

ANALYSIS OF DETERMINANTS OF UNEMPLOYMENT RATE IN INDONESIA

Muhamad Fathul Muin¹

¹BPS-Statistics Papua, Dr. Samratulangi Street, Dok II, Jayapura, Papua

Corresponding Author:

¹fathul.muin@bps.go.id

Abstract

Solving the unemployment issue is one of the best ways to reduce poverty. Through the provision of job opportunities, the poverty rate can be reduced. Therefore, this research explores the factors that influence the unemployment rate across 34 provinces over the 2015-2018 period using the panel regression technique. The variable used consisting of economic growth, the percentage of people with IT competence, and the average school duration. This study indicates that the unemployment rate can be reduced by increasing the average school duration. Meanwhile, the level of economic growth and the proportion of people with IT competence have an insignificant influence on Indonesia's unemployment rate. Based on these findings, the government needs to ensure that every resident in its territory can receive an adequate education.

Keywords : *Labour Market, Job Opportunity, Unemployment.*

Abstrak

Menyelesaikan persoalan pengangguran merupakan salah satu cara terbaik untuk mengatasi kemiskinan. Melalui penyediaan lapangan kerja, maka angka kemiskinan dapat ditekan. Oleh karena itu, penelitian ini akan mengkaji faktor-faktor yang dapat memengaruhi angka pengangguran di 34 provinsi selama periode 2015-2018 dengan menggunakan teknik regresi panel. Variabel yang digunakan terdiri atas pertumbuhan ekonomi, persentase penduduk dengan kompetensi TI, dan rata-rata lama sekolah. Hasil penelitian ini menunjukkan bahwa tingkat pengangguran dapat ditekan dengan meningkatkan rata-rata lama sekolah. Sedangkan pertumbuhan ekonomi dan kompetensi penduduk dibidang teknologi informasi tidak berpengaruh signifikan terhadap pengurangan jumlah pengangguran di Indonesia. Berdasarkan temuan tersebut, pemerintah perlu memastikan bahwa setiap penduduk dapat mengenyam pendidikan yang memadai sesuai dengan kebutuhan.

Kata Kunci : *Pasar Tenaga Kerja, Peluang Pekerjaan, Pengangguran.*

INTRODUCTION

The Labour issue is still an important thing in the development agenda, especially in welfare discussion. Poverty appears because people do not have the purchasing power to meet their daily needs of living standards (Sartika et al., 2016). The employment provision will provide income for them to be used as capital in meeting their daily needs. Hence, it may conclude that job opportunity is the most fundamental effort to reduce the poverty rate (Karnani, 2011).

Meanwhile, to create jobs, a stimulus is needed to increase demand, which is reflected in increased public consumption (Mardalena et al., 2019). Theoretically, the aggregate demand will stimulate the producers to increase the output produced, which needs more production factors such as the labours. To get a picture of the increase in demand can be reflected through economic growth (constant price).

Besides, the development of information and technology (IT) also influences the labour market (Pianta, 2017). Sultanuzzaman et al. (2019) also argue that technology is quite enough for the economy because of the capacity to boost the economy on a broad scale. Some other studies show a contradiction where technology gets rid of a lot of labour (Rotman, 2013). However, other opinions state that technology can prevent a job and create alternative work that did not exist before (Caliskan, 2015).

Therefore, mastering IT becomes essential to survive in the current labour market (Deloitte, 2017). Technological developments that have penetrated every line of life, including business and industry, make workers must be able to adjust to improve their ability on IT. Even though technology has mostly replaced human workers' position, with adequate technological literacy, their position will not be replaced (ILO, 2010).

In Indonesia, the studies that link IT to employment are still limited to the management sector, specifically discuss the employees' IT mastery to work performance, for example, as the researches were done by Handayani et al. (2018), Muzakki et al. (2016), and Siregar (2019). From an economic perspective, the technological approach is more famous in endogenous growth theory, which mentions that technology will affect total production (Budiono, 2011; Fazri et al., 2017). Nevertheless, IT development is not limited only to employee performance and increased production. It also massively

influences a region's socio-economic patterns due to its digitalization (Alemie, 1998; Tisdell, 2014). Therefore, it is quite important to include elements of a technological approach in labour studies in Indonesia.

