International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 2, 2020
ISSN: 1475-7192

STRUCTURAL CHANGE, ECONOMIC GROWTH, AND EMPLOYMENT OPPORTUNITIES IN INDONESIA; A Simultaneous Approach

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ABSTRACT---*The purpose of this study is toanalyze the relationship between structural change, economic growth and employment in Indonesia.The analytical method use dissimultaneous regression model consisting of 3 (three) equations where economic growth, structural change and employment is treated as endogenous variables, and include three (3) exogenous variables namely investment, wage and education. From the identification test is known thatequation of employment is exactly Identified then estimated using indirect leastsquare (ILS) method, while 2 other sareover-Identified equation then estimated using a two stage leastsquare (TSLS) method.*

The results showed that : 1) Economic growth is positively and significantly influenced by employment and investment, 2) Employment are positively and significantly influenced by economic growth and structural change, while the wage rate has a negative effect; 3) structural change positively and significantly influenced by economic growth and the advancement of education.

Important recommendations of these findings are : 1) expansion of employment should be more focused on efforts to encourage productive investments with labor-intensive technologies, 2) increased investments must be accompanied by improvement of the level of educationand improving the quality of labor, 3) the process of structural change must be maintained in the direction of employment transformation through the development of labor-intensive industrial and service sectors.

Keywords---*economicgrowth, structuralchange, employment*

I. INTRODUCTION

Labor problems in Indonesia are still quite alarming to date, marked by high labor force growth and low employment opportunities. Statistical data in the last 10 years shows that labor force growth of an average of 2 percent per year has not been fully absorbed by increased economic activity, where employment opportunities are only able to grow at an average of 0.9 percent annually.

The issue of manpower certainly cannot be separated from the dynamics of economic activity distributed in the production sectors. Therefore a thorough analysis needs to involve developments in each sector. Sectoral analysis can at least describe descriptively about the extent to which development in each sector contributes to the creation of employment opportunities. And one analysis of economic growth in the context of sectoral development can be seen from the process of

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structural change, namely the shifting role of each sector to its total output. Structurally, Indonesia's economy continues to experience a shift every year, where the role of the agricultural sector which was initially quite dominant, is now starting to be displaced by the strengthening share of the agricultural sectors. In the last three decades the role of the manufacturing industry sector increased from 13.7 percent in 1987 to 20.9 percent in 2018. The opposite phenomenon occurs in the agricultural sector. During this period, the share of the agricultural sector decreased significantly, from 22.91 percent in 1987 to only 12.8 percent in 2018. The shift in GDP structure should have a positive impact on expanding employment opportunities, bearing in mind that the progress of the industrial sector can give birth to productive investments that can absorb excess labor in the agricultural sector, while at the same time supporting the development of the agricultural sector as a provider of raw materials. Lewis (Todaro, 2003: 135), in the two sector model states that if there is an increase in output and investment in the modern sectors, there will be an abundance of labor mobilization from the traditional sector (agriculture / rural), flowing into the modern sectors (industry) in urban areas accompanied by increased productivity. That means that the growth of the industrial sector should be able to make a positive contribution to increasing national productivity, expanding employment opportunities and reducing poverty.

This research tries to explore further the extent of structural changes that have an impact on strengthening output and creating employment opportunities in Indonesia.

