Labour Productivity In Medan

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Abstract. This study aims to determine the effect of minimum wage and education on labour productivity in Medan. This study adopts a quantitative research approach, utilizing time series data spanning from 2008 to 2022. The dataset is sourced from the Central Bureau of Statistics of Medan (BPS Medan). Data analysis is executed using multiple linear analysis, employing E-views 12 software with *the Ordinary Least Square* (OLS) method, expressed through the regression equation Yit = β0 + β X11it + β X22it + εit. Notably, the preliminary findings indicate that the minimum wage variable has a positive impact on labour productivity, whereas the level of education appears to exert no discernible effect on labour productivity. However, it is noteworthy that when assessing these variables together, both minimum wage and education jointly influence labour productivity.

Keywords: Minimum Wage, Education, and Labour Productivity

1 Introduction

Economic development in Indonesia still has many problems in the field of employment, which in essence labour is a factor of production that has a role in national development. The potential arising from the high quantity can be utilized in creating a qualified workforce, so that high productivity will create added value of production in the process of national development. Nonetheless, the ongoing issue in Indonesia is the disparity between its substantial population and the corresponding shortage of high skills and quality, resulting in restricted productivity within production endeavors.

The level of productivity achieved is an indicator in the achievement of efficiency and economic progress, both measures for a nation and an industry. (Sedarmayanti, 2009). Productivity is one of the most important indicators of economic activity economic activity. In the long term, enhanced productivity serves as a driving force for a nation's economic expansion. This underscores why numerous countries are engaged in fierce competition to bolster their productivity levels (Kemenaker, 2016). Increased productivity on a national scale will increase revenue and can be utilized for investment and expansion which in turn will expand employment opportunities as one of the objectives of national development. In economic theory, maximum profit is the goal of various types of industries or companies. Efforts to maximize profits can be achieved from an economic point of view as the most efficient way. (Sukirno, 2013).

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The measure of labour productivity is calculated from the amount of GRDP per labour in an economic activity.

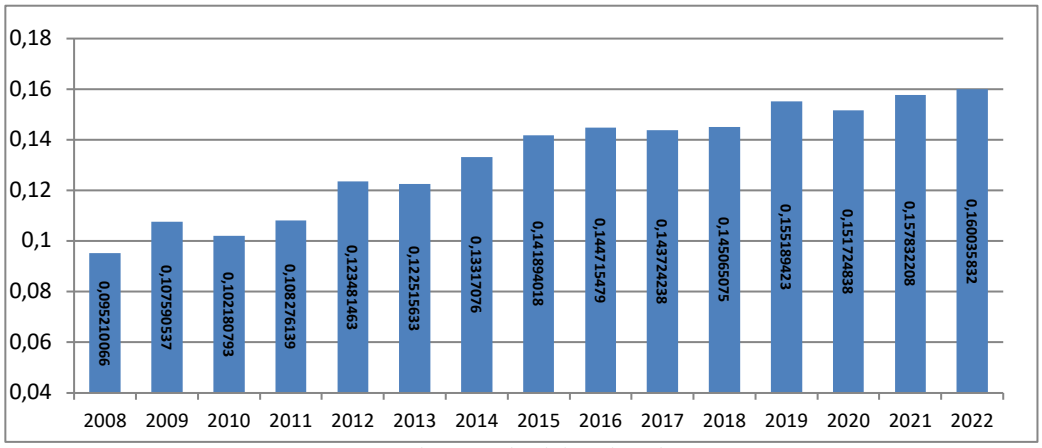

Fig. 1. Labour Productivity of Medan 2008-2022

Based on the processed data from BPS Medan, it indicates that labour productivity in Medan still tends to fluctuate.

Many factors affect labour productivity including wages and education. According to Keynes, wage efficiency can occur when wages are high and make workers more productive. Wages play a role in shaping labour productivity, as companies often hesitate to trim wage expenditures during periods of surplus labour supply. However, while lowering wages can trim overall company costs, it may also lead to reduced worker output and, consequently, a decline in company profits.

Education according to human *capital* theory says that in developing human resources it is necessary to have education and job training. The existence of education and training carried out will increase the productivity of these human resources while working, this is due to the increase in quality that occurs. (Sukarniati, 2019).

In research (Chairunnisa & Juliannisa, 2022) and (Daniel, 2020) suggest that wages affect labour productivity. For education according to (Chairunnisa & Juliannisa, 2022) said Further examination indicates that labour productivity remains unaffected by the level of education. In contrast, (Daniel, 2020) asserts that education holds a substantial influence on labour productivity. Given the varied findings in previous studies, researchers are eager to investigate the interplay between wages and education in shaping labour productivity in Medan.