As for education, labour absorption cannot be separated from the role of education obtained by the community (Nugroho & Moonti, 2019). The diverse employment opportunities and the availability of a quality workforce are also inseparable from education's role in it. Educated people are considered capable of seeing various opportunities (Jimenez et al., 2015) and have adequate competence (Abdulrahamon et al., 2018). Therefore, education is needed to support the production process to boost output optimally and following the expectations expected by demand.

Besides, the average level of people education can influence the community's socio-economic development (Brennan, 2008; Sharma & Monteiro, 2016). The education level will also escalate the variety and level of community consumption, which is increasingly diverse (Ioncica et al., 2012; Worsley et al., 2004). This condition causes the demand for various types of goods and services to increase, and in turn, it will increase the number of labour demand and increase the absorption of existing labour (Keynes, 2008; Michailat & Saez, 2015).

Most of the previous studies only linked education to workers' aspects and ignored the entire population's educational conditions in general. Even though education influences labour absorption, it is not only on the assumption of increasing workers' capability but also on changing the social environment that allows the creation of many job vacancies. Therefore, an educational approach with a different perspective needs to be done in this study.

Regarding this research's urgency, Indonesia is still facing an extensive workforce of 131.01 million people or 49.34 per cent of the total population as of August 2018 (BPS, 2018). Also, the potential for economic growth is quite good, with an average economic growth of 5 per cent, making it momentum for income distribution and poverty alleviation through job creation. Therefore, it becomes essential to evaluate the effect of economic growth, the mastery of technology, and education level on the employment rate in Indonesia.

Therefore, this study aims to determine the extent of economic growth, IT mastery by the people, and the average education on influence labour absorption. Based on the findings and conclusions in this study, it hopes that it can serve as an evaluation material for the government in determining macro steps to increase labour absorption so that the unemployment rate can be reduced.

RESEARCH METHODS

The Scope of Research

The scope of this research includes all 34 provinces in Indonesia. The secondary data used from 2015 to 2018, covering four variables obtained from the BPS Statistics Indonesia, viz:

1. Percentage of the unemployment rate.

It is the ratio of the number of unemployed people to the total workforce.

2. Economic growth with a constant price.

It is an increase in the regional economic comparison between one period to the previous period using constant prices in 2010.

3. Percentage of the people with IT competence.

It is the proportion of adolescents and adults aged 15-59 years who have skills in Information and Computer Technology (ICT).

4. The average duration schools.

It is the average length of school that has been taken by every resident aged 15 years and over.

Research Model

From the consumption side, economic growth reflects an increase in aggregate demand for goods and services compared to the previous period. Likewise, when viewed from the production aspect, economic growth can be interpreted as an increase in output produced by economic units. The increase in consumption and production can occur when production inputs are met, one of which is labour. Therefore, the effect of economic growth on the number of unemployed is negative.

Meanwhile, people's IT ability is also an added value for someone related to the workforce's modern era skills. Their good ability towards IT reflects that the workforce can adapt to various production process changes, include changes in production technology. A good adaptation is necessary to self stay the current status as an employee in a corporation. Also, it gives the current opportunities with various entrepreneurial ideas. Thus, mastery of IT should have a positive effect on employment. It means that mastery of IT will negatively affect the number of unemployed people.

As for education, as expressed by experts, it is the primary key in producing quality human beings, starts in technical skills, thinking abilities, and adaptability. Therefore, education has a central role in producing a competent workforce that follows the industrial need. Thus, education will have a negative effect on the number of unemployed people.

Based on this description, in general, the relationship between economic growth, mastery of IT, and education level on the unemployment rate are diagnosed as having a negative and significant relationship. Therefore, visually, the relationship between the four variables can be described as follows:

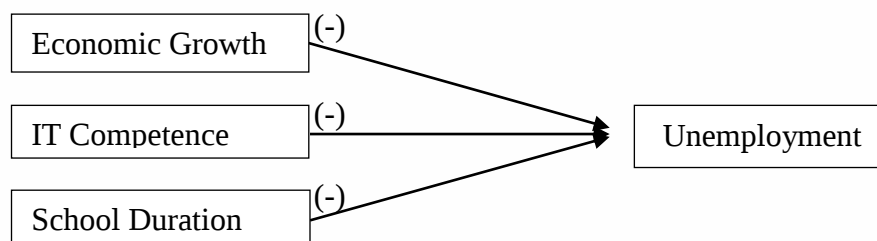


Figure 1
Proposed Research Model

Analysis Method

The inference analysis used in this research is panel data regression analysis. The number of cross-section data (i) are 34 provinces ($i = 1, 2, \dots, 34$) and time-series data (t) are 4 years ($t = 2015, 2016, 2017, 2018$). The type of panel data used is the balanced panel so that the total observations in this study are 136 observations. Based on Hill et al., (2011), there are four stages of the analysis are as follows:

1. Determine the best model estimate using three types of statistical tests. In general, the possible models that can be obtained consist of 3 types, namely:
 - a.) The common-effect model (CEM) is a model that assumes that there are no differences between individuals or the time. In other words, these effects are constant. The decision to determine this model is based on two test statistics, namely the Chow test and the LM test. When the model probability in the two statistical test results is not significant, then CEM is the best model estimate.
 - b.) The fixed-effect model (FEM) is a model that assumes a different effect between individuals is fixed. These individual differences will have an impact on the different intercept values for each provincial modelling. To decide that the FEM is the best model estimate, two statistical results are needed, namely the Hausman test and the Chow test. When the probabilities on the Hausman statistical test results and Chow test results are significant, then the FEM is the best model estimate.
 - c.) The random-effect model (REM) is a model that assumes that there are differences in the intercept of each individual, where the intercept is a random variable that accommodates the differences in individual characteristics and time. The consideration to decide REM as the best model requires two conclusions from the statistical test results: the Hausman test and the LM test. When the Hausman test results are not significant, and the LM test is significant, REM is the best estimation model.
2. Checking for classical assumptions.

The classical panel regression assumption test consists of testing the assumptions for normality, homoscedasticity, and non-multicollinearity. The use of these assumption test is intended to obtain unbiased and consistent estimator values. In detail, each of these assumptions are described as follows:

a.) Normality

The normal error distribution is required for regression modelling. If this assumption is violated, the various statistical analysis cannot be performed. The statistical test used follows the chi-square distribution. As for an alternative, when the error distribution is not normal, the data need to be transformed.

b.) Homoscedasticity

In regression, it assumed that residual variance between observations is constant. If there is heteroscedasticity in the data, and there is no cross-sectional correlation, then the estimation method is Generalized Least Square/Weighted Least Square. Meanwhile, when data heteroscedasticity occurs, and there is a cross-sectional correlation, the estimation method is Estimated Generalized Least Square/Feasible Generalized Least Square with Cross Section SUR/Panel Corrected Standard Errors.

c.) Non-multicollinearity

Ideally, each independent variable in the regression is independent and correlate with each other. To detect the presence of multicollinearity, the variance inflation factor (VIF) can be used, which measures the increase in variance in parameters. When the VIF calculation results show more than 5 or 10, there is multicollinearity between exogenous variables. The next step to be taken when multicollinearity occurs is reviewing the independent variables used.

3. Test the significance of the model with F test, t-test, and coefficient of determination.

These three tests are used to determine the model's ability to explain the effect of the independent variable on the variation of the dependent variable. A good model that does not require many independent variables but can explain the phenomenon in the variation of the dependent variable accurately.

4. Interpreting the chosen model

The model design for this research developed as follows:

$$\widehat{\text{Unemployment}}_{it} = C + \text{Economic Growth}_{it} + \text{IT Competence}_{it} + \text{School Duration}_{it} + \varepsilon_{it}$$

RESULTS AND DISCUSSION

Selection of the Best Model

The first stage to determine the best model is using the Chow Test. It has a purpose to compare pooled and fixed-effect models. Based on the test results in Table 1, the probability is 0.000 and smaller than 0.01. Using one per cent significance level, there is at

least one unequal interception from the 34 provinces studied. Therefore, the fixed effects model is better than the pooled model.

Table 1
The Result of Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	21.943	(33.99)	0.000
Cross-section Chi-square	288.047	33	0.000

The next stage is to determine the best model between fixed effect and random effect models. We used the Hausman test to find the best model between them. Shown in table 2, the calculation of probability in the amount of 0.0001 and smaller than 0.01. This result concludes that using a one per cent significance level, the fixed-effect model is better than the random effect model. Thus, from the two tests that have been carried out, it can be concluded that the fixed-effect is the best model.

