THE 2ND INTERNATIONAL CONFERENCE ON ECONOMICS, BUSINESS, AND MANAGEMENT RESEARCH (ICEBMR)
"Shaping the Sustainable Future: Trends and Insights in Economics, Business, Management, and Information Technology"
https://e-conf.usd.ac.id/index.php/icebmr/ | ISSN: 3032-596X

THE IMPACT OF THE COVID-19 PANDEMIC ON THE LABOR SECTOR IN INDONESIA: A MULTIVARIATE ANALYSIS OF VARIANCE APPROACH

Florentinus Nugro Hardianto[1], Shendy Ferika[2], Media Putri Baroto[3]
[1,2,3]*Sanata Dharma University*
Email: [1]flnugroho@gmail.com, [2]ferikashendy@gmail.com, [3]mediaputri.baroto@gmail.com

ABSTRACT

The COVID-19 pandemic has affected the development of the labor sector. The economic impact of restrictions and lockdowns during the pandemic has resulted in job declines, mass layoffs, and financial uncertainty for many workers. This study aims to conduct a comparative analysis of the development of the labor sector in Indonesia before and during the COVID-19 pandemic. The data analysis tool used in this study is Multivariate Analysis of Variance (MANOVA). One of the uses of this analysis is to perform comparison or difference tests. This analysis is carried out through the stages of multivariate normality tests, homogeneity tests, simultaneous comparison tests (multivariate) and comparison tests separately (univariate). The results of the study concluded that multivariately there were significant differences in labor development in Indonesia between before and during the COVID-19 pandemic.

Keywords: *labor sector development, comparative analysis, manova, covid-19 pandemic.*

1. Introduction

The emergence of the COVID-19 pandemic around 2019-2021 resulted in an extraordinary crisis for the international community. COVID-19 is the largest pandemic in a century, measured by areas affected, human lives lost, and economic activities damaged (Huang et al., 2021). The COVID-19 pandemic caused serious disruptions in human society and unprecedented health and economic crises (Nascimento, Erick Giovani Sperandio, Badaro, 2020). The COVID-19 pandemic caused enormous socioeconomic turmoil in the spring of 2020 as it threatened health as well as the suspension of many business activities (Witteveen & Velthorst, 2020). The recent COVID-19 pandemic affected society as a whole (Stalmachova & Strenitzerova, 2021), and became a significant factor influencing change in all sectors of the world (Stalmachova & Strenitzerova, 2021).

The extraordinary crisis caused by the COVID-19 pandemic has been felt in various sectors of the economy. The global economy is experiencing unprecedented disruption due to the COVID-19 pandemic (Dang & Viet Nguyen, 2021). The spread of the coronavirus and the imposition of stay-at-home rules have increased uncertainty and reduced economic activity in various economic sectors globally, resulting in the closure of financial markets, businesses, corporate offices, and other social activities (Mulyono, 2023). Major challenges for developed and developing countries due to the spread of COVID-19 include global supply chain problems that have been disrupted and economies that have entered recession (Al-Youbi et al., 2020; Queiroz et al., 2022).

In connection with the crisis caused by the COVID-19 pandemic, this paper tries to analyze the influence of the COVID-19 pandemic on the workforce aspect. In particular, this paper aims to compare the development of the workforce before and during the COVID-19 pandemic. The development of the workforce in question is the development of the macro

workforce in Indonesia. Macro labor development is compared using several relevant indicators such as open unemployment rate, proportion of informal employment, percentage of children aged 10-17 years employed, percentage of formal labor, underemployment rate, and proportion of informal employment in the non-agricultural sector in Indonesia.