2 Literature Review

Measurement of labour productivity is very important to be able to see the development of outputs and inputs produced by one worker (Muhammad agus, 2021). L. Greenberg argues that productivity is a measure of the comparison between the totality of expenditure in a certain

period then divided by the totality of income during the same period of time. Then Samuelson argues that productivity as a concept measures the ratio of total output to the average weighted input. Drawing from the insights of these experts, it is possible to deduce that productivity represents the relationship between the income generated and the resources expended.

Productivity is a direct outcome of resource optimization and the successful realization of objectives. Maximizing both effectiveness and efficiency invariably yields heightened levels of productivity, productivity when related to labour is the level of per capita income produced and achieved by workers in a certain period of time. (Li & Tanna, 2019). In labour productivity, the result achieved is Entire regional domestic product at constant prices (ADHK GRDP). While the input used is the labour itself. Labour productivity it self is seen from the quality when the labour works. Where if he can produce more output than other workers, the labour is said to be more productive and has better quality.

Wage Rate

According to (Ruslan, 2020) wages are receipts in accordance with their contribution to work which serves as a guarantee of a decent life. wages are given in the form of money, as well as other additions whose amount and payment are carried out in accordance with the agreement of both parties. (Sumarsono, 2009) It also implies that the minimum wage is established based on regional, sector-specific, or sub-sectoral considerations. Minimum wages consist of minimum wages based on provincial areas (UMP) and minimum wages based on district / city areas (UMK). Money wages and real wages are two types of labour wages. The amount of money received by workers used in the production process is called money wages. Then the amount of cash paid to workers or labourers in exchange for services in accordance with the terms of the employment agreement is called real wages. If labour is able to increase added value, the company will hire more people (Husain dkk., 2023).

In setting wages, the government sets minimum wage standards that are applied in various regions. To determine the increase in the minimum wage, the government is working hard to review it so that its decision does not increase the number of high unemployment. Minimum wage stands as the least monthly remuneration for employees with less than one year of tenure, encompassing their fundamental salaries and set perks. It is evident that the minimum wage is determined based on government-mandated wage levels for services rendered by employees.

Education Level

Education levels represent a protracted journey involving structured and methodical processes. It's during this journey that managerial personnel acquire both theoretical and conceptual knowledge with broad applications (Hariandja, 2002). Education is a person's main capital to achieve economic success in the long term of a nation (Ganie, 2017) According to (Suparmoko, 2002) education is the most important resource compared to other factors of production. On the other hand, it is also an important factor for successful economic development. This assertion finds support in the human capital theory, which posits that an increase in workers education can lead to an increase in their income.

The highest education that a worker is able to take can increase productivity at work, this is because with education it will improve better abilities and achieve a decent standard of living for these workers. Assessing the state of educational attainment can be accomplished by examining the average years of schooling. The average duration of schooling is determined by considering how long the local population typically takes to complete their respective educational programs. In Indonesia, the government has set a compulsory education standard of

12 years. The quality of work and the level of income of a person can be improved through the addition of one year of schooling. Education is often likened to a human investment, with the returns on this investment becoming apparent several years into the future for the individual.

3 Research Methods

The research methodology employed in this study is quantitative analysis. Quantitative research is characterized by its emphasis on theory validation through the quantification of research variables and statistical data analysis. (Ghozali, 2009). This research type is designed with the specific objective of elucidating the connections between variables, particularly the correlation between minimum wage and education concerning labour productivity in Medan.

Location and Time of Research

The research was carried out in Medan City, utilizing data on the city's minimum wage, educational attainment, and labour productivity sourced from the Central Bureau of Statistics of Medan (BPS Medan) spanning from 2008 to 2022. The research was conducted on May 24, 2023.

Data Type and Source

The research exclusively relies on *time series data*. Time series data involves multiple collections of data at consistent time intervals, utilizing the same instruments and subjects for each collection. (Sugiyono, 2018)**.** The primary data source for this study comprises information publicly released by the Central Bureau of Statistics of Medan (BPS Medan). The dataset utilized in this study encompasses data related to the minimum wage, educational attainment, and labour productivity in Medan from the years 2008 to 2022.

