International Journal of
Economics Development Research, Volume 5(4), 2024
pp. 2812-2826

Forecasting the Impact of Increasing Regency/City Minimum Wage on the Total Open Unemployment Rate in Sidoarjo Regency for 2024-2030

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Abstract:

The increase in the minimum wage for Sidoarjo Regency from 2013 to 2023 shows a sharp increase. This makes open unemployment even higher and places Sidoarjo Regency in first place with the highest number of unemployed in East Java. If the minimum wage in Sidoarjo Regency experiences a very significant increase in the following years, more companies will go bankrupt or even move outside Sidoarjo Regency to prevent greater losses, resulting in more unemployment in Sidoarjo Regency. This research aims to determine the impact of forecasting increases in the minimum wage on open unemployment in Sidoarjo Regency every year 2024 to 2030. This research uses the ARIMA (0,1,0) model, which is then analyzed using IBM SPSS Statistics 25 version. The research results show that open unemployment in Sidoarjo Regency over the next 6 (six) years is likely to increase by 0.43% every year. This happens because of the increase in the minimum wage which tends to get higher every year.

Keywords: *Inflation, Economic Growth, Minimum Wage, Open Unemployment, ARIMA*

Sumbitted: 24 June 2024, Accepted: 20 July 2024, Published: 21 September 2024

1. Introduction

Employment in Indonesia is open to all citizens, applicable to anyone and anywhere. However, the availability of jobs relative to job seekers is often mismatched, leading to significant labor issues, such as unemployment. This problem makes the unemployment rate a critical economic indicator, reflecting regional economic health, inflation trends, and the impact of local minimum wage policies (Chen & Yang, 2022; Zhang & Lin, 2020).

Economists argue that an increase in the minimum wage typically shifts the supply curve upward while reducing the demand for labor, as employers may cut back on the number of workers to manage higher wages, which in turn contributes to a rise in unemployment (Dube & Jacobs, 2021; Lee & Saez, 2020). Panjawa and Soebagiyo (2014) found that in Surakarta City, a higher minimum wage was positively correlated with increased unemployment rates, indicating that wage hikes can lead to higher unemployment.

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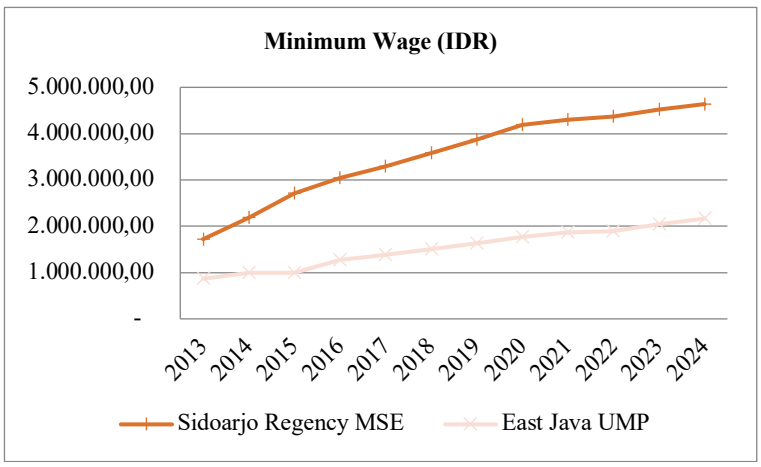
Recent research also highlights the significant role of inflation, economic performance (PE), and minimum wage in influencing unemployment rates in Indonesia. Studies suggest that while minimum wage increases can substantially impact unemployment rates, inflation tends to exacerbate unemployment, whereas economic growth shows less effect on the unemployment rate (Belman & Wolfson, 2019; Viscusi & Masterman, 2022).

Further research focused on the Surakarta Prefecture shows that inflation, minimum wage, and population size all significantly influence unemployment, while regional gross domestic product (GRDP) has a negative effect (Ashenfelter & Card, 2020; Zhao & Xie, 2022). This aligns with findings indicating that minimum wage adjustments and population growth can substantially impact unemployment rates, while GRDP does not significantly affect this variable.