2. Literature Review

The labor market has also been adversely affected by the COVID-19 pandemic. Labor markets around the world are experiencing major shocks due to the COVID-19 pandemic (Kikuchi et al., 2021). The COVID-19 pandemic has dramatically affected employment, with many workers being asked to work from home, many being asked to leave, or even many being laid off as unemployed (Petts et al., 2021). Government policies in implementing social restrictions during the COVID-19 pandemic such as self-quarantine, mobility restrictions, and business closures make it difficult for the labor market to adapt so that sooner or later many employed workers face greatly reduced workloads, temporary inactivity, or even job loss (Witteveen & Velthorst, 2020). Many people have lost their jobs, and on the other hand, employers have also found it difficult to hire their employees due to the business difficulties they face due to the COVID-19 pandemic (Hakovirta & Denuwara, 2020). Since the World Health Organization declared COVID-19 a pandemic on March 11, 2020, working life has changed dramatically as many workplaces have been forced to close, more work is done online, and also many workers have struggled to continue working while caring for their children in the family (Qian & Fuller, 2020).

The COVID-19 pandemic has even caused health problems for employees. The COVID-19 pandemic has had a substantial adverse impact on workers both regarding their physical and mental health (Singh et al., 2021). The COVID-19 pandemic has had a major impact on the mental and physical well-being of workers who have mentally decreased due to anxiety, fear, stress, and new working conditions, and on the other hand physically decreased also due to decreased physical activity, increased consumption of unhealthy foods, and lack of communication with colleagues (Olariu et al., 2022). The COVID-19 pandemic, which requires some workers to work from home, has caused physical effects such as reduced physical activity, increased consumption of junk food, weight gain, poor sleep quality, and musculoskeletal pain, in addition to mental effects such as increased levels of anxiety, depression, stress, headaches, fatigue, and lower job satisfaction (Chirico et al., 2021). The decline in physical and mental well-being of a number of workers while working from home during the COVID-19 pandemic is related to problems with physical exercise, food intake, communication with colleagues, children at home, interruptions at work, adjusted working hours, workstation settings and satisfaction with environmental factors in the workspace room (Xiao et al., 2021).

The government, companies, and related organizations together need to make anticipatory and recovery efforts for workers negatively affected by the COVID-19 pandemic. Due to the COVID-19 pandemic, the government needs to make various efforts in order to help workers who have lost their jobs to get them back, minimizing the gap between the skills possessed by workers and the skills needed by the company (Mayhew & Anand, 2020). Given the severity of the COVID-19 pandemic, organizations must become more flexible and quick in overcoming its negative impacts (Al-Youbi et al., 2020). Company leaders can keep their employees safe and promote well-being during the COVID-19 pandemic by providing employees with alternative work flexibility regarding working hours and workload resolution given changes in work patterns, conducting social interactions virtually or online with their employees, establishing effective collaboration online with their employees by utilizing various appropriate communication equipment, and build a positive attitude to its employees

with a number of facilities or adequate attention for its employees (Caligiuri, Paula, and De Cieri, 2020).

Looking at the various extraordinary impacts due to the COVID-19 pandemic, some consider that the COVID-19 pandemic crisis has a greater impact than previous crises. The COVID-19 pandemic had an unprecedented impact on labor markets and consumer markets, exhibiting more severe economic activity than the global financial crisis experienced, and the effects of economic & monetary policies carried out were similar to or outweighed in nature than previous major crises such as the global crisis of 2008, the Crash of 1978, and the depression of 1929 (Li et al., 2022). The comparison of the crisis during the Great Lockdown of 2020 with the Great Recession of 2009 is that the shocks associated with the Great Recession arise from pressures throughout the economy, especially high-income countries, while conversely, the Great Lockdown during the COVID-19 Pandemic is borne outside the global economic system, and is likely to leave most countries severely affected, both high- and low-income countries (Schmidhuber, J. and Qiao, 2020).

3. Research Methods

This study belongs to the type of comparative research. Comparative research is research that compares the presence of one or more variables in two or more different samples, or at different times (Sugiyono, 2016). The reason researchers use comparative research is because according to the problem of this study, namely the problem of comparison or difference between two samples, namely the development of the Indonesian workforce before and during the Covid-19 pandemic.