II. LITERATURE REVIEW

Lewis's Two-Sector Model Lewis divides the economy into 2 sectors namely (1) the traditional sector, namely the subsistence rural sector which is overpopulated and characterized by marginal productivity of labor equal to zero, and (2) the modern urban industrial sector which has a high level of productivity and is a place for labor transferred little by little from the subsistence sector. According to Lewis in many underdeveloped countries, there is an unlimited workforce with subsistence. Thus, economic development takes place if capital accumulates as a result of the transition of surplus labor from the "subsistence" sector to the "Capitalist" sector. The capitalist sector employs workers with wages in mining, factories and plantations, in order to generate profits. Where per capita output in the capitalist sector is higher than in the subsistence sector. Meanwhile, the level of wages in the modern sector is assumed to be constant and, based on a certain premise, the amount is set to exceed the average level of wages in the traditional subsistence agriculture sector. (Lewis assumes that wage levels in urban areas must be at least 30 percent higher than the average income in rural areas to force workers to move from their original villages to the cities). At a constant wage level in urban areas, the rural labor supply curve is considered to be perfectly elastic. Completion of the Two Sector Model of Fei-Ranis the Lewis model in fact still contains some weaknesses because of the assumptions used, especially for most developing countries (Todaro, 2003: 137). Among them is the assumption of capital reinvestment which in reality is not linear, and therefore a surplus of labor has actually occurred in many cities, and real wages in the modern sector are no longer constant. With these weaknesses, John Fei and Gustav Ranis try to improve the weaknesses of the Lewis model with an emphasis on the problem of unlimited labor surplus from the Lewis model (Jhingan 2007: 217). The improvement is mainly in the phasing of labor changes. The Fei-Ranis model divides the stages of changing labor transfers from the agricultural sector to the industrial sector into three stages based on the marginal productivity of labor with the level of wages considered constant and exogenously determined. The first stage, labor is assumed to be abundant so that the marginal productivity of labor is close to zero. In this case the surplus of labor transferred from the agricultural sector to the industrial sector has a perfectly elastic supply curve. At this stage although there is a transfer of labor, total production in the agricultural sector does not decrease, labor

productivity increases and the industrial sector grows due to additional labor from the agricultural sector. Thus, the transfer of labor benefits both sectors of the economy. The second stage is the condition where the marginal product of labor is positive, but the amount is still smaller than the wage level. This means that every reduction of one unit of labor in the agricultural sector will reduce total production. At this stage the transfer of labor from the agricultural sector to the industrial sector has a positive balance of costs, so the labor supply curve has a positive elasticity. Labor transfers continue to occur which results in a decrease in production, but the decline is still lower than the level of wages that are not paid. On the other hand, because the production surplus offered to the industrial sector decreases while demand increases, which is caused by the addition of labor, the relative price of agricultural commodities will increase. The third stage is the commercialization stage in both sectors of the economy. At this stage the marginal product of labor is already higher than the wage level. Entrepreneurs engaged in the agricultural sector began to retain their workforce. Labor transfer will still occur if technological innovation in the agricultural sector can increase the marginal product of labor. Meanwhile, due to the assumption of reinvestment in the industrial sector, the demand for labor in this sector will also continue to increase

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Empirical Model from Chenery

Empirical models of structural change compiled based on research by Hollis B. Chenery, known as the analysis of "patterns of development" (patterns of development). The study was conducted in a "cross sectional" or "time series" for the period after the Second World War in a number of developing countries. Like the Lewis model, Chenery also focuses its attention on the process of gradually changing the economic, industrial and institutional structure of a backward economy, thus enabling the emergence of new industries to replace the position of the agricultural sector as a driver of economic growth. This shift in economic structure, according to Chenery, was in line with the increase in per capita income which brought changes in consumer demand patterns from food and other basic necessities to a variety of industrial goods and services, the accumulation of physical and human capital (HR), the development of industries in urban areas that occur simultaneously with the migration process of population from rural to urban areas, as well as a decrease in the rate of population growth and a smaller family size. This theory also states that increased savings and investment are conditions that must be met, but that alone is not enough (necessary but not sufficient conditions) to spur economic growth. In addition to capital accumulation, a series of interrelated changes in the structure of the country's economy are also needed in order to carry out a fundamental transition from the traditional economic system to the modern economic system. These structural changes involve all economic functions including the transformation of production and changes in the composition of consumer demand, international trade and resources, as well as changes in socio-economic factors such as the process of urbanization, growth and population distribution in the country concerned.

