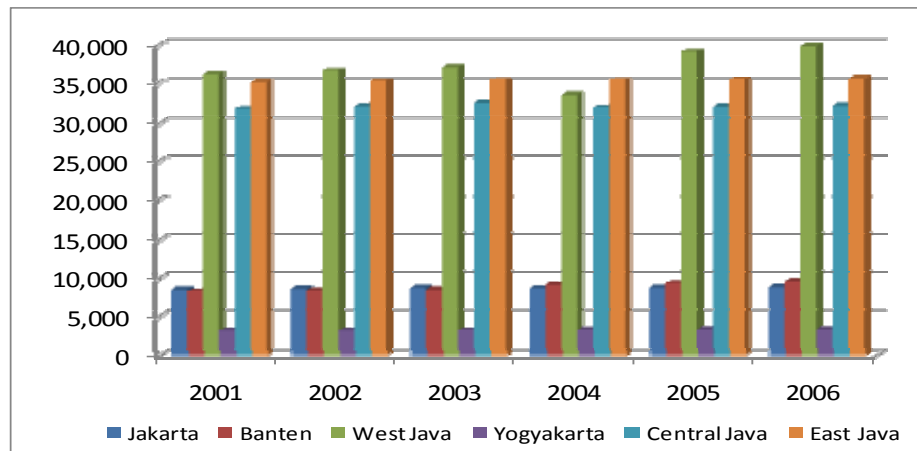
Source: CEIC database

## 2.2. West Java

### 2.2.1. Population

Java is the most populated island in Indonesia. Related to the population figures, West Java is the most populated province in Java, especially from the year 2001 until 2003 and 2005 until 2006 (see Figure 7). Based on Figure 7, we can also see that West, East, and Central Java are the most populated provinces in Java. The least populated provinces in Java are Yogyakarta, Banten, and the capital city of Indonesia, Jakarta.

Figure 7. The Number of Population in Java, 2001-2006 (in thousands people)



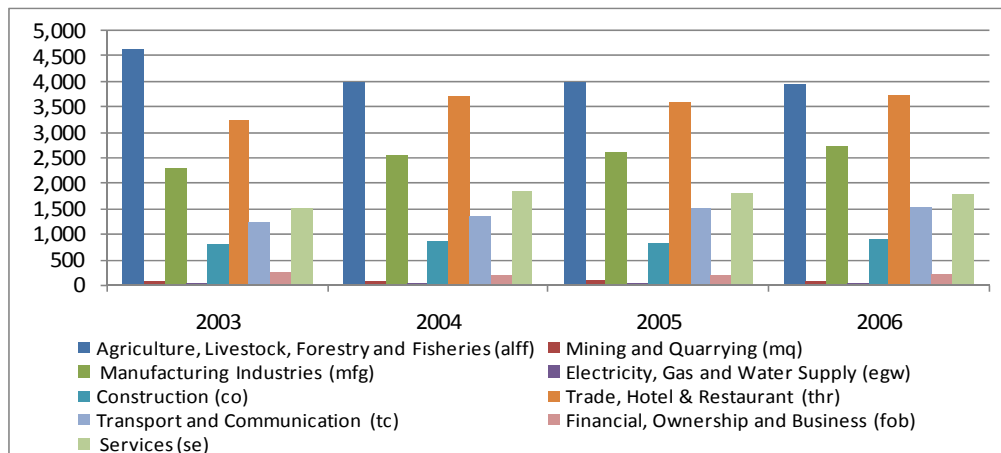
Source: CEIC database

In terms of percentage figures, Yogyakarta is the least populated province in Java, contributing below 5 percent to Java's population. West Java is the most populated province, contributing 28-32 percent to Java's population (see Figure 7).

### 2.2.2. Employment

After looking at the population trends in Java, specifically West Java, we look at these trends in relation to the trends of employment in West Java. Based on Figure 8, the ALFF sector is still a significant and major employment source for West Java's workers. From the year 2003 until 2006, the employment figures in the ALFF sector were 3.9-4.6 million people. The second major employer is the trade, hotel, and restaurant sector.