The main variable in this study is the development of employment in Indonesia. This main variable is then represented by 6 indicators. The six indicators used in this study are as follows: open unemployment rate, proportion of informal employment, percentage of children aged 10-17 years employed, percentage of formal employment, underemployment, and proportion of informal employment in the non-agricultural sector. This study used secondary data mainly from publication reports Badan Pusat Statistik (BPS).

The data analysis methods used in this study are quantitative descriptive analysis and comparative analysis, especially difference tests. The data analysis tool used in this study is Multivariate Analysis of Variance (MANOVA). One of the uses of this analysis is to perform comparison or difference tests. This analysis was carried out through the stages of multivariate normality tests, homogeneity tests, simultaneous comparison tests (multivariate) and comparison tests separately (univariate) with the help of SPSS Version 26 software.

4. Research Findings and Discussion

4.1 Descriptive Statistics

To provide an overview and information about research variable data, descriptive tables are used. Descriptive data in this study include the number of research samples, mean value, standard deviation, minimum value, and maximum value. The results of descriptive statistical analysis are described as follows. The 2019 open unemployment rate (before the pandemic) with a total of 34 data (n) had an average value (mean) of 4.5644, a standard deviation of 1.58825, with a minimum value of 1.39 and a maximum of 7.91. The 2020 open unemployment rate (during the pandemic) with a total of 34 data (n) had an average value (mean) of 5.2432, a standard deviation of 1.68127, with a minimum value of 2.85 and a maximum of 9.31. The proportion of informal employment in 2019 (before the pandemic) with a total of 34 data (n) had an average value (mean) of 56.5826, a standard deviation of 10.76891, with a minimum value of 29.57 and a maximum of 79.29. The proportion of informal employment in 2020 (during the pandemic) with a total of 34 data (n) had an average value (mean) of 61.0088, a standard deviation of 9.62044, with a minimum value of 35.41 and a maximum of 79.92.

The percentage of children aged 10 to 17 years working in 2019 (before the pandemic) with a total of 34 data (n) had an average value (mean) of 2.6829 standard deviations of 1.07890, with a minimum value of 0.98 and a maximum of 5.26. The percentage of children aged 10 to 17 years working in 2020 (during the pandemic) with a total of 34 data (n) had an average value (mean) of 3.9115, a standard deviation of 1.65301, with a minimum value of 1.19 and a maximum of 8.05. The percentage of formal workers in 2019 (before the pandemic) with a total of 34 data (n) had an average value (mean) of 43.4174 standard deviations of 10.76891, with a minimum value of 20.71 and a maximum of 70.43. The percentage of formal workers in 2020 (during the pandemic) with a total of 34 data (n) had an average value (mean) of 38.9912, a standard deviation of 9.62044, with a minimum value of 20.08 and a maximum of 64.59.

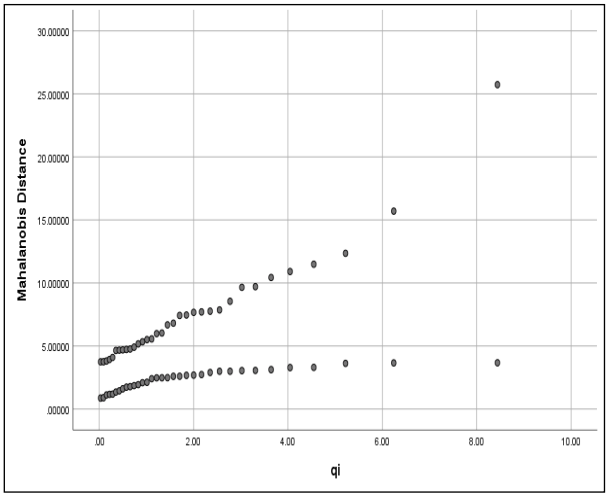
The 2019 underemployment rate (before the pandemic) with a total of 34 data (n) had an average value (mean) of 7.3935 standard deviations of 2.79529, with a minimum value of 1.89 and a maximum of 13.97. The 2020 underemployment rate (during the pandemic) with a total of 34 data (n) had a mean value of 10.6953, a standard deviation of 2.66102, with a minimum value of 5.75 and a maximum of 16.83. The proportion of informal employment in the non-agricultural sector in 2019 (before the pandemic) with a total of 34 data (n) had an average value (mean) of 42.4109 standard deviations of 6.68219, with a minimum value of 25.33 and a maximum of 59.96. The proportion of informal employment in the non-agricultural sector in 2020 (during the pandemic) with a total of 34 data (n) had an average value (mean) of 47.1962, a standard deviation of 5.76839, with a minimum value of 30.87 and a maximum of 60.31.

