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INCREMENTAL LABOUR OUTPUT RATIO (ILOR) AND OUTPUT GROWTH IN INDONESIA IN THE SHORT TERM

RASIO OUTPUT TENAGA KERJA INKREMENTAL (ILOR) DAN PERTUMBUHAN OUTPUT DI INDONESIA DALAM JANGKA PENDEK

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Abstract

This study specifically projects output and predicts economic growth, investment needs, and additional labor requirements sectorally, using labor and output data (GDP by business field at constant prices) for the period 2001-2019. The analysis method used is labor projection based on the output approach, namely the Incremental Labor Output Ratio (ILOR). The results of the study show that (1) the increase in output in the agricultural sector does not have an impact on the expansion of labor absorption in the sector, but the conditions contrast with the increase in output in the public services, mining and trade sectors which will have an impact on the expansion of labor (2) Additional labor in the agricultural sector does not provide optimal results or additional labor in the agricultural sector and has an impact on decreasing output in the future (3) Additional labor in the mining sector will result in high output in the future.

Keywords : Output, Economic Growth, Investment, Incremental Labour Output Ratio (ILOR).

Abstrak

Penelitian ini secara khusus memproyeksi output dan memprediksi pertumbuhan ekonomi, kebutuhan investasi dan tambahan tenaga kerja secara sektoral dengan menggunakan data tenaga kerja dan output (PDB menurut lapangan usaha atas harga konstan) selama periode 2001-2019. Metode analisis yang digunakan adalah proyeksi tenaga kerja berdasarkan pendekatan output yaitu Incremental Labour Output Ratio (ILOR). Hasil penelitian menunjukkan bahwa (1) peningkatan output disektor pertanian tidak memberikan dampak perluasan penyerapan tenaga kerja disektor tersebut, namun kondisi kontras dengan peningkatan output disektor jasa kemasyarakatan, pertambangan dan perdagangan yang akan memberikan dampak perluasan tenaga kerja (2) Tambahan tenaga kerja di sektor pertanian tidak memberikan hasil yang optimal atau tambahan tenaga kerja disektor pertanian dan memberikan dampak

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penurunan output dimasa depan (3) Tambahan tenaga kerja di sektor pertambangan akan menghasilkan output yang tinggi dimasa yang akan datang.

Kata Kunci : Output, Pertumbuhan Ekonomi, Investasi, Incremental Labour Output Ratio (ILOR).

1. INTRODUCTION

Dynamic economic changes have a structural impact on the economy (Oreiro et al., 2020). These structural changes can be seen in the pattern of industrialization, which plays an important role in Indonesia's economy, and in the context of Workforce planning from the output side, as reflected in sectoral workforce projections. In terms of economic structure, the distribution of sectors is classified into three main sectors: Agriculture, Industry, and Services. In general, the Indonesian economy during 2000-2019 was driven by the industrial sector, with an average of 52.04 percent. In terms of trends, the Indonesian economy followed a different pattern during 2015-2019. This is evident in the decline in the shares of the industrial and agricultural sectors, while the service sector's share increased overall during that period. This condition indicates a structural transformation of the economy, with the formation of an Agriculture-Industry-Service pattern.

This phenomenon is associated with a review of the literature that empirically shows differences with several studies, namely Schlogl & Sumner (2020) & Mcmillan et al., (2011) which found that there is a change in economic patterns that will significantly increase economic growth because the Workforce is transformed from the traditional sector to the modern sector, which has an impact on the shift of labor from the low-productivity sector to the productive sector high. Empirically, the condition of the economic structure starkly contrasts with the state of labor absorption in Indonesia, which remains concentrated in the traditional sector, namely the agricultural sector. This implication is clearly seen over the last 20 years.

The agricultural sector has played an important role in labor absorption in Indonesia over the past 20 years; on average, as much as 58.3 percent of the Workforce is absorbed in the sector. In contrast to the industrial sector, although the highest output contribution is the lowest, which is 20.2 percent on average. In terms of trends, labor shifts are emerging, even though labor absorption is concentrated in the agricultural sector. Looking at the trend over the last 20 years, there has been a slight shift of labor to the service sector, averaging 21.5 percent. This shift has been predicted by Richter (1986), who explained that labor projections are inseparable from uncertainty about the trend of future economic growth, driven by changes in employment patterns and technological developments.