Figure 8. Employment by Sector in West Java, 2003-2006 (in thousands people)



Source: CEIC database

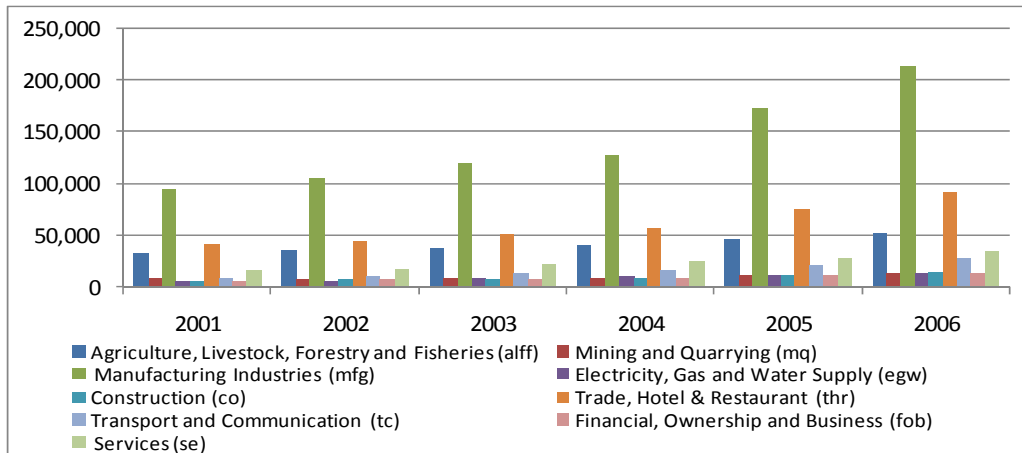
The figures show the tendency towards decreasing activity in the ALFF sector, or farm activities, and the tendency towards an increase in non-farm activities, especially the manufacturing sector. This occurrence is largely due to the structural transformation phenomenon, which states that the employment share of the agricultural sector will decrease while the employment share of the industry and services sector will increase.

### 2.2.3. Gross Domestic Product

Population and employment data only gives an illustration of demographic conditions in West Java. To identify the accumulation phenomenon in West Java, we have to take a look at its GDP data. The structure of GDP in West Java has changed after the economic crisis 1997/1998. Farm activities don't take a role anymore as a major contributor to GDP.

Based on Figure 9, non-farm activities became a major contributor to economic growth in West Java. Farm activities still have a role, but they are now not as significant, as a third contributor to economic growth. From the year 2001 until 2006, the manufacturing sector contributed 90-220 trillion Rupiah or more than 40 percent of GDP.

Figure 9. GDP at constant price 2000 in West Java, 2001-2006 (in billions Rupiah)



Source: CEIC database

### 3. RESEARCH ANALYSIS

This paper will analyze the relationship between employment and GDP growth using Pearson's Correlation Coefficient and also show the data of its proportion in the economy of West Java. Pearson's Correlation Coefficient is used for determining the relationship between two variables. It specifically indicates the association in the short run. This paper will also calculate the stability of employment and GDP in West Java, using its nominal value with the CV tool, in order to observe the trend of those indicators and to forecast it in the long run.

#### 3.1. Employment Growth and Economic Growth

The value of Pearson's Correlation Coefficient is needed by researchers in order to identify the relationship between employment and economic growth. With the value of Pearson's Correlation Coefficient we can measure, and know how close, the relationship between employment and economic growth, whether it is negative, positive, or has no correlation at all.

Table 1. Correlation between Employment and GDP Growth in West Java

	lw_e_alf	lw_e_mq	lw_e_mfg	lw_e_co	lw_e_egw	lw_e_tc	lw_e_thr	lw_e_fob	lw_e_se
lw_gdp	-0.640	0.552	0.740	0.863	0.622	0.867	0.604	0.199	0.857

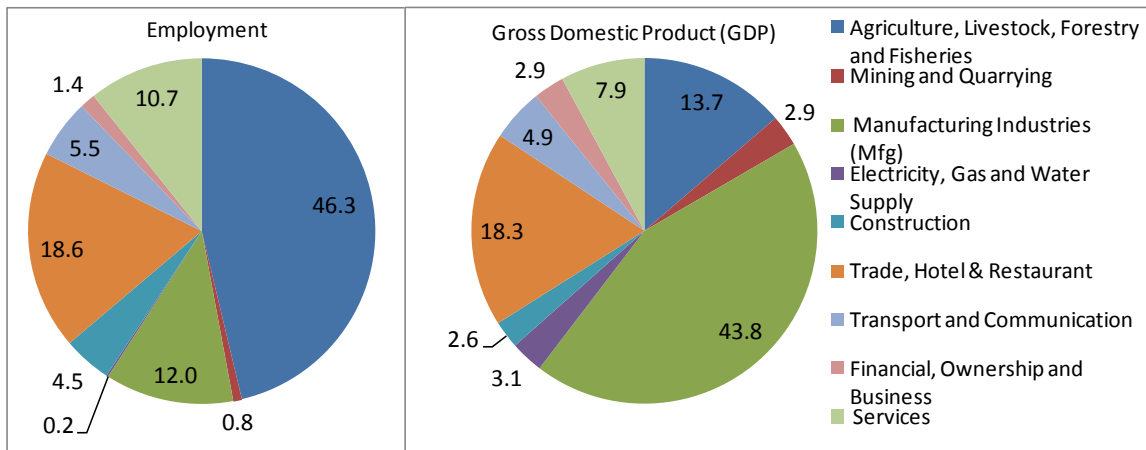
Notes: "l" means ln or growth, "e" means employment, and "w" means West Java