In Sidoarjo Regency, the issue of unemployment is exacerbated by an imbalance between labor force demands and available job opportunities, alongside low human resource quality (Owyang & Pabilonia, 2021). Despite high employment opportunities and economic growth in Sidoarjo, the unemployment rate has continued to rise over the past five years. As of 2021, Sidoarjo had 1,106 medium and large industrial companies (Diskominfo, 2022). However, the increase in minimum wage has led to a decline in investment and job losses, with 208 companies shutting down and 1,363 workers laid off by the end of 2022 due to these wage pressures (Sabia & Burkhauser, 2019).

Referring to East Java BPS (Central Bureau of Statistics) data, the Sidoarjo District MSE is in cluster 1 (one) of East Java, which has the third highest MSE compared to other regions. The details are described in graph 1.



Source: BPS East Java Province (2024)

Figure 1. Sidoarjo district minimum wage compared to the East Java provincial minimum wage for the period 2013-2023

The data description in graph 1 shows that the nominal increase in MSEs in Sidoarjo

Regency has always increased sharply every year. When referring to the results of Effendy's research (2019), an increase in MSEs can reduce poverty and control the number of unemployment. However, the opposite condition is that the TPT in Sidoarjo Regency is still not under control, and has been ranked first in East Java Province in the last 4 (four) years. The details are described in graph 2.

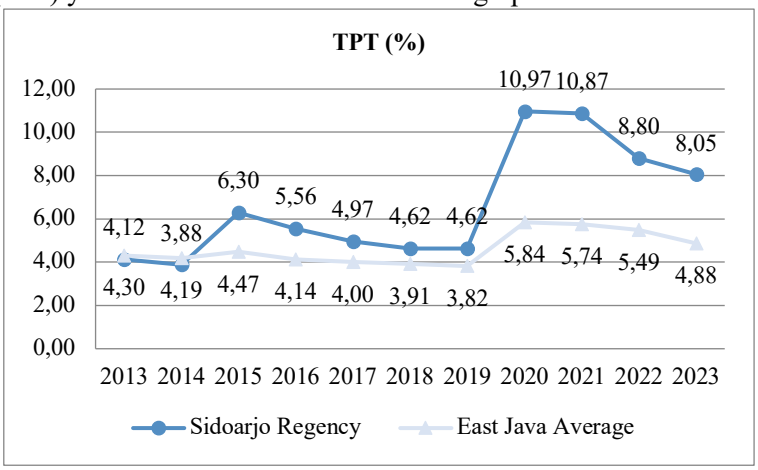


Figure 2. Sidoarjo district's labor force employment rate compared to East Java province's average labor force employment rate 2013-2023

Source: BPS East Java Province (2024)

Based on the data in Figure 2, it is necessary to increase the absorption of labor for the residents of Sidoarjo Regency. The details of the comparison of the amount of MSE with the TPT of Sidoarjo District when compared to other cities/districts in the past 10 (ten) years are described in the following table.

Table 1. Comparison of Sidoarjo District MSE and TPT

No.	Year	MSES	TPT (%)	Rating)*
1	2013	1,720,000.00	4.12	23/38
2	2014	2,190,000.00	3.88	23/38
3	2015	2,705,000.00	6.30	6/38
4	2016	3,040,000.00	5.56	7/38
5	2017	3,290,800.00	4.97	7/38
6	2018	3,577,428.68	4.62	6/38
7	2019	3,864,696.20	4.62	7/38
8	2020	4,193,581.85	10.97	1/38
9	2021	4,293,581.85	10.87	1/38
10	2022	4,368,581.85	8.80	1/38
11	2023	4,518,581.85	8.05	1/38

)* Ranked values are in order of highest TPT to lowest TPT.

Source: BPS East Java Province (2024)

Based on Table 1, it can be concluded that in the past 10 (ten) years, the increase in the Sidoarjo District MSE from 2013 to 2023 has shown a sharp increase. This has led to higher unemployment rates and has put Sidoarjo District in first place with the highest number of unemployed people in East Java. However, Sidoarjo Regency's position has experienced a significant decline, but still remains in the highest position.