Apart from the concentration of labor absorption in the agricultural sector, over the past few years, there has been a shift in the orientation of the agricultural market towards higher productivity, as revealed by Ramarao et al. (2014), who explain that this trend is driving liberalization and globalization. The projection of a skilled workforce must also be considered alongside changes in the economic structure (World Bank, 2014). Consistent with this, Taylor

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(2020) found that developing countries need to accelerate investment in the agricultural sector to increase productivity, and that this investment must go hand in hand with the movement of workers from the agricultural sector to other sectors. Recommendations related to this issue: Bertrand (2004) suggests addressing changes in a small number of sectors and skills by emphasizing the structure of work, focusing on the relationship between economic growth and the type of work, and the mobility of work.

The transformation will be related to the workforce planning process from the supply side. The grand theory that is the basis of reference to see the relationship between sectors with the pattern of labor supply uses the labor planning approach from the supply side, namely using the approach developed by Richter (1986) which explains the Aspects of Labor Planning in terms of labor supply reviewed from the number of population, school-age population and labor participation rate which has not been able to significantly predict the uncertainty of development trends economic growth in the future due to changes in work patterns and technological changes. A more comprehensive model of Workforce planning from the preserver's side involves applying demographic calculations for population, migration, education, and training.

Specifically, labor planning based on the relationship between output and labor quantity was discussed by Psacharopoulos (1991), who explained that labor projection is inseparable from changes in output and labor quantity according to the level of skill/education "required" for the production of these outputs. In line with this, Ziderman & Horn (1993) stated that the pattern of labor stagnation must be supported by training as an alternative to fulfill the type of work provided.

More comprehensively studied by Adams et al. (1992), who explained that labor segregation must take into account labor market signals, according to which labor planning is intensified in job training monitoring. Indirectly, the planning provides information to guide training decisions and manage the training system. These planning benefits can improve training efficiency and enhance labor market performance. To plan for this, planning techniques are needed that balance social benefits and training costs in a responsive way to changing economic conditions. Similarly, in planning for the strategic provision of skills with long lead times, much workforce planning focuses on providing information about skill demand, which can be used by individuals, companies, and managers of training institutions in their training decision-making.

The empirical discussion of sectoral labor projections using the elasticity approach was studied by Islam & Nazara (2000), who found that the highest elasticity of job opportunities in Indonesia occurred in the agricultural sector, followed by the trade, services, and industrial sectors. Consistent with this, Amjad (1981) measures labor planning in a substantial way using the methods of additional capital and incremental labor productivity and elasticity. According to him, there are limitations in the ability to absorb labor in Asian countries; in this case, the large-scale manufacturing sector accounts for most of the total development resources invested by these countries, but does not provide high employment opportunities.

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In addition, the state's capacity to provide public-sector jobs is declining, especially amid the recent push to privatize the economy. The labor force in these countries is concentrated in the agricultural sector. The growth of labor absorption outside the agricultural sector is, in many cases, insufficient to absorb the increase in the labor force, leading to high job vacancies in agriculture. The recommendation for this issue is to increase productive employment within the agricultural sector. A different approach taken by Matías (2010) is an incremental labor productivity approach considered to produce a more realistic scenario. The new approach he proposed is to use a dynamic shift-share formulation, which allows for time-varying changes in both the sectoral structure and the levels of the variables considered.

Regarding the availability of sectoral labor, Ismail et al. (2011) examined labor needs in the service sector. This study categorizes labor by two job types: professional and technical workers. This estimate predicts that, during the period, half of the workers will be professional and technical workers. Meanwhile, the findings of the sectoral labor slowdown show that, in the future, the wholesale and retail trade sectors and hotels and restaurants will have high labor availability. In addition to the type of work, this study also found that the need for labor is based on the level of education and labor market signals, as a reference for training organizers about the needs of prospective students in universities and related programs for future job requirements, as well as helping institutions determine the number and type of students entering.

Labor projections are carried out by Henderson (2015) using an output approach. The results of its research found that by 2024, the services sector will account for more than 81 percent of all jobs in the economy and will account for the majority of job growth projected for 2014 to 2024. The Healthcare and social assistance sectors will account for more than one-third of the jobs added during the projection period. Real output from the total services sector is projected to grow slightly faster than the economy as a whole, thereby increasing the proportion of total output in 2024. In contrast to L. Agarwal et al. (2013), who modeled workforce projections in the construction and building sectors, the study found that the construction sector requires a large number of unskilled, skilled, and technical workers for the planning, monitoring, and implementation of construction projects.