Table 2
The Result of Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	20.580	3	0.0001

Classical Assumption Testing

For the panel regression, three assumptions need to be fulfil required. They are normality, non-multicollinearity, and homoscedasticity. Based on the test results like figure 2, the probability value is 0.0367 and greater than the significance level of 0.01. It shows that the error from the data set is normally distributed.

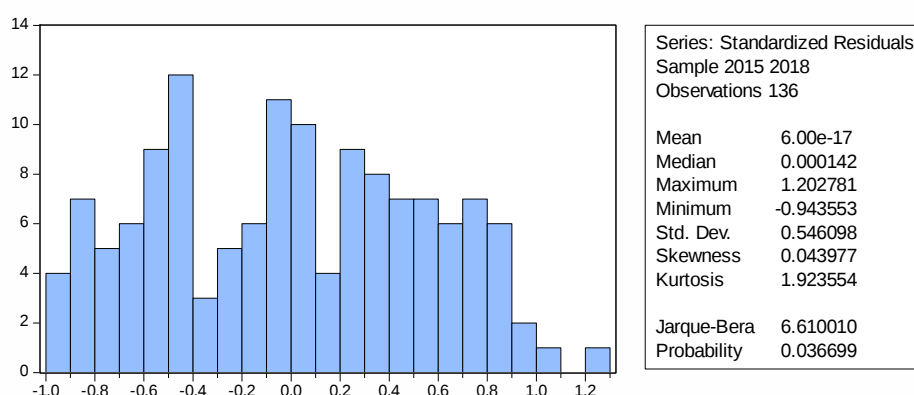


Figure 2.
Normality Test

The second step is the non-multicollinearity test. Based on the test results obtained by the VIF as table 3, the score of all variables are below the specified threshold of 5. Thus, it can be concluded that there is no linear relationship (non-multicollinearity) between the independent variables used.

Table 3
The Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.4906	128.9581	NA
Economic Growth	0.0033	5.9439	1.0322
IT Competence	0.0002	13.9312	1.5831
School Duration	0.0403	158.3019	1.5925

The third step is the homoscedasticity assumption test. Based on the test as table 4, the probability values are all greater than the significance level of 0.01. It shows that the data set experiences homoscedastic symptoms. It means that the OLS method may be used.

Table 4
The Homoscedasticity Test

F-statistic	1.5404	Prob. F (3; 132)	0.2071
Obs*R-squared	4.6002	Prob. Chi-Square (3)	0.2035
Scaled explained SS	5.7310	Prob. Chi-Square (3)	0.1255

The Selected Model

Simultaneously, the overall test results show the resulting probability of 0.0000, which is smaller than the significance level of 0.01. The results of this test provide a decision that with a significance level of one per cent, there is at least one independent variable that has a significant effect on the unemployment rate in Indonesia. The adjusted R-square value supports this result in 0.8807. It shows that the model can explain variations of unemployment phenomena by 88.07 per cent. Meanwhile, another 11.93 per cent is explained by other variables beyond the model.

Table 5
The Result of Final Equation Model

Variable	Coefficient	Std. Error	t-Stat	Prob.
C	34.3839	9.738	3.531	0.0006
Economic Growth	0.0110	0.028	0.386	0.7006
IT Competence	-0.0009	0.015	-0.060	0.9519
School Duration	-3.3668	1.177	-2.860	0.0052
Effects Specification				
R-sq	0.9125	Mean dep. var		5.2326
Adj R-sq	0.8807	S.D. dep. var		1.8789
F Stat.	28.6820	Prob.		0.0000

When viewed partially by using t-test statistics at a significance level of one per cent, there is one variable (school duration), which significantly affects the unemployment rate. It can be known from the result of the probability is 0.0052 and smaller than the significance level of 0.01. Meanwhile, the two other variables (economic growth and IT competence) are insignificant to explain the model. This conclusion is based on both probability are 0.7006 and 0.9519, which are greater than the significance level of 0.01.