Therefore, a strategy is needed to increase employment in Sidoarjo Regency. Thus, if the minimum wage in Sidoarjo Regency experiences a very significant increase in the following years, more and more companies will go bankrupt or even move outside Sidoarjo Regency to prevent greater losses, resulting in more unemployment in Sidoarjo Regency.

The impact of the determination of MSEs in Indonesia, especially in Siodarjo Regency, is still a complicated problem. The stipulation of the MSE policy has proven unable to reduce the unemployment rate so that it does not have an impact on poverty due to low wages. In this case, the involvement of the government is very important as a policy maker, so that unemployment does not increase. Thus, there is a need for research related to forecasting the impact of MSE increases on the number of unemployment in Sidoarjo Regency in the coming year period as a form of preventive action in overcoming unemployment in the future so that it is easy to overcome and provide solutions early on in suppressing unemployment.

2. Theoretical Background

Minimum Wage

The minimum wage is the lowest legally mandated wage that employers must pay their workers, especially for those with little to no work experience, typically ranging from zero to one year. The authority to set minimum wages lies with the Governor, who makes decisions based on recommendations from the Provincial Wage Board. The process involves adjusting the minimum wage to ensure it aligns with the cost of living needs as determined by the Ministry of Manpower (Anderson & Meyer, 2020; Belman & Wolfson, 2019). According to Government Regulation Number 36 of 2021, the minimum wage includes basic wages and may also include fixed allowances. The goal of setting a minimum wage is to ensure that workers receive an income that meets basic living standards while considering the economic conditions of businesses and their productivity (Dube & Jacobs, 2021; Neumark & Wascher, 2021).

Open Unemployment Rate (TPT)

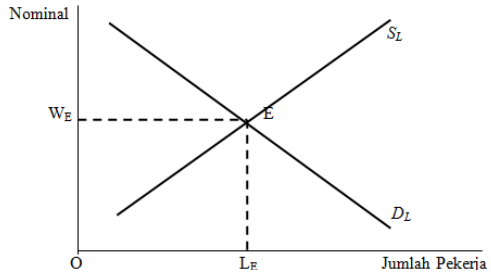
Current employment levels are often suboptimal, leading to significant unemployment issues. Unemployment includes individuals who are either not seeking work, are actively searching for employment, are setting up their own business, or are employed but have not yet started their jobs (Hussmanns et al., 1990). Another perspective defines unemployment as a condition where individuals in the productive age group are without jobs, are actively job searching, or are otherwise not engaged in employment (Ahn & Lee, 2021; Card & Krueger, 2020).

Unemployment is categorized into several types, with open unemployment referring to individuals who are not engaged in any work activity at all. The unemployment rate is the percentage of the labor force that is without work, and it is influenced by various factors, including economic growth, which reflects the increase in the production of goods and services (Ashenfelter & Card, 2020; Stigler, 2020). The relationship between population growth, industrial development, and investment in a region

significantly impacts unemployment and poverty levels. Increased population can potentially create more job opportunities, but if not matched with adequate job creation, it may lead to intense job competition and higher unemployment rates (Belman & Wolfson, 2019; Zhao & Xie, 2022).

Relationship between MSEs and TPT

The labor market equilibrium is reached when the wage is at the equilibrium point between the demand for labor and the supply of labor in a certain region, as shown in Figure 3 below.



Source: Mankiw (2012)

Figure 3. Labor Market Equilibrium Curve

Graph 3 above illustrates that the labor demand line tends to fall, while the labor supply line tends to rise. Thus, if there is an increase in wages, it can lead to a decrease in the demand for labor, but also lead to an increase in the supply of labor, and tends to be similar to the nature of the demand for goods market and the supply of goods market (Mankiw, 2012). So, if the government does not participate in strategic policy-making efforts to address the problem, in balancing the needs between the supply of labor and the demand for labor will have an impact on achieving wage adjustments, it can result in a decreasing number of workers who are already working due to layoffs and also unemployment is increasing because job seekers are increasingly unable to find work (Borjas, 2013).