4.2 Multivariate Normality Test

A normality test is performed to determine whether the research data is normally distributed or not. In this study, the normality test used was *Mahalanobis Distance.* The multivariate normality test was carried out by creating a *scatter-plot* between *the expensive* distance and *Chi Square*. If these *scatter-plots* tend to form straight lines and more than 50% of the mahalanobis distance value is less than or equal to *Chi Square*, then Ho is accepted meaning multivariate normally distributed data.

Based on the results of the normality test in table 1, it can be explained that the data are multivariate normal distribution because these *scatter-plots tend* to form straight lines and more than 50% of the mahalanobis distance value is less or equal to the qi value. In addition to paying attention to scatter-plots, we can also draw conclusions from the correlation value.

Table 1. Normality Test



Source: Analysis Results

When viewed in the output of the table above, *Mahalanobis distance* correlates with qi of 0.604 which indicates that the correlation coefficient is very high. The magnitude of the correlation coefficient between -1 to +1. If the correlation coefficient > r table or sig value. < 0.05 there is a significant correlation. In scatter-plots this means the data comes from a multivariate normally distributed sample.

Table 2. Correlation Test

		Mahalanobis Distance	qi
Mahalanobis Distance	Pearson Correlation	1	.604**
	Sig. (2-tailed)		.000
	N	68	68
qi	Pearson Correlation	.604**	1
	Sig. (2-tailed)	.000	
	N	68	68

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Analysis Results

4.3 Simultaneous Variance/Covariance Matrix Homogeneity Test Results

The results obtained from the multivariant normality test and correlation test can be used to conduct the next test, namely the homogeneity test. The homogeneity test is used to determine whether there are similarities between several existing populations. The criterion on homogeneity testing is if the sig value. < 0.05, it can be concluded that the data variance is not homogeneous. So, the further test used is *Gamess Howell* and if the value of sig. > 0.05 then it can be concluded that the data variance is homogeneous. So, the next test used is *Bonnferoni.* The results of the homogeneity test showed that of the six variables had a significance value of > 0.05. So it can be concluded that the data variance is homogeneous.

4.4 Simultaneous Comparison Test (Multivariate)

The Manova test or *Multivariate Analysis of Variance* is used to measure the influence of independent variables on a categorical scale on several dependent variables at once on a quantitative data scale (Imam Ghozali, 2009: 79). The criteria in the Manova test itself is if the value of sig. < 0.05 then it can be interpreted that there is a significant influence and j if the value of sig. > 0.05 then it can be interpreted that there is no significant influence. In the Multivariate Test table above e can find out the SPSS output results for the Manova Test. It is known that the significance value is 0.000, the value is < 0.05, so it is concluded that there is an influence on the Covid-19 pandemic on the six variables.

Table 3. Simultaneous Comparison Test (Multivariate)

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.994	2008.786[b]	5.000	62.000	.000
	Wilks' Lambda	.006	2008.786[b]	5.000	62.000	.000
	Hotelling's Trace	161.999	2008.786[b]	5.000	62.000	.000
	Roy's Largest Root	161.999	2008.786[b]	5.000	62.000	.000
Covid19	Pillai's Trace	.448	10.083[b]	5.000	62.000	.000

	Wilks' Lambda	.552	10.083[b]	5.000	62.000	.000
	Hotelling's Trace	.813	10.083[b]	5.000	62.000	.000
	Roy's Largest Root	.813	10.083[b]	5.000	62.000	.000