Data Analysis Technique

The technique in this study uses multiple linear regression models which are processed using *E-views* 12 software with the *Ordinary Least Square* method. Where the equation in this study is as follows:

$Y_{it} = \beta_0 + \beta X_{11it} + \beta X_{22it} + \varepsilon_{it}$

Where:

Y :Labour Productivity
β_0 : Constant
β_1 β_2 : Regression line coefficient
X_1 : Education Level
X2 : Minimum Wage
i : Regional
t : Time
ε : *error*

4 Results and Discussion

Classical Assumption Test

1. Normality Test

The normality test is used to test whether the residual data in a regression model is normally distributed or not. One way to test for normality is to use the Jarque-Berra Test.

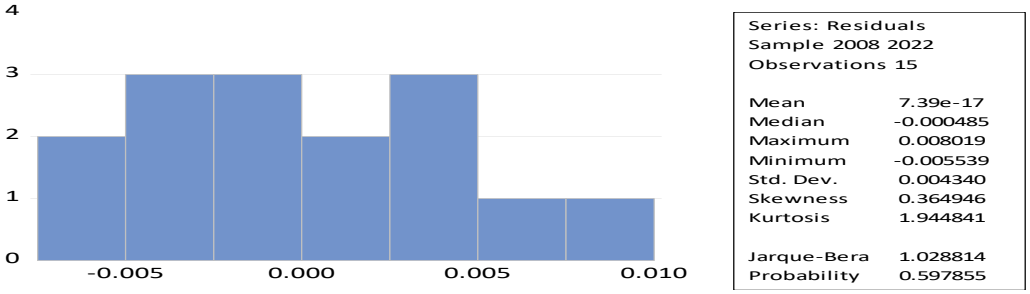

Fig.1 Normality Test

When the Jarque-Bera probability > 0.05, it indicates that the data adheres to a normal distribution. The test outcomes reveal a Jarque-Bera probability of 0.597855, which is > 0.05, signifying that the residual data in the regression model follows a normal distribution.

1. Multicollinearity Test

The multicollinearity test is conducted to identify the presence of a complete linear relationship among the independent variables. This examination is carried out by assessing the Variance Inflation Factor (VIF) values.

Table.1 Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.029996	20472.27	NA
Wages	4.75E-05	6767.916	7.153279
Education	0.011858	46661.54	7.153279

According to the multicollinearity assessment, the Centered VIF values for each variable, which are 7.153279, are below 10. This indicates that there is no issue of multicollinearity in this study.

1. Autocorrelation Test

The autocorrelation test is employed to identify whether there is serial correlation within the regression model. This test is conducted using the LM (Breusch Godfrey) test, and it relies on the Chi-Square probability value of Obs*R-squared to make this determination.

Table. 2. Autocorrelation Test

Prob. F(2.10)	**0.7746**
Prob. Chi-Square(2)	0.6883

According to the autocorrelation test, the Chi-Square probability value of 0.6883 is greater than 0.05, indicating the absence of autocorrelation issues in this study.

2. Heteroscedasticity Test

The heteroscedasticity test, conducted using White's test and relying on the Chi Square probability value of Obs*R-squared, is employed to identify any variation in the residuals' variance within the regression model.

Table. 3. Heteroscedasticity Test

Prob. F(4.10)	**0.5025**
Prob. Chi-Square(4)	0.4128
Prob. Chi-Square(4)	0.8790

According to the test for heteroscedasticity, the Chi-Square probability value of 0.4311 is greater than 0.05, indicating that there is no heteroscedasticity issue in this study.

Hypothesis Testing

1. Independent Variable Significance Test (t-test)

The purpose of the t-test is to examine whether the independent variable has a distinct impact on the dependent variable, assuming that all other factors remain unchanged. The t test can be explained by the following hypothesis:

-If the prob(sig.) value > 0.05 then H0 is accepted and Ha is rejected.

-If the prob(sig.) value <0.05 then H0 is rejected and Ha is accepted.

Table. 4. Test

Variables	t-statistic	Prob
C	-4.008411	0.0017
Minimum Wage	5.177867	0.0002
Education	1.192287	0.2562

In this study, the resulting df = n-k value is df = 15-3 = 13 and a significance of 0.05 so that the value of t_{table} is 2.160368, then:

a) Testing the wage variable

According to the regression findings presented in the table, the t_{count} for the minimum wage stands at 5.177867, surpassing the critical value of 2.178813. The education variable has a probability value of 0.0022, indicating that the minimum wage variable has a statistically significant impact on labour productivity. Consequently, we can affirm that the null hypothesis (Ha) is accepted, establishing that the minimum wage variable does indeed influence labour productivity.

b) Testing the Education variable

According to the regression findings in the table, the t_{count} value for education is 1.192287, which is less than 2.178813. The probability value for education is 0.2562, indicating that there is no significant statistical impact of the education variable on labour productivity. In summary, the null hypothesis (Ha) is rejected, suggesting that the education variable does not influence labour productivity.