Prior Research

Zagler (2000), in his research in European countries concluded that structural changes were significant enough to affect economic growth, but resulted in high and continuous unemployment. According to him, during the transition period the unemployment rate will exceed the equilibrium level, consequently unemployment increases in the short term. Whereas in the long run unemployment can be reduced through adjusting the quality of labor. The estimation results show that high bargaining power on the individual worker side is the key determinant of unemployment, where the quality of labor is flexible, so that additional pressure on the labor market will come from a shift in the relative bargaining power of the workers themselves. In line with Zagler's findings, Bachmann and Burda (2002) also found relatively similar things when conducting research on the dynamics of structural change and employment opportunities in Germany in the period 1975-

2001. Bachman and Burda argued about rising unemployment in Germany due to structural changes. Changes in economic structure in Germany shifted from the industrial sector to the service sector, where the contribution of the industrial sector to national output decreased by 30 percent and vice versa the contribution of the service sector increased more than doubled in the last almost thirty years. The change in structure caused employment opportunities in the service sector to increase by only 6-10 percent, while the contribution of the industrial sector in creating employment opportunities decreased in proportion to the decline in share output. The available employment in the service sector was apparently unable to accommodate existing unemployment, because the available employment opportunities due to structural changes only accommodate workers with certain qualifications needed, while others remain unemployed until they make adjustments to their qualifications and work experience.

On the other hand, Alvarez and Poschke (2009) argued that labor mobility that took place from the agricultural (rural) sector to the non-agricultural (urban) sector was generally caused more by increased productivity in the non-agricultural sector than by decreasing productivity in the agricultural sector (a factor attractiveness). They regressed panel data from 13 countries in the world since the 19th century and concluded three important findings, namely: first, during World War I, labor migration from the agricultural sector was caused more by pull factors ("labor pull" channels), namely increased non-agricultural sector productivity. While the "labor push" factor due to declining agricultural productivity only had a significant effect after World War II; Second, on average in general, the increase in non-agricultural productivity plays a significant role, in this case the "labor pull" channel is the more dominant factor; Third, the share of agricultural labor declined even greater when manufacturing productivity rose relative to agriculture (Salem et al., 2018). Experience in Europe also appears to occur in the Australian economy. This is shown by the results of Janissen's research, et al (1998). Their findings conclude that structural changes have led to significant changes in the labor market, namely the number of people who offered to work and the number and types of jobs available. An important finding is that employment growth is unstable with an increase in labor supply, accompanied by rising unemployment and underemployment. Meanwhile, structural changes also affect the demand for certain skills. As a result, the composition of the workforce and opportunities to enter or move between work and industry have changed - with young, old, unskilled and those from non-English speaking backgrounds who are most affected. Changing labor market conditions have been a key dimension of structural change in Australia over the past three decades. This change was manifested in an analysis of unemployment trends, the composition of the workforce, the pattern of employment opportunities and the ability of workers to move between industry and employment. One of the most important changes in Australian labor supply and demand conditions over the past 25 years has led to substantial growth in unemployment.

Another finding is Valli and Saccone (2009), researching on Growth and Structural Change in China and India since 1978, where in 1978 these two developing countries with different political and economic direction both had very low GDP per capita levels and growth quite high population. Their results show that India and China have both succeeded in boosting impressive economic growth in the last 30 years. The difference is in the reallocation of labor between the two countries which were initially also dominant in the agriculture sector (In 1978 the agricultural sector employment opportunities in China amounted to 70 , 5% and in India 77%). The dynamics of sectoral growth in China lead to the dominance of the secondary sector (industry) while in India the development of the Tertiary sector (Services) is more dominant because from the beginning the two countries were superior in these sectors. The difference has an impact on the pattern of labor allocation and the share of sectoral employment opportunities between the two countries. If in China, the growth of industrial sector output is much higher than the growth of employment opportunities, then in India the growth of

service sector employment opportunities is relatively more balanced with the growth of output. Despite the different sectoral labor allocation patterns, the two countries are equally able to allocate relatively good employment opportunities in each sector.