Source: CEIC database (processed by MINITAB 13)

Table 1 shows the correlation between employment and growth in West Java. Based on Table 1, the Pearson’s correlation coefficient between employment growth in the ALFF sector and GDP growth is -0.640. This means that there is a negative correlation or relationship between employment growth in the ALFF sector and GDP growth. It also describes a direct relationship where increasing GDP growth is in line with decreasing employment in the ALFF sector. The ALFF sector automatically describes farm activities because it recognizes them as a derivation from the ALFF sector.

Employment growth in non-farm activities, based on Table 1, show a positive correlation to GDP growth. It implies a direct relationship where increasing GDP growth is in line with increasing employment in non-farm activities. The strongest correlation has happened between employment growth in the transport and communication sector and GDP growth (0.867), followed by construction (0.863) and services (0.857).

Figure 10. Employment and GDP by Sector in West Java 2003 (in percent)



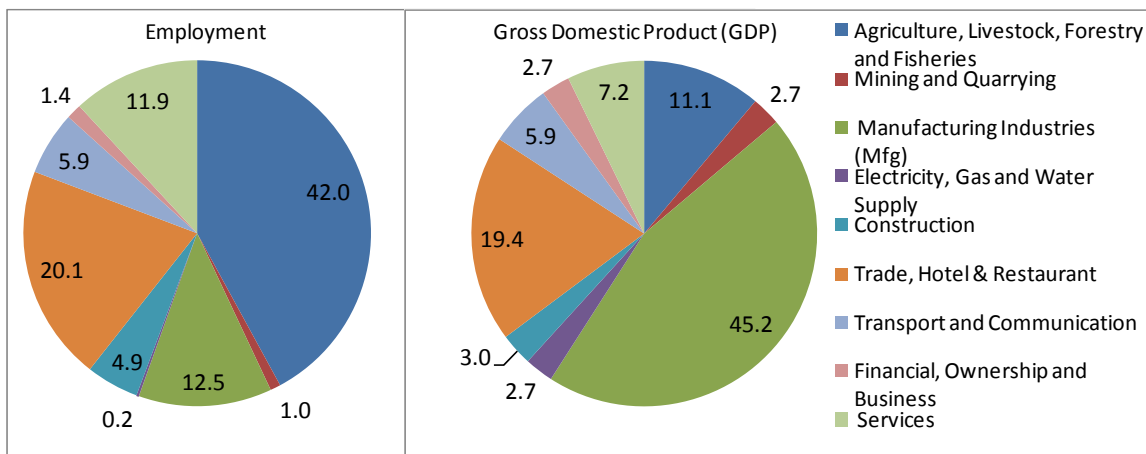
Source: CEIC database

Even though Pearson’s Correlation Coefficient has already shown the association between two variables effectively, this paper will develop the necessary evidence to support the result of Pearson’s Correlation Coefficient. Based on Figure 10, farm activities represented by the ALFF sector generated the biggest contribution to employment in 2003, the trade, hotel, and restaurant sector were the second biggest contributor (18.6 percent) and the manufacturing sector was the third (12 percent). An interesting phenomenon is the contrary condition happening between employment and growth as in 2003 while the ALFF sector contributed 46.7 percent towards employment, the output production was only 13.7 percent

of GDP. The manufacturing sector only contributed 12 percent in employment terms but it generated 43.8 percent of GDP and also took a role as the biggest contributor to economic growth.