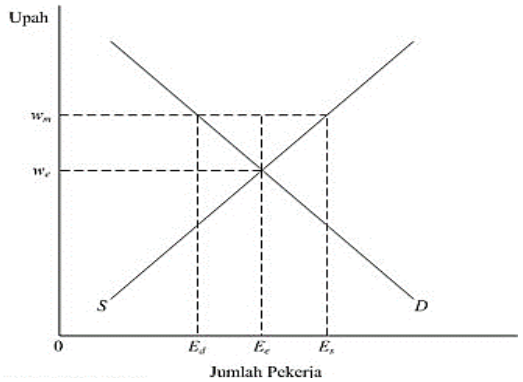


Figure 4. Movement of Labor Market Curve as an Impact of Minimum Wage

Source: Borjas (2013)

The depiction of graph 4 shows that the value of Ee shows the amount of labor employed in a certain area and the value of Wm shows the labor market at the equilibrium wage level in that area. So, if there is a minimum wage set by the

government at Wm, it can have an impact on reducing labor demand for companies, where there is a condition of decreasing the number of workers who have worked by Ee - Ed. In addition, high wages will also lead to an increase in job seekers who do not get a job by Ee - Es because more people enter the scope of the labor demand market. Therefore, unemployment with an impact on poverty will occur if the equilibrium wage is below the minimum wage set by government regulation (Borjas, 2013).

3. Methodology

The research uses a quantitative descriptive approach to analyze data numerically and statistically. Time series data from 2013 to 2023, sourced from the Central Statistics Agency (BPS), is utilized to forecast the impact of minimum wage increases on unemployment in Sidoarjo Regency for 2024-2030. The methodology involves multiple linear regression analysis to describe, predict, and control the variables under study.

The process starts with a literature review to select relevant journals and information on minimum wage, inflation, economic growth, and unemployment. Data collection involves gathering information on these variables from BPS. Descriptive statistics and multiple linear regression are used for analysis, with IBM SPSS Statistics 25 as the analytical tool.

Classical assumption tests are conducted to ensure the validity of the regression model. These tests include assessing normality with the Kolmogorov-Smirnov test, checking for multicollinearity by ensuring the variance inflation factor (VIF) is below 10, and testing for heteroscedasticity to confirm residual variance consistency. An autocorrelation test is generally omitted due to the cross-sectional nature of the data. Finally, a forecasting simulation using the least squares method will project future inflation and economic growth from 2025 to 2030.

4. Empirical Findings/Result

Based on the results of processing and analysis of all data that has been carried out, the results of the normality test, multicollinearity test, and heteroscedasticity test are then described. The description is explained in the following tables.

Normality Test
Normality testing is calculated using the Kolmogorov-Smirnov test, where the calculated results are described in table 1.

Table 1. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		11
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	1.80579466
Most Extreme Differences	Absolute	.098
	Positive	.086
	Negative	-.098
Test Statistic		.098
Asymp. Sig. (2-tailed)		.200[c,d]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		
d. This is a lower bound of the true significance.		

Source: *IBM SPSS Statistics 25 Version*

Based on the calculated results of the normality test written in table 2, the significance value is 0.200, which means that the value is more than 0.05 (≥ 0.05). Therefore, the normality requirement in regression can be fulfilled because the residual data is normally distributed.

Multicollinearity Test

Furthermore, a multicollinearity test was conducted with the calculated results outlined in table 2.

Table 2. Multicollinearity Test Results

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-.428	2.281		-.187	.855		
	MSES	2.051E-6	.000	.729	3.190	.011	1.000	1.000
a. Dependent Variable: TPT								

Source: *IBM SPSS Statistics 25 Version*

Based on the calculated results of multicollinearity testing presented in table 3, the data obtained that the VIF value in the *collienary statistics* column is 1.000, and does not exceed the probability value of 10.00. Thus, the requirement of multicollinearity in regression can be fulfilled because multicollinearity constraints between independent variables do not occur.