Source: Analysis Results

4.5 Separate Comparison Test (Univariate)

This univariate test was conducted to see if there were significant differences in the six dependent variables separately before the COVID-19 pandemic and during the COVID-19 pandemic. The results of the univariate test with the *Test of Between-Subject Effect* indicate that the level of open unemployment there was no significant difference in the period before the Covid-19 pandemic and during the Covid-19 pandemic, informal employment there was no significant difference in the period before the Covid-19 pandemic and during the Covid-19 pandemic, the percentage of children after 10 to 17 years working there was a significant difference in the period before the Covid-19 pandemic and during the Covid-19 pandemic Covid-19 pandemic, the percentage of formal labor there was no significant difference in the period before the Covid-19 pandemic and during the Covid-19 pandemic, the underemployment rate there was a significant difference in the period before the Covid-19 pandemic and during the Covid-19 pandemic, and the proportion of informal employment in the non-agricultural sector there was a significant difference in the period before the Covid-19 pandemic and during the Covid-19 pandemic.

5. Conclusion

Multivariately, it is concluded that there are significant differences in labor development in Indonesia between before and during the COVID-19 pandemic. Univariately it is concluded as follows. There was no significant difference in the development of the open unemployment rate between before and during the COVID-19 pandemic. There was no significant difference in the development of the proportion of informal employment between before and during the COVID-19 pandemic. There is a significant difference in the percentage of children aged 10-17 years working between before and during the COVID-19 pandemic. There was no significant difference in the percentage development of the formal workforce between before and during the COVID-19 pandemic. There was no significant difference in the development of the underemployment rate between before and during the COVID-19 pandemic. There are significant differences in the development of the proportion of informal employment in the non-agricultural sector between before and during the COVID-19 pandemic.

Based on the results of the study, a number of suggestions were given as follows. Entrepreneurs and organizations need to comply with authority guidelines, evaluate business risks, and design business continuity plans to improve business resilience in an effort to anticipate similar conditions as during the pandemic. Workers and organizations should be active in the implementation of preventive measures in the workplace, adhere to hygiene practices, and support solidarity with sick workers and individuals. This study acknowledges limitations and recommends future research to supplement research variables with broader indicators of workforce development. It is also recommended to use different labor development variables, extend the study period, and expand the sample in order to obtain a higher degree of generalization. Further research is expected to provide broader and more complete information about workforce development in Indonesia.

References

Al-Youbi, A. O., Al-Hayani, A., Rizwan, A., & Choudhry, H. (2020). Implications of COVID-19 on the labor market of Saudi Arabia: The role of universities for a sustainableworkforce. *Sustainability (Switzerland)*, *12*(17). https://doi.org/10.3390/su12177090

Caligiuri, Paula, and De Cieri, H. (2020). *4 ways companies can support their workers during the coronavirus crisis*. Maret 31, 2020. https://theconversation.com/4-ways-companies-can-support-their-workers-during-the-coronavirus-crisis-134732

Chirico, F., Zaffina, S., Di Prinzio, R. R., Giorgi, G., Ferrari, G., Capitanelli, I., Sacco, A., Szarpak, L., Nucera, G., Taino, G., Afolabi, A., & Ilesanmi, O. (2021). Working from home in the context of COVID-19: A systematic review of physical and mental health effects on teleworkers. *Journal of Health and Social Sciences*, *6*(3), 319–332. https://doi.org/10.19204/2021/wrkn8

Dang, H. A. H., & Viet Nguyen, C. (2021). Gender inequality during the COVID-19 pandemic: Income, expenditure, savings, and job loss. *World Development*, *140*(xxxx), 105296. https://doi.org/10.1016/j.worlddev.2020.105296

Hakovirta, M., & Denuwara, N. (2020). How COVID-19 redefines the concept of sustainability. *Sustainability (Switzerland)*, *12*(9), 10–13. https://doi.org/10.3390/su12093727

Huang, Y., Qiu, H., & Wang, J. (2021). Digital Technology and Economics Impacts of Covid-19: Experiences of the People'S Republic of China. *ADBI Working Paper Series*, *1276*, 75–75.