After going through several stages of testing, the best estimation model selected is the fixed-effect model. The formed regression equation is as follows:

$$\widehat{\text{Unemployment}}_{it} = (34,3839 + u_i) - 3,3668 \text{ Duration School}_{it}$$

Table 6
The Individual Effect

No.	Province	Effect	No.	Province	Effect
1.	Aceh	4.8338	18.	West Nusa Tenggara	-4.6579
2.	North Sumatra	3.4680	19.	East Nusa Tenggara	-5.6086
3.	West Sumatra	1.6206	20.	West Kalimantan	-4.5606
4.	Riau	2.8775	21.	Central Kalimantan	-1.2627
5.	Jambi	-1.5236	22.	South Kalimantan	-1.5123

No.	Province	Effect	No.	Province	Effect
6.	South Sumatra	-1.4914	23.	East Kalimantan	5.1441
7.	Bengkulu	-0.7410	24.	Norrth Kalimantan	1.2876
8.	Lampung	-2.4471	25.	North Sulawesi	4.3874
9.	Kep. Bangka Belitung	-3.1828	26.	Central Sulawesi	-1.9446
10.	Kep. Riau	6.1273	27.	South Sulawesi	-0.9082
11.	DKI Jakarta	9.2015	28.	Southeast Sulawesi	-0.7878
12.	West Java	2.5367	29.	Gorontalo	-4.4950
13.	Central Java	-3.7422	30.	West Sulawesi	-5.0521
14.	DI Yogyakarta	1.4047	31.	Maluku	6.5823
15.	East Java	-3.9067	32.	North Maluku	0.7695
16.	Banten	4.3664	33.	West Papua	5.0320
17.	Bali	-2.7860	34.	Papua	-9.0289

Discussion

Based on the regression result, economic growth has an insignificant effect on the unemployment rate. This result indicates that the increase in economic growth does not affect decreasing the unemployment rate in Indonesia. This finding opposite of the hypothesis in this research that assumes economic growth will decrease the unemployment rate. However, this finding is supported by previous research conducted by Funlayo (2013) and Safatillah (2014).

In several cases, economic growth ordinarily able to create additional job opportunities. Growth in Regional Gross Domestic Product (RGDP) indicates that consumption has increased. This condition will push the production to increase with additional production factors, such as the capital (Limam & Miller, 2004) and labour (Winanto, 2019). However, in this case, there is an anomaly phenomenon.

There is an explanation of why economic growth does not significantly reduce the unemployment rate. Economic growth will not significantly affect additional employment when the drivers of economic growth come from non-labour-intensive sectors. The increase in production output, which is only influenced by the increase in the use of production technology or the increase in the number of employee work shifts, will

certainly not affect the job opening. Several sectors that are not effective in creating employment are the mining and quarrying sector, the information and communication sector, the financial services and insurance sector, and the real estate sector. The four sectors have a relatively large share of RGDP, but the contribution to labour absorption is low.

Meanwhile, economic growth that will be positive in absorbing labour will occur in the agriculture, forestry, fisheries sectors, the manufacturing sector, the wholesale trade sector, the transportation, warehousing sector, and accommodation food and beverage provision sector. The five sectors have a relatively high share of labour, some of which even exceed their RGDP share. Therefore, it becomes logical that an increase in economic growth will not have a positive impact.

Next, the regression result shows that IT competence has an insignificant effect on the unemployment rate decline. It can say that an increase in IT skills on the people does not guarantee that they would get jobs. This finding opposite the hypothesis assumed that IT competence has a negative effect on the unemployment rate. This result also contradicts the previous studies that documented that IT competency plays a role in increasing job opportunities, and IT penetration triggers employment termination and makes a transition for new business types (Dachs, 2017).

From a workforce aspect, IT skills make people able to compete for new jobs. However, the existence of IT also eliminates some of the pre-existing jobs. It is a cancel-out effect, where there is a replacement of one another between work types. It means that IT's existence only changes the work structure without changing the number of existing jobs. This argument is also supported by Michailat & Saez (2015) in their research, which reveals that shocks to labour demand tend to be caused by shocks to demand, not IT developments.

Besides, if viewed from a broader perspective, the insignificance of IT mastery by the people on labour absorption is also due to the low technology penetration in Indonesia. As a result, the creation of a multiplier effect is too small. Although in several big cities, the use of IT has penetrated until the transportation sector, the share of this sector to the workforce is still relatively small. As a result, the technological literacy possessed by some of these people is unable to create a massive labour effect. It is different if the penetration

of technology is evenly distributed across all society; technological literacy can create various job opportunities for many people. It is like what happened in South Korea, the United States, Australia, and several other developed countries.