III. METHOD

Model Specifications

The analytical method used is the simultaneous regression equation with the following models:

$$KK = \alpha_0 + \alpha_1 SC + \alpha_2 PDB + \alpha_3 W + e_1 \quad (1)$$

$$PDB = \beta_0 + \beta_1 KK + \beta_2 INV + e_2 \quad (2)$$

$$SC = \lambda_0 + \lambda_1 PDB + \lambda_2 EDU + e_3 \quad (3)$$

Where:

GDP = real GDP, KK = Employment opportunities, INV = Investment, SC = Structural Change,

EDU = Education Level, W = Real minimum wage level

Identification Test

1. Order Condition

The results of order condition testing for the three equations in the above model are briefly presented in table 1 below:

Table 1: Model Identification Results with Order Conditions

Reg	*K*	*k*	*M*	*(K – k)*	*(m – 1)*	Description
(1)	3	1	3	2	2	→ *just identified*
(2)	3	1	2	2	1	→ *over identified*
(3)	3	1	2	2	1	→ *over identified*

2. Rank Condition. The three equations are transformed into equations (4), (5) and (6), then entered into the matrix as follows

Tabel 2: Matriks *Rank Condition*

Reg	Variable						
	1	**KK**	**PDB**	**SC**	**W**	**INV**	**EDU**
(4)	$-\beta_{10}$	1	$-\beta_{11}$	$-\beta_{12}$	$-\beta_{14}$	0	0
(5)	$-\beta_{20}$	$-\beta_{23}$	1	0	0	$-\beta_{25}$	0
(6)	$-\beta_{30}$	0	$-\beta_{31}$	1	0	0	$-\lambda_{26}$

Determinant equation (4): $A=\begin{vmatrix} -\beta_{25} & 0 \\ 0 & -\lambda_{26} \end{vmatrix} \neq 0$ → identified

Determinant equation (5): $A=\begin{vmatrix} -\beta_{12} & -\beta_{14} \\ 1 & 0 \end{vmatrix} \neq 0$ → identified

Determinant equation (6): $A=\begin{vmatrix} 1 & -\beta_{14} \\ -\beta_{23} & 0 \end{vmatrix} \neq 0$ → identified

Exogenous Test

Exogenous test results can be seen in table 3 belowT:

Table 3. Exogenous Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.867714	0.049293	-37.89026	0.0000
PDB	2.42E-12	0.031115	7.79E-11	1.0000
PDB_PRD	0.488941	0.031358	15.59240	0.0000**
R-squared	0.997090	F-statistic		7879.741
Adjusted R-squared	0.996963	Prob(F-statistic)		0.000000
C	3.876809	0.006710	577.7757	0.0000
SC	0.034001	0.066100	0.514385	0.6094
SC_1	0.560136	0.066486	8.424874	0.0000**
R-squared	0.993370	F-statistic		3446.330
Adjusted R-squared	0.993082	Prob(F-statistic)		0.000000

Significant at 1% alpha

It appears that PDB_PRD and SC_PRD are significant, meaning it can be concluded that the GDP variable and the SC variable are endogenous variables.

Simultaneity Test

Simultaneity test results are shown in table 4 below

Table 4: Simultaneity Test Results

Dependent Variable: KK
Method: Least Squares
Sample: 1970 2018
Included observations: 49

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.024372	0.385927	-0.063151	0.9499

PDB_PRD	0.332066	0.032826	10.11583	0.0000
SC_PRD	0.191369	0.039899	4.796395	0.0000
V2	-0.036257	0.031004	-1.169438	0.2485
V3	0.031248	0.036657	0.852446	0.3986

R-squared	0.998104	Mean dependent var	4.310408
Adjusted R-squared	0.997932	S.D. dependent var	0.354530
S.E. of regression	0.016123	Akaike info criterion	-5.320726
Sum squared resid	0.011437	Schwarz criterion	-5.127684
Log likelihood	135.3578	Hannan-Quinn criter.	-5.247486
F-statistic	5791.455	Durbin-Watson stat	0.771053
Prob(F-statistic)	0.000000		

It appears that the variable and (in the table symbolized by V2 and V3) are not statistically significant. This means that the model does not experience simultaneity problems.