In 2006, the proportion of employment and GDP in West Java didn't show the significant changes. Farm activities still took a role as the biggest contributor to employment. Meanwhile, non-farm activities gave the biggest contribution to economic growth in West Java (Figure 11). Based on Figure 10 and 11, the contribution of farm activities, or the ALFF sector, on employment and GDP has a tendency to decrease. On the other hand, the contribution of non-farm activities tends to increase over time.

Figure 11. Employment and GDP by Sector in West Java, 2006 (in percent)



Source: CEIC database

The production function, which implies that output is structured by capital (K), labor (L), natural resources (N), and technology (A), also can explain this phenomenon. The output of farm activities is mostly dependant on labor and natural resources. On the other hand, the output of non-farm activities is not only depended on labor and natural resources, but also capital and technology. In order to increase the volume of production, it is necessary for producers to use new technology and a big amount of capital rather than to acquire increased labor. This reason can be rationally accepted by means of efficiency and effectiveness.



### 3.2. Employment Stability

After analyzing the relationship between employment and GDP growth in West Java, this paper aims to use a different approach for examining the stability of employment and GDP in West Java. This approach will be used for observing the trend of employment and GDP and also for predicting those indicators in the long run.

Table 2. The Employment Stability in West Java after the Economic Crisis 1997/1998

	Mean	Std Deviation	Coefficient of Variation
w_e_alff	41,144	533	1.30
w_e_mfg	11,456	464	4.05
w_e_se	10,342	445	4.30
w_e_thr	18,051	851	4.71
w_e_co	4,426	222	5.01
w_e_tc	5,355	350	6.53
w_e_fob	1,199	81	6.77
w_e_egw	195	29	14.60
w_e_mq	869	134	15.43

Source: CEIC database (processed by MINITAB 13)

Based on Table 2, the most stable sector in employment is the ALFF sector or farm activities. The value of the ALFF sector's CV is 1.30. It is lower than other sectors, especially the sectors related to non-farm activities. Manufacturing is the second most stable sector (4.05) and services take the position of the third most stable sector (4.30).

### 3.3. GDP Stability

After examining employment stability, this paper intends to give other evidence related to stability, in the form of GDP stability. Based on Table 3, the most stable sector in terms of its contribution to GDP, again, is the ALFF sector or farm activities (12.49). Although the contribution of the ALFF sector to GDP is not particularly significant, the fluctuation of the ALFF sector is not too high. This is why the ALFF sector is the most stable sector in West Java after the economic crisis 1997/1998. The second most stable is the electricity, gas, and water sector (17.68), and the third most stable is the services sector (18.20).

From this result, we can see that local government should focus on sectors, which have the best stability in employment and GDP to enhance economic growth. Trends of employment and GDP can be predicted into the future and can be utilized by policy makers when introducing new economic policies.

Table 3. The GDP Stability in West Java after the Economic Crisis 1997/1998

	Mean	Std Deviation	Coefficient of Variation
w_gdp_alff	42,835	5,350	12.49
w_gdp_egw	9,953	1,760	17.68
w_gdp_se	25,821	4,700	18.20
w_gdp_fob	9,880	2,014	20.38
w_gdp_mq	10,010	2,043	20.41
w_gdp_mfg	148,213	35,269	23.80
w_gdp_thr	63,820	15,222	23.85
w_gdp_co	9,578	2,627	27.43
w_gdp_tc	17,872	5,029	28.14

Source: CEIC database (processed by MINITAB 13)

#### 4. CONCLUSION

The aim of this paper was to examine the macroeconomic relationship between employment and economic growth in the most populated province in Indonesia with both literature and empirical studies. There are several conclusions from the findings of this paper.

Firstly, based on the research analysis above, it can be found that employment growth in the ALFF sector, or farm activities, in West Java have a negative relationship to economic growth. Non-farm activities have a positive relationship to economic growth. This is not surprising because this phenomenon has already been predicted before on the subject of structural transformation. Hence, employment in non-farm activities, in the short run, has a significant role in enhancing the economic growth in West Java.

Secondly, regarding the result of employment and GDP stability we can say that the role of farm activities should always be recognized as a potential sector, which can support economic growth especially in West Java. Employment and GDP stability in farm activities are more stable than non-farm activities. Consequently, we can say that employment and GDP in farm activities have good prospects for West Java's economic growth in the long run.

In summary, the role of farm activities is expected to become a key part of West Java's economic growth. For that reason, local government should be careful in managing its blue print development program because the literature and empirical studies have proven that farm activities have good prospects when it comes to boosting economic growth in the long run.

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