1. Model Feasibility Test (F-test)

The F-test is used to examine how the collective impact of independent variables influences the dependent variable.

Table 5. Test f

F-statistic	**141.9330**
Prob(F-Statistic)	0.000000

In this study, the Ftable value (df1 = 2 df2 = 12) obtained a result of 3.8852, therefore the value of $F_{count} > F_{table}$ (141.9330> 3.8852) and the probability is 0.000000 < 0.05. A conclusion can be drawn that both the minimum wage and education factors jointly influence labour productivity.

2. Test Coefficient of Determination (R2

This assessment is designed to evaluate the extent to which the model reflects the connection between the independent variable and the dependent variable.

Table 6. R-squared test

R-squared	**0.959441**
Adjusted R-voiced	0.952681

According to the test results, the R-squared value of 0.95441 indicates that 95.44% of the variation in the independent variable (labour productivity) can be accounted for by the independent variables (minimum wage and education), with the remaining 4.56% attributed to factors not considered in the study. Similarly, the adjusted R-squared value of 0.9526981 signifies that 95.26% of the variation in the independent variable (labour productivity) can be explained by the independent variables (minimum wage and education), leaving 4.74% of the variation unexplained by the variables included in the study.

Multiple Linear Regression Test

This analytical model is chosen and utilized to make an approximation of the state of the variable that relies on it. Then this model can be used if the independent variable has at least two and is used to see the truth of the hypothesis stated. The following are the results of the OLS (Ordinary Least Squares) variable estimation.

Table 7. Regression Test Results

Variables	**Coeficient**	**Std. error**	**t-statistic**	**Prob.**
C	-0.694227	0.173193	-4.008411	0.0017
Wages	0.035668	0.006888	5.177867	0.0002
Education	0.129834	0.108895	1.192287	0.2562

From the regression findings provided earlier, we can derive the subsequent regression equation:
PTK = -0.694227 + 0.129834PEND + 0.035668WAGES

The regression equation results show:

1. The unchanging figure of -0.694227 represents the labour productivity variable, assuming that both the minimum wage and education variables remain constant. In such a scenario, labour productivity stands at a decrease of 0.694%.
2. The regression coefficient for the minimum wage (X2) is 0.035668, signifying that a one-unit increase in education results in a 0.035% rise in labour productivity.
3. The regression coefficient for Education (X1) is 0.129834, indicating that a one-unit increase in education leads to a 0.129% increase in labour productivity.

The Effect of Minimum Wage on Labour Productivity

According to the conducted tests, it is evident that the minimum wage has a substantial impact on labour productivity. This is in line with Keynes' theory that says efficiency wages can occur when wages are high and make workers more productive. This can also be seen with the increase in the growth of MSEs in Medan every year. Based on the decision of the Governor of North Sumatra Number 188.44/1018/KPTS/2022, the minimum wage of Medan has reached Rp.3,370,645 in 2022. If the economy is high, wage growth will also increase, so that it will motivate workers to be better at work. This aligns with the findings of a study by (Daniel, 2020), which indicates that salaries have a constructive and substantial impact on workforce efficiency.

Effect of Education on Labour Productivity

Based on the research that has been done that education has no effect on labour productivity. This is not in line with human *capital* theory, which says that in developing human resources, education and job training are needed. The existence of education and training carried out will increase the productivity of these human resources when working, it is due to the increase in quality that occurs. This can happen because educated unemployment in Medan is still high. Based on BPS data for Medan, the number of educated unemployment in 2019 was 80,666 people, then in 2020 it increased to 101,414 people. With this it can be seen that many of the highly educated workforce do not have the ability and cannot compete in the world of work so that educated unemployment occurs. This aligns with the findings of a study by (Chairunnisa & Juliannisa, 2022), which concluded that the level of education does not impact labour productivity.

4 Conclusion

Drawing from the research analysis and discussions, it can be inferred that the minimum wage exerts an impact on labour productivity in Medan. Because wages and productivity have a reciprocal relationship, if wages are high it will motivate labour to work more optimally. So to increase labour productivity, a gradual increase in wages is carried out by taking into account the level of labour productivity.

In this research, it was found that education does not influence labour productivity in Medan. This is primarily due to the fact that obtaining a higher level of education alone, without the inclusion of soft skills, does not lead to an improvement in work productivity. Therefore, it is necessary to improve skills through training programs or expertise.

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