IV. RESULTS AND ANALYSIS

Structural Change

The estimation of the structural change equation is preceded by determining the reduce form equation and then incorporating the prediction results into the initial model. So it produces the following equation:

$$SC = \lambda_0 + \lambda_1 \widehat{PDB} + \lambda_2 EDU + e_3 \quad (4.2)$$

Where is the GDP prediction result from the reduce form equation.

According to the model identification results, this equation is estimated using the TSLS method by entering all exogenous variables as an instrument list. Estimation results can be formally presented as follows:

$$\mathbf{SC = -\ 5{,}915 + 0{,}407\widehat{PDB} + 0{,}885EDU}$$

SE (0,883) (0,097) (0,207)

t-stat (-6,699) (4,194)*** (4,279)***

F_{stat} = 1510,165***

R^2 = 0,985

***** significant at 1% alpha**

The estimation results show that economic growth and education level have a significant effect on the ongoing structural changes, with coefficients of 0.497 and 0.885, respectively. This means that every percent increase in economic growth will increase the structural change index by 0.49 percent, and every percent increase in education will increase structural changes by 0.88 percent. The coefficient of determination (R2) of 0.985 indicates that the ability of the model to predict structural changes is 98.5 percent.

Economic growth

As with the previous equation, the economic growth equation (GDP) is also estimated using the TSLS method, and the results can be written as follows:

$$\mathbf{PDB = 6{,}391 + 1{,}095\widehat{KK} + 0{,}358INV}$$

SE	(0,610)	(0,221)	(0,082)
t-stat	(10,475)	(4,943)***	(4,360)***

F_{stat} = 2189,591

R^2 = 0,989

*** signifikan pada alfa 1%

Job opportunities have a positive and significant effect on economic growth in Indonesia with a coefficient of 1.095. This coefficient can be interpreted as the coefficient of elasticity (sensitivity) because the data used is logarithmic data, which means that every percent increase in employment can increase economic growth by 1,095 percent. In other words the employment opportunity elasticity to economic growth is more than 1 or can be said to be "elastic" (E> 1).

Likewise, investment has a positive and significant effect on economic growth, but with an elasticity coefficient value of less than 1 which is 0.358. In other words, the elasticity of capital to economic growth is "inelastic" (E <1). This means that although capital has a positive effect on economic growth, in terms of sensitivity, the increase in growth due to increased capital is still relatively small. Furthermore, the coefficient of determination (R2) of 0.989 shows that the ability of the model to predict economic growth is 98.9 percent.

The above analysis shows that the role of labor as a motor of development is still very large for increasing economic growth in Indonesia. This is due to the quantity, primary sector production results still dominate the structure of our GDP even though from the aspect of growth tends to decrease. Besides that, the large industries that contribute to growth are primary and secondary industries which use a lot of labor. While the results of production from tertiary industries that are high-tech and capital-intensive appear to be still relatively limited in the total GDP structure, so that despite having significant growth, industries that rely on the strength of productivity of capital have relatively small and insufficient contributions to dominates the total ongoing growth.

This is supported by GDP data and analysis from the expenditure aspect which shows that the role of consumption activities still dominates our economic growth compared to the role of investment, where the role of consumption so far is still above 70% of total GDP while the investment role is no more than 26%. Integrally, this reality at least gives a clear and synergistic message that the influence of growth determinants of the expenditure / demand aspect also reflects the impact of growth determinants on the production / supply aspect.