In addition to output conditions, workforce planning can be projected through a main occupation approach. Maier et al. (2017) predict a decline in employment opportunities for nearly 5 million skilled workers across 9 of 20 major occupations by 2030.
Consistent with the Wolf & Lockard (2012) overall job type projected to increase by about 14 percent over the 2010-2020 period with more than half a million new jobs expected for each of the four occupations including registered nurse, retail salesperson, family health assistant, and personal care assistant; Jobs that typically require post-secondary education to enter are projected to grow faster than average, but jobs that typically require a high school diploma or less will continue to represent more than half of all occupations.

In line with this, Cappelen et al. (2013), based on labor projections, show that the previous trend of increasing demand for workers with higher education and upper vocational

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education will continue until 2030. Meanwhile, the proportion of demand in primary, higher, and vocational education is expected to decrease through 2030. Meanwhile, in terms of growth, most areas of higher education have seen increases, especially for prospective workers in economics, administration, and nursing. This condition, according to Giesecke et al. (2011), is associated with the labor market, so there is a need to adjust relative wage movements across all qualifications and jobs.

Allen et al. (2018) conducted a specific discussion of labor projections in the agricultural sector, analyzing the structure of work in the food economy across four major segments: agriculture, processing, marketing, and food. The implications of this study explain the relationship between rural-urban employment structure and rural employment diversification, which are related to the transformation that forms patterns in the agricultural sector, this study finds the need for projections related to employment strategies related to agricultural productivity, employment outside the agricultural sector and labor market conditions in rural-urban areas and these conditions should be applied to productive workers and types of jobs By Gender.

Charlton (2019) emphasizes productivity in the agricultural sector linked to investment, education, training, and innovation. If the agricultural industry fails to account for variables, there will be a tendency for workers in the agricultural sector to move into higher-wage, skill-intensive jobs in other sectors. This will affect declining agricultural production, and labor-intensive crop production will shift to other countries where wages remain low. In line with this, Maoyong et al. (2015) stated that changes in the work structure in the agricultural sector are driven by changes in the demographic composition and labor force, as well as structural changes in the economy.

2. RESEARCH METHOD

This study will present an estimate of sectoral labor in Indonesia using labor and output data (GDP by business field at constant prices) for the period 2001-2019. Data was obtained from Indonesia's central statistics agency. The analysis method used is labor projection based on the output approach, namely the Incremental Labor Output Ratio (ILOR) and the ICOR Labor Approach. Transition (1969) and Walters (1966) model the approach mathematically as follows:

$$ILOR = \frac{\Delta L_i}{\Delta Y_i}$$

ΔL_i = additional labor in sector i and = additional output (GDP ΔY_iat constant prices in sector i. For the investment approach, the following equation is used.:

$$\text{Labor productivity} = \frac{Y_i}{L_i}$$

Y_i= Output (GDP in sectors i dan L_i= Workforce in the sector i.

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If the amount of ILOR is negative, it means that, over a certain period, the change in absorbed labor exceeds the change in economic output. There are times when labor absorption has decreased, yet it still produces a fairly high output value. Or a lot of labor is absorbed, but gross added value decreases. Both of these things will hurt the social and economic dimensions. For developing countries, of course, it will prioritize the absorption of a large number of workers first at a relatively good level of productivity.

3. RESULTS AND DISCUSSION

This paper presents estimates of sectoral employment opportunities during the period 2001-2019, using labor productivity, the Incremental Labor Output Ratio (ILOR), and the ICOR Labor Approach. The estimated labor force projection is inseparable from the condition of labor productivity; the average picture of labor productivity in all business sectors during the period 2001-2019 can be seen in Table 1:

Table 1. Labor Productivity by Business Field in Indonesia, 2001-2019

Business Field	Productivity					
	2001-2004	2005-2008	2009-2012	2013-2016	2017-2019	2001-2019
Agriculture, Plantations, Forestry, Hunting, and Fisheries	0,006	0,007	0,008	0,009	0,011	0,008
Mining and Quarrying	0,207	0,174	0,140	0,142	0,151	0,163
Industry	0,037	0,043	0,044	0,050	0,048	0,044
Electricity, Gas, and Drinking Water	0,059	0,066	0,079	0,078	0,066	0,070
Construction	0,060	0,066	0,069	0,073	0,082	0,069
Trade, Restaurants and Accommodation Services	0,014	0,017	0,019	0,021	0,021	0,018
Transportation, Warehousing, and Communication	0,017	0,023	0,043	0,062	0,070	0,042
Financial Institutions, Real Estate, Rental Businesses, and Corporate Services	0,121	0,134	0,113	0,097	0,131	0,119
Community, Social, and Individual Services	0,014	0,015	0,014	0,015	0,017	0,015