Heteroscedasticity Test

The last step in a series of classic assumption tests is the multicollinearity test, where this test is needed to prove the assumption that the residual data has a constant variance for all observations (homoscedasticity). The regression model is said to have a heteroscedasticity problem if the residual data does not meet this assumption. The calculated results of this test are described in table 3 below.

Table 3. Heteroscedasticity Test Results

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.091	1.205		-.075	.942
	MSES	4.368E-7	.000	.394	1.286	.231

a. Dependent Variable: Abs_RES

Source: *IBM SPSS Statistics 25 Version*

Based on the calculated results of the heteroscedasticity test presented in table 4, it is known that the Sig. probability value is 0.231, where if the probability value exceeds the value of 0.05. Thus, the requirement of heteroscedasticity in regression is stated not to occur.

Forecasting Inflation and Economic Growth Using the Least Squares Method
Inflation

Based on data from BPS East Java Province on the value of inflation from 2013 to 2023, the data is described in Table 4 (BPS, 2024).

Table 4. Inflation Value of East Java in 2013-2023

No.	Year	East Java Inflation (%)
1	2013	7.78
2	2014	4.13
3	2015	6.70
4	2016	2.69
5	2017	3.84
6	2018	2.75
7	2019	2.45
8	2020	1.30
9	2021	1.92
10	2022	6.80
11	2023	3.01

Source: BPS East Java Province (2024)

Furthermore, the calculated results of *IBM SPSS Statistics 25 Version* related to inflation prediction in 2023 using the least squares method, which is described in table 5.

Table 5. Testing Results of the Least Squares Method (Inflation)

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	5.671	1.339		4.235	.002
	t	-.288	.197	-.437	-1.459	.179

a. Dependent Variable: Inflation

Source: *IBM SPSS Statistics 25 Version*

Based on the data in table 6, the constant b value is obtained which shows a change value of -0.288 and a constant a of 5.671, so that the equation value is obtained. y which has a value of 5.671 + (-0.288) (x), where x shows the year of a certain period.

Thus, the inflation prediction data of East Java Province in 2024-2030 are described in Table 6.

Table 6. Inflation Forecasting of East Java in 2024-2030

No.	Year	East Java Inflation (%)
1	2024	**2.21**
2	2025	**1.93**
3	2026	**1.64**
4	2027	**1.35**
5	2028	**1.06**
6	2029	**0.77**
7	2030	**0.49**

Source: Processed data

Based on the results in Table 6, it is obtained that the inflation rate decreases annually by 0.80% with the assumption that other variables are constant. Furthermore, the inflation rate from each year will be used in the formulation of the calculation of the Sidoarjo District MSE value in a certain year period based on the Government's formula.

Economic Growth

Based on data from BPS East Java Province on the value of PE from 2013 to 2023, the data is described in Table 7 (BPS, 2024).

Table 7. Sidoarjo Regency Economic Growth Rate 2013-2023

No.	Year	PE Sidaorjo (%)
1	2013	6.89
2	2014	6.44
3	2015	5.24
4	2016	5.51
5	2017	5.80
6	2018	6.01
7	2019	5.99
8	2020	-3.69
9	2021	4.21
10	2022	7.53
11	2023	6.16

Source: BPS East Java Province (2024)

Furthermore, the calculation results of *IBM SPSS Statistics 25 Version* related to the prediction of PE in 2023 using the least squares method, which are described in table 8.

Table 8. Testing Results of the Least Squares Method (Economic Growth)

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	6.222	2.028		3.068	.013
	t	-.187	.299	-.204	-.626	.547

a. Dependent Variable: PE

Source: *IBM SPSS Statistics 25 Version*

Based on the data in table 9, the constant value b is obtained which shows a change value of -0.187 and constant a of 6.222, so that the equation value is obtained y which has a value of 6.222 + (-0.187) (x), where x shows the year of a certain period. Thus, the PE prediction data for Sidoarjo Regency in 2024-2030 is described in table 9.