Employment Opportunity

Unlike the two previous equations that were overidentified, the employment opportunity equation was exactly identified. Therefore this model will be estimated using the indirect OLS method or Indirect Least Square (ILS), with the following equation:

$$KK = \alpha_0 + \alpha_1\widehat{SC} + \alpha_2\widehat{PDB} + \alpha_3 W + e_1 \quad (7)$$

Where $\widehat{SC}$ and $\widehat{PDB}$ is the predicted result of the reduce form equation

The ILS estimation results for the above equation can be formally displayed as follows:

$$\mathbf{KK = -\ 8{,}847 + 0{,}122\widehat{SC} + 0{,}416\widehat{PDB} - 0{,}044W}$$

SE	(0,442)	(0,043)	(0,041)	(0,016)
t-stat	(-1,917)	(2,867)***	(10,197) ***	(-2,827) ***

F_{stat} = 8933,675***

R^2 = 0,998

*** signifikan pada alfa 1%

Economic growth and structural changes each individually and together have a positive and significant effect on employment opportunities. The coefficient of economic growth is 0.416, which means that every one percent of economic growth will increase employment opportunities by 0.42 percent. While the coefficient of structural change is 0.122, which means that every one percent shift in economic structure will increase employment opportunities by 0.12 percent. Meanwhile the wage level has a negative effect with a coefficient of -0.044 which means that every one percent increase in wages will reduce employment opportunities by 0.04 percent.

The positive effect of structural change and economic growth on employment is in line with Lewis's theory which says that the process of structural change will distribute abundant employment opportunities in the rural traditional sector to the modern urban sector so as to increase employment opportunities and economic growth. Growing economic activity certainly has an impact on increasing demand for labor and creating job opportunities.

As for the effect of wage rates can be explained simply through demand theory which is derived from labor demand, where wage levels are an indicator of prices for labor. In the theory it is explained that the higher the level of wages (the price for labor), the lower the demand for labor, as the curve shown in Figure 2.5.

The decline in labor demand will naturally have a direct impact on employment opportunities, because when viewed from the supply aspect, Indonesia experiences a significant supply of labor excess (indicated by high unemployment) and is not matched by adequate qualifications. As a result, wage increases that tend to continue to encourage companies to limit the number of workers and anticipate it by expanding investment in the capital-intensive sector. Thus it is clear that an increase in the wage rate directly has a significant negative impact on employment opportunities.

V. CONCLUSIONS

1. Economic growth is positively and significantly influenced by employment and investment opportunities, where the employment elasticity of economic growth is more than 1 or can be said to be "elastic" (E> 1). While the elasticity of investment (capital) to economic growth is "inelastic" (E <1). These results show that the Indonesian economy in general is actually still driven by labor-intensive sectors.
2. Economic growth has a positive and significant effect on employment opportunities and structural changes. This reflects that the economic growth that took place in Indonesia was able to create investment and employment opportunities in modern sectors and significantly reduce the dominance of the agricultural sector in the output structure.

3. The effect of advancing education levels on structural transformation is positive and significant, indicating that improving the quality of the workforce encourages productivity in the modern sector to increase. In other words, the higher the level of education, the more people will move in the modern sectors, resulting in growth in the modern sector increasing faster than traditional sectors (agriculture).
4. Structural change has a positive influence on economic growth and job creation as Lewis's theory says that the process of structural change will distribute abundant employment opportunities in the rural traditional sector to the modern urban sector so as to increase employment opportunities and economic growth.
5. The wage level has a significant negative effect on employment opportunities. This is because the process of increasing the level of wages that continues to take place from year to year has not been followed in proportion to the quality improvement of the workforce itself. On the other hand the reinvestment process is more allocated to capital-intensive activities, so that the labor demand curve is relatively unchanged but tends to only move along the demand curve itself.

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