Kikuchi, S., Kitao, S., & Mikoshiba, M. (2021). Who suffers from the COVID-19 shocks? Labor market heterogeneity and welfare consequences in Japan. *Journal of the Japanese and International Economies*, *59*(November 2020), 101117. https://doi.org/10.1016/j.jjie.2020.101117

Li, Z., Farmanesh, P., Kirikkaleli, D., & Itani, R. (2022). A comparative analysis of COVID-19 and global financial crises: evidence from US economy. *Economic Research-Ekonomska Istrazivanja* , *35*(1), 2427–2441. https://doi.org/10.1080/1331677X.2021.1952640

Mayhew, K., & Anand, P. (2020). COVID-19 and the UK labour market. *Oxford Review of Economic Policy*, *36*, S215–S224. https://doi.org/10.1093/oxrep/graa017

Mulyono. (2023). Pandemic Covid-19 Impact on Technology and Telecommunication Industry: Evidence from Indonesia Listed Company. *E3S Web of Conferences*, *388*. https://doi.org/10.1051/e3sconf/202338803034

Nascimento, Erick Giovani Sperandio, And Badaro, R. (2020). The New Technologies in the Pandemic Era. *Journal of Bioengineering Technologies and Health*. https://doi.org/DOI: 10.34178/jbth.v3i2.122

Olariu, A. A., Popa, I., & Simona, C. (2022). *Modelling the COVID-19 Pandemic Effects on Employees ' Health and Performance : A PLS-SEM Mediation Approach*.

Petts, R. J., Carlson, D. L., & Pepin, J. R. (2021). A gendered pandemic: Childcare, homeschooling, and parents' employment during COVID-19. *Gender, Work and Organization*, *28*(S2), 515–534. https://doi.org/10.1111/gwao.12614

Qian, Y., & Fuller, S. (2020). COVID-19 and the gender employment gap among parents of young Children. *Canadian Public Policy*, *46*, S89–S101. https://doi.org/10.3138/CPP.2020-077

Queiroz, M. M., Ivanov, D., Dolgui, A., & Fosso Wamba, S. (2022). Impacts of epidemic outbreaks on supply chains: mapping a research agenda amid the COVID-19 pandemic through a structured literature review. In *Annals of Operations Research* (Vol. 319, Issue 1). Springer US. https://doi.org/10.1007/s10479-020-03685-7

Schmidhuber, J. and Qiao, B. (2020). *Comparing Crises: Great Lockdown versus Great*

Recession. https://doi.org/10.4060/ca8833en

Singh, G. K., Lee, H., & Azuine, R. E. (2021). Increasing Trends in Physical and Mental Health Problems among US Workers in Different Job Sectors During the COVID-19 Pandemic. *International Journal of Translational Medical Research and Public Health*, *5*(2), 90–102. https://doi.org/10.21106/ijtmrph.351

Stalmachova, K., & Strenitzerova, M. (2021). Impact of the COVID-19 pandemic on employment in transport and telecommunications sectors. *Transportation Research Procedia*, *55*, 87–94. https://doi.org/10.1016/j.trpro.2021.06.009

Sugiyono. (2016). *Metode Penelitian Kuantitatif, Kualitatif dan R&D* (24th ed.). Alfabeta.

Witteveen, D., & Velthorst, E. (2020). Economic hardship and mental health complaints during COVID-19. *Proceedings of the National Academy of Sciences of the United States of America*, *117*(44), 27277–27284. https://doi.org/10.1073/pnas.2009609117

Xiao, Y., Becerik-Gerber, B., Lucas, G., & Roll, S. C. (2021). Impacts ofWorking from Home during COVID-19 Pandemic on Physical and Mental Well-Being of Office Workstation Users. *Journal of Occupational and Environmental Medicine*, *63*(3), 181–190. https://doi.org/10.1097/JOM.0000000000002097