Table 9. Forecasting economic growth in Sidoarjo Regency for 2024-2030

No.	Year	PE Sidaorjo (%)
1	2024	**3.98**
2	2025	**3.79**
3	2026	**3.60**
4	2027	**3.41**
5	2028	**3.23**
6	2029	**3.04**
7	2030	**2.85**

Source: Processed data

Referring to the results in Table 9, it is found that the PE value decreases annually by 0.19% with the assumption that other variables are constant. Furthermore, the PE value of each year will be used in the formulation of the calculation of the Sidoarjo District MSE value in a certain year period based on the Government's formula.

Forecasting the Open Unemployment Rate Using the ARIMA Method

In this TPT forecasting, calculations are carried out using the ARIMA method based on the formulation of the calculation of the MSE increase according to Government Regulation Number 36 of 2021 Article 26. Furthermore, model identification has been carried out, and the best model is obtained, namely using *Seasonal* ARIMA (0,1,0), which is described in table 10.

Table 10. Parameter Significance Testing Results

Model Fit											
					Percentile						
Fit Statistic	Mean	SE	Minimum	Maximum	5	10	25	50	75	90	95
Stationary R-squared	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000
R-squared	.193	.	.193	.193	.193	.193	.193	.193	.193	.193	.193
RMSE	2.514	.	2.514	2.514	2.514	2.514	2.514	2.514	2.514	2.514	2.514
MAPE	21.385	.	21.385	21.385	21.385	21.385	21.385	21.385	21.385	21.385	21.385
MaxAPE	54.127	.	54.127	54.127	54.127	54.127	54.127	54.127	54.127	54.127	54.127
MAE	1.599	.	1.599	1.599	1.599	1.599	1.599	1.599	1.599	1.599	1.599
MaxAE	5.938	.	5.938	5.938	5.938	5.938	5.938	5.938	5.938	5.938	5.938
Normalized BIC	2.304	.	2.304	2.304	2.304	2.304	2.304	2.304	2.304	2.304	2.304

Source: *IBM SPSS Statistics 25 Version*

Based on table 10 above, the results of parameter significance testing with the *Mean Absolute Percentage Error (MAPE)* value are 21.385%, which means that the error from using the model tends to be small and the accuracy of this prediction is 78.615%. Furthermore, a plot of the forecasting results is presented in graph 5 below.

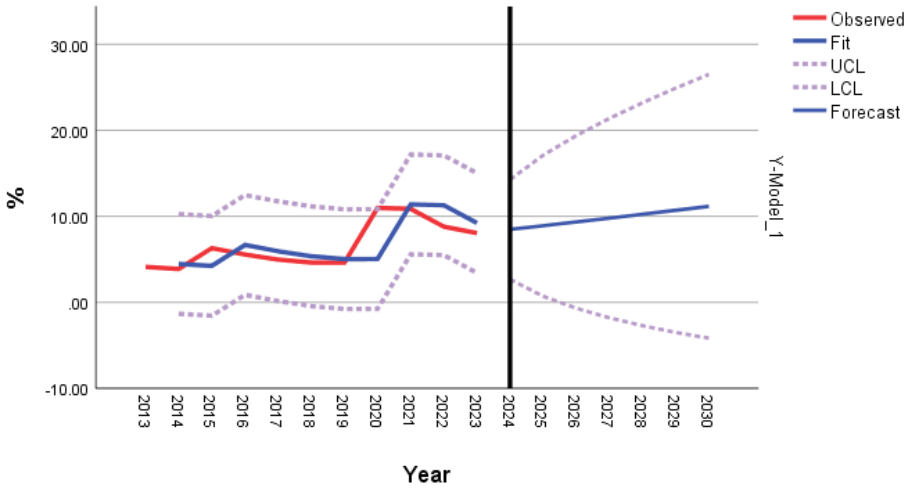


Figure 5. ARIMA (0,1,0) Output Results
Source: *IBM SPSS Statistics 25 Version*

Based on graph 5 above, it is known that in the period 2013-2023, the TPT rate in Sidoarjo Regency tended to fluctuate. However, forecasting the TPT in 2024-2030 tends to increase. Detailed data related to forecasting the increase in the TPT rate in Sidoarjo Regency in 2024-2030 are described in Table 11 below.