Meanwhile, the last result of regression shows that the educational variable negatively affects the unemployment rate with a coefficient of -3.3668. This value indicates that an increase of one year of average education in society causes the unemployment rate to reduce by -3.3668 per cent, *ceteris paribus*. This finding is in line with the study by Riddell and Song (2011), who found that education, especially in 12 and 16 years of schooling, significantly increases the employment rates.

Education affects life satisfaction achieved through various mediums, including income and work (Powdthavee et al., 2015). It confirms that education improves a person's ability to adapt to the work environment or solve various problems. In a broader scope, people's education can accelerate the community's social life to develop continuously, which will create agglomeration of demand. This condition stimulates producers to take advantage of this momentum by increasing the scale of production and product variation. So that in the end, it will increase labour demand, and many workers will be absorbed. From this point of view, it can be understood that the average population's education will have a positive impact on employment in Indonesia.

Currently, the average duration of school in Indonesia is eight years or equal to the junior high school level. It makes sense that increasing school duration will increase job opportunities and decrease the unemployment rate significantly. However, it does not mean that increasing education will create more jobs and optimal labour absorption. The statistics showed that people in higher education have more unemployment (Maryati, 2015). It may happen because more people educated need a better job with high income (Ishchenko-Padukova et al., 2017). Regardless of the pros and cons, education is essential for labour. Education will have the primary role to create a new quality of economy and society in common (Lavrinovicha et al., 2015). Nevertheless, it necessary be noted that the curriculum must be set based on market-needed oriented (Martinez, 2018), as like entrepreneurship skills and other specific skills.

Implication

Based on this study's findings, several follow-ups need to be done to increase labour absorption so that the unemployment rate in Indonesia can be reduced. These follow-ups are a concrete effort to intervene based on the variables used in this study.

First, this study finds that aggregate economic growth does not affect labour absorption since the economic growth not in the labour-supporting sector. Based on this, the government needs to reobserve the fiscal policy related to government spending. It needs to spend out on the leading sectors of each region by still taking into labour absorption. Government spending can increase economic growth by providing a multiplier effect if spending is made in the right sector. In the future, the paradigm of budget absorption needs to pay attention to each region's economic posture. This effort is made so that the role of the Regional Budget as one of the economic supports and social welfare can be realized.

Second, the insignificance of IT mastery by the population on labour absorption is due to the cancel-out effect and the lack of multiplier effect of IT on labour-intensive job creation. As a follow-up, the efforts that can be made by the government to increase public literacy towards technology are the introduction of massive IT-based services. So far, several government steps such as smart-city, e-government, internet entering villages, and e-money through QRIS are strategic steps to increase public literacy towards IT in its role in everyday life. This step needs to be promoted more massively so that the achievement of IT penetration is step up.

Third, the significant reduction in education level in the unemployment rate gives a signal to the government that the level of education is essential to get attention. Education is the key to human resource development, both in the mastery of industrial skills, possession of insight and information, problem-solving, and creativity. Therefore, the government needs to encourage people to easily access education, both in terms of physical affordability, appropriate quality, and cost. Equality in the people's ability to access education will increase the participation rate of education, which will stimulate the economy as a whole and prepare a reliable workforce that can absorb this stimulus with production activities.

CONCLUSION

This research has the objective to test the effect of economic growth, IT mastery, and education level on Indonesia's unemployment rate. The method to determine the relationship among three variables uses panel regression with 34 provinces in range 2015-2018. The finding of this research is that the high economic growth and a sufficient percentage of IT mastery do not guarantee a decrease in most provinces' unemployment rates in Indonesia. This study also concluded that the factor that could reduce the unemployment rate is the average school duration.

Based on these findings, it becomes work for governments to increase the average length of school years while still paying attention to the curriculum which relevant to the job necessity. It also needs further research to investigate the comparison between vocational and non-vocational education and rediscuss the postgraduate level's existence than undergraduate and diploma levels.