Source : (Indonesian Central Statistics Agency, 2019)*, processed*

Sectorally, the agricultural sector has the lowest productivity. In the period, the highest average productivity was recorded in 2017-2019, at 10.1 million/worker. Meanwhile, the lowest average period occurred in 2001-2004, which was 6 million/worker. As for the sector with the highest productivity, namely the mining sector, it had an average of 163 million per worker during the 2001-2019 period. Productivity trends in the mining sector fluctuated on average. In the period 2001-2014, the average mining productivity was the highest at 207 million/worker. The amount of ILOR can be used as a parameter in determining the optimal Workforce for business sectors. Sectorally, the 4 years can be seen in Table 2:

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Table 2. ILOR Value by Business Field in Indonesia, 2001-2019

Business Field	ILOR					
	2001-2004	2005-2008	2009-2012	2013-2016	2017-2019	2001-2019
Agriculture, Plantations, Forestry, Hunting, and Fisheries	-0.025	0.023	-0.046	-0.032	0.008	-0.016
Mining and Quarrying	0.158	0.016	0.035	-0.005	-0.026	0.039
Industry	-0.002	0.017	0.027	0.000	0.028	0.013
Electricity, Gas, and Drinking Water	0.060	-0.007	0.009	0.022	0.036	0.024
Construction	0.025	0.009	0.012	0.013	-0.003	0.012
Trade, Restaurants and Accommodation Services	0.001	0.023	0.051	0.033	0.074	0.034
Transportation, Warehousing, and Communication	0.024	0.010	-0.012	0.005	0.005	0.007
Financial Institutions, Real Estate, Rental Businesses, and Corporate Services	0.008	0.008	0.022	0.010	-0.008	0.009
Community, Social, and Individual Services	0.053	0.059	0.086	0.041	0.018	0.053

Source : (Indonesian Central Statistics Agency, 2019)*, processed*

Based on Table 2. Shows that on average, during the years 2001-2019. The value of ILOR in the agricultural sector is negative with an average that shows that the increase in GDP in the agricultural sector is caused by an increase in labor productivity that is not accompanied by an increase in labor absorption, meaning that the performance of the agricultural sector has not been able to increase the absorption of labor in the sector so that the output produced by each worker in the agricultural sector is low. In the sectoral comparison, the ILOR value for all economic sectors is positive, indicating that every increase in output expands labor absorption. The findings show that several sectors have ILOR values below the average during the period 2001-2019, namely the industrial, construction, financial, and communication sectors, which range from 0.007 to 0.013.

The highest ILOR values occurred in the Community Services (0.053), Mining (0.039), and Trade (0.034) sectors. The impact of the high value of ILOR in the three sectors will have an impact on employment conditions in the future, where the increase in output that occurs will have a significant impact on the expansion of labor absorption, especially in the Community Service Sector, this shift proves that there is a structural transformation of employment, the agricultural sector which has the highest share of the labor market which is trending in a negative trend which means that there is a change employment opportunities caused by increased output, slowly the labor pattern has changed seeing the lowest ILOR value and this material has an impact on labor migration which was once concentrated in the agricultural sector, now the expansion of the Workforce is predicted to occupy other sectors such as the service, mining and trade sectors. Based on these two approaches, the trend of labor growth in

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the agricultural sector over the last 20 years was analyzed to demonstrate the trend during that period. The trend of labor growth is presented in Table 3:

Table 3. Labor Growth by Business Field in Indonesia

Business Field	Workforce Growth (%)					
	2001-2004	2005-2008	2009-2012	2013-2016	2017-2019	2001-2019
Agriculture, Plantations, Forestry, Hunting, and Fisheries	-0.1	0.4	-1.1	-4.8	0.2	-0.4
Mining and Quarrying	11.2	0.5	9.6	-9.9	-2.5	3.6
Industry	-1.3	3.0	5.3	-0.6	5.1	2.2
Electricity, Gas, and Drinking Water	21.9	-5.3	5.3	32.2	5.0	7.1
Construction	6.1	4.3	5.5	13.3	-1.6	3.8
Trade, Restaurants and Accommodation Services	0.7	2.4	2.5	12.5	7.1	2.9
Transportation, Warehousing, and Communication	4.4	2.9	-5.3	10.0	2.9	1.4
Financial Institutions, Real Estate, Rental Businesses, and Corporate Services	4.0	6.2	13.3	26.1	-5.5	5.4
Community, Social, and Individual Services	2.0	5.3	6.7	11.0	0.7	3.6

Source : (Indonesian Central Statistics Agency, 2019)*, processed*

The trends presented in Table 3 show that average labor growth in the agricultural sector was negative, averaging -0.4 percent during the period. In general, all economic sectors during the 2001-2019 period experienced a positive trend except for the agricultural sector, the highest labor growth trend during the period on average, namely the electricity, gas and drinking water sector of 7.1 percent, the mining and community service sector of 3.6 percent and the financial institutions, real estate, rental business, and corporate services sectors of 5.4 percent.

On average of 4 years, it can be seen that the agricultural sector experienced a negative growth trend in the periods 2001-2004 (-0.1 percent), 2009-2012 (-1.1 percent), and (-4.8 percent). Meanwhile, mining occurred in the period 2013-2016 (-9.9 percent) and 2017-2019 (-2.5 percent). Meanwhile, the trade sector occurred in the 2017-2019 period (1.6 percent). This empirical result shows that labor growth in the agricultural sector is negative; this aligns with the ILOR calculation, which also shows negative growth. As for the Output growth trend seen in Table 4:

Table 4. GDP Growth by Business Sector in Indonesia

Business Field	**Output Growth (%)**					
	2001-2004	2005-2008	2009-2012	2013-2016	2017-2019	2001-2019
Agriculture, Plantations, Forestry, Hunting, and Fisheries	3.2	3.5	3.5	3.6	3.7	3.5
Mining and Quarrying	-1.2	1.9	2.8	1.7	1.3	1.3
Industry	4.8	4.2	4.5	4.4	3.7	4.4
Electricity, Gas, and Drinking Water	6.3	7.7	7.0	5.1	3.7	6.0
Construction	4.6	7.1	6.3	4.9	5.8	5.7

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Trade, Restaurants and Accommodation Services	5.6	7.4	6.4	6.3	5.8	6.3
Transportation, Warehousing, and Communication	9.5	12.6	11.1	7.4	7.5	9.7
Financial Institutions, Real Estate, Rental Businesses, and Corporate Services	6.5	6.6	5.9	9.6	5.4	6.9
Community, Social, and Individual Services	4.0	5.7	5.8	4.9	5.7	5.2

Source : (Indonesian Central Statistics Agency, 2019)*, processed*

Based on the sectoral GDP growth trend, it shows that, on average, all economic sectors experienced positive GDP growth, meaning that, during the period 2001-2019, the Gross Domestic Product grew. For the economic sectors that had the highest growth trend during the 2001-2019 period, namely the transportation sector at 9.7 percent, the trade sector at 6.3 percent, and electricity, gas, and drinking water (6.0 percent).

Meanwhile, for the sectors with the lowest growth rates, namely the mining sector at 1.3 percent and the agricultural sector at 3.5 percent. Compared with the labor growth trend, the agricultural sector is suboptimal, as evidenced by negative labor growth and the lowest average growth over the last 19 years.

4. CONCLUSION

This study focuses on projecting the Workforce based on output using the Incremental Labor Output Ratio (ILOR) approach in all economic sectors in Indonesia during the period 2001-2019. This study found that increases in agricultural output did not affect labor absorption in the sector. In contrast, increases in output in the community service, mining, and trade sectors would have affected the expansion of the Workforce. The recommendations in this study are related to the very low productivity and value of ILOR in the agricultural sector, based on the recommendations of the issue revealed by Ramarao et al. (2014), that there is a need to shift the orientation of the Indonesian agricultural market towards high productivity or pursue agricultural trends to lead to liberalization and globalization. The projection of skilled labor must also be considered alongside labor investment in the agricultural sector. At the same time, based on Taylor's (2020) parameters, it is necessary to accelerate investment in Indonesia's agricultural sector to increase productivity.

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