REFERENCES

- Abdulrahman, I. A., Adeleye Samuel Toyin, & Tanimola, F. A. (2018). *Impact of Educational, Professional Qualification, and Years of Experience on Accountants' Job Performance*. <https://doi.org/10.5281/ZENODO.1210796>
- Alemie, L. (1998). How is Information Technology Shaping the Economy and Society? *Information Development*, 14(4), 181–184. <https://doi.org/10.1177/02666666984239454>
- BPS. (2018). *Keadaan Angkatan Kerja di Indonesia Agustus 2018* (Data Publication 04120.1807). Badan Pusat Statistik.
- Brennan, J. (2008). Higher Education and Social Change. *Higher Education*, 56(3), 381–393. <https://doi.org/10.1007/s10734-008-9126-4>
- Budiono, S. (2011). Teknologi, Perdagangan Internasional, dan Pertumbuhan Ekonomi: Suatu Kajian Teori Ekonomi Klasik ke Perdagangan Internasional Modern. *Jurnal Riset Manajemen dan Bisnis*, 6(1), 69–93.
- Caliskan, H. K. (2015). Technological Change and Economic Growth. *Procedia - Social and Behavioral Sciences*, 195, 649–654. <https://doi.org/10.1016/j.sbspro.2015.06.174>
- Dachs, B. (2017). The Impact of New Technologies on the Labour Market and the Social Economy. *MPRA Paper 90519, University Library of Munich, Germany*.

Deloitte. (2017). *What Key Competencies are Needed in the Digital Age? The Impact of Automation on Employees, Companies and Education*.

<https://www2.deloitte.com/content/dam/Deloitte/ch/Documents/innovation/ch-en-innovation-automation-competencies.pdf>

Fazri, M., Siregar, H., & Nuryartono, N. (2017). Efisiensi Teknis, Pertumbuhan Teknologi, dan Total Faktor Produktivitas pada Industri Menengah dan Besar di Indonesia. *Jurnal Ekonomi Dan Kebijakan Pembangunan*, 6(1), 1–20.

Funlayo, O. E. (2013). The Impact of Economic Growth on Employment in Nigeria. *International Business and Management*, 6(1), 113–119.
<https://doi.org/10.3968/j.ibm.1923842820130601.1145>

Handayani, R., Runtuwene, R. F., & Sambul, S. A. P. (2018). Pengaruh Penguasaan Teknologi Informasi Terhadap Kinerja Karyawan Pada PT. Telkom Indonesia Cabang Manado. *Jurnal Administrasi Bisnis*, 6(2), 10–16.

Hill, R., Griffiths, W. E., & Lim, G. C. (2011). *Principles of Econometrics* (4th ed.). John Wiley & Son, Inc.

ILO. (2010). *A Skilled Workforce for Strong, Sustainable and Balanced Growth: A G20 Training Strategy*. International Labour Office.

Ioncica, M., Petrescu, E.-C., Ioncica, D., & Constantinescu, M. (2012). The Role of Education on Consumer Behavior on the Insurance Market. *Social and Behavioral Sciences*, 46, 4154–4158. <https://doi.org/10.1016/j.sbspro.2012.06.217>

Ishchenko-Padukova, O., Kazachanskaya, E., Movchan, I., & Nawrot, Ł. (2017). Economy of Education: National and Global Aspects. *Journal of International Studies*, 10(4), 246–258. <https://doi.org/10.14254/2071-8330.2017/10-4/19>

Jimenez, A., Palmero-Camara, C., Gonzalez-Santos, M. J., Gonzalez-Bernal, J., & Jimenez-Eguizabal, J. A. (2015). The Impact of Educational Levels on Formal and Informal Entrepreneurship. *BRQ Business Research Quarterly*, 18(3), 204–212. <https://doi.org/10.1016/j.brq.2015.02.002>

Karnani, A. (2011). Reducing Poverty through Employment. *Innovations: Technology, Governance, Globalization*, 6(2), 73–97.

Keynes, J. M. (2008). *The General Theory of Employment, Interest and Money*. Atlantic.

Lavrínovicha, I., Lavrínenko, O., & Teivans-Treinovskis, J. (2015). Influence of Education on Unemployment Rate and Incomes of Residents. *Procedia - Social and Behavioral Sciences*, 174, 3824–3831. <https://doi.org/10.1016/j.sbspro.2015.01.1120>

- Limam, Y. R., & Miller, S. M. (2004). Explaining Economic Growth: Factor Accumulation, Total Factor Productivity Growth, and Production Efficiency Improvement. *Economics Working Papers*, 1–41.
- Mardalena, M., Adjil, A., Suhel, S., Andaiyani, S., & Harunurrasyid, H. (2019). How Leading Economic Sectors Stimulate Economic Growth, Income and Labor Absorption? Input—Output Approach. *International Journal of Economics and Financial Issues*, 9(1), 234–244. <https://doi.org/10.32479/ijefi.6406>
- Martinez, W. (2018). How Science and Technology Developments Impact Employment and Education. *Proceedings of the National Academy of Sciences*, 115(50), 12624–12629. <https://doi.org/10.1073/pnas.1803216115>
- Maryati, S. (2015). Dinamika Pengangguran Terdidik: Tantangan Menuju Bonus Demografi di Indonesia. *ECONOMICA: Journal of Economic and Economic Education*, 3(2), 124–136.
- Michaillat, P., & Saez, E. (2015). Aggregate Demand, Idle Time, and Unemployment. *The Quarterly Journal of Economics*, 130(2), 507–569. <https://doi.org/10.1093/qje/qjv006>
- Muzakki, M. H., Susilo, H., & Yuniarto, S. R. (2016). Pengaruh Penggunaan Teknologi Informasi terhadap Kinerja Karyawan (Studi Pada Karyawan PT. TELKOM Pusat Divisi Regional V Surabaya). *Jurnal Administrasi Bisnis*, 39(2), 169–175.
- Nugroho, A. B., & Moonti, U. (2019). Analysis of the Effect of Capital Expenditures, Economic Growth and Education Levels on Labor Absorption. *JEJ: Jambura Equilibrium Journal*, 1(1), 31–37.
- Pianta, M. (2017). Technology and Employment: Twelve Stylized Facts for the Digital Age. *MPRA: Munich Personal RePEc Archive*, 1–31.
- Powdthavee, N., Lekfuangfu, W. N., & Wooden, M. (2015). What's the Good of Education on Our Overall Quality of Life? A Simultaneous Equation Model of Education and Life Satisfaction for Australia. *Journal of Behavioral and Experimental Economics*, 54, 10–21. <https://doi.org/10.1016/j.socec.2014.11.002>
- Riddell, W. C., & Song, X. (2011). The Impact of Education on Unemployment Incidence and Re-employment Success: Evidence from the U.S. Labour Market. *Discussion Paper No. 5572*, 1–35.
- Rotman, D. (2013). How Technology Is Destroying Jobs. *MIT Technology Review*. <https://www.technologyreview.com/2013/06/12/178008/how-technology-is-destroying-jobs/>

- Safatillah, M. B. (2014). Analisis Faktor-Faktor yang Mempengaruhi Penyerapan Tenaga Kerja pada Industri Elektronik di Indonesia. *Economics Development Analysis Journal*, 3(2), 276–283. <https://doi.org/10.15294/edaj.v3i2.3833>
- Sartika, C., Balaka, M., & Rumbia, W. A. (2016). Studi Faktor-Faktor Penyebab Kemiskinan Masyarakat Desa Lohia Kecamatan Lohia Kabupaten Muna. *Jurnal Ekonomi*, 1(1), 106–118.
- Sharma, R., & Monteiro, S. (2016). Creating Social Change: The Ultimate Goal of Education for Sustainability. *International Journal of Social Science and Humanity*, 6(1), 72–76. <https://doi.org/10.7763/IJSSH.2016.V6.621>
- Siregar, P. N. U. S. (2019). Pengaruh Disiplin Kerja dan Penguasaan Teknologi Informasi terhadap Kinerja Pegawai di Universitas Darma Agung. *Jurnal Darma Agung*, XXVII (1), 785–796.
- Sultanuzzaman, M. R., Fan, H., Mohamued, E. A., Hossain, M. I., & Islam, M. A. (2019). Effects of Export and Technology on Economic Growth: Selected Emerging Asian Economies. *Economic Research-Ekonomska Istraživanja*, 32(1), 2515–2531. <https://doi.org/10.1080/1331677X.2019.1650656>
- Tisdell, C. (2014). *Information Technology's Impacts on Productivity, Welfare and Social Change: Second Version*. <https://doi.org/10.22004/AG.ECON.195701>
- Winanto, A. R. (2019). Investment, Labor and Their Effects on Economic Growth of Ponorogo Regency. *Ekulilibrium: Jurnal Ilmiah Bidang Ilmu Ekonomi*, 14(1), 68–83.
- Worsley, A., Blaschea, R., Ball, K., & Crawford, D. (2004). The Relationship between Education and Food Consumption in the 1995 Australian National Nutrition Survey. *Public Health Nutrition*, 7(5), 649–663. <https://doi.org/10.1079/PHN2003577>