Table 11. Sidoarjo Regency TPT Forecasting for 2024-2030

No.	Year	TPT (%)
1	2013	4.12
2	2014	3.88
3	2015	6.30
4	2016	5.56
5	2017	4.97
6	2018	4.62
7	2019	4.62
8	2020	10.97
9	2021	10.87
10	2022	8.80
11	2023	8.05
12	2024	**8.48**
13	2025	**8.91**
14	2026	**9.35**
15	2027	**9.79**
16	2028	**10.25**
17	2029	**10.70**
18	2030	**11.17**

Source: Processed data

Referring to the explanation in Table 11, the data shows that the TPT in Sidoarjo Regency for the next 6 (six) years tends to increase by 0.43% each year. This occurs because of the increase in MSEs which tend to increase every year. The phenomenon of the higher TPT rate is not only due to the MSE factor, but also because of the increasing number of labor forces that are minimally absorbed in the world of work,

as well as the increasing number of companies that choose to relocate to districts / cities that have lower MSEs compared to the amount of Sidoarjo Regency in 2025 to 2030. This is very likely to happen, which ultimately has an impact on the termination of employment which tends to be massive. Thus, strategic policies from the Central Government and Local Government are needed to anticipate this so that the increase in the TPT rate in Sidoarjo Regency for the next 6 (six) years does not occur, so that the employment climate can run conducively and the economy runs healthily.

5. Discussion

Based on the general conditions of employment described earlier, there are several issues that need attention, including the Sidoarjo District Labor Market Rate (TPT), which is still the highest in East Java, the increase in the TPT for women, and the TPT for high school and vocational school graduates. The TPT in Sidoarjo Regency is high because it is a buffer city for the provincial capital and one of the destinations for migrants looking for work, both in Sidoarjo Regency and Surabaya City. This is supported by the high economic growth in Sidoarjo Regency of 7.53% in 2022 which causes the bargaining power of workers in Sidoarjo to be higher so that competition for jobs becomes tighter.

The increase in TPAK and TPT for women, as well as the decrease in the number of women who are not part of the labor force in Sidoarjo District, indicates that women who were previously housewives or still at school level in 2023 are entering the labor market. Local government programs related to women's empowerment through skills training, such as sewing, making flower bouquets or souvenirs, give women the courage to enter the job market by planning to open a business or become a job seeker in that field. The waiting period between skills training and getting a job or starting their own business may be a factor in the increase in the women's TPT rate. Monitoring and evaluation is needed as a post-training follow-up and to find out how effective the skills training program can affect employment problems.

In addition, another issue that still occurs is the TPT of SMK and SMA graduates, which shows an increase from the previous year. The TPT for high school graduates is the highest compared to the TPT for other levels, while the TPT for vocational graduates has the highest increase. There is a possibility that the characteristics of the labor force at this level of education tend to look for jobs that are in accordance with their expertise, especially in the group of new entrants to the labor market, so that the waiting time from the time they declare their entry into the labor market or intend to look for work to obtaining suitable work will be relatively longer than the labor force at other levels. The implementation of *job fairs* can be one of the means to cut the waiting time because it can accelerate the meeting between job seekers with special abilities and job providers who need workers with these special abilities.

6. Conclusions

The policy of adjusting MSEs set by the government is well-intentioned, in order to balance the needs of businesses in running their businesses with the fulfillment of economic needs from the workers' side. However, this strategic initiative has not been able to fully overcome the problem of Sidoarjo District's unemployment rate, which has tended to rise in recent years. Inflation, PE, and MSE have proven to have a significant impact on forecasting the number of open unemployment rates in Sidoarjo Regency in 2024-2030. Referring to the results of the research conducted, the best model was obtained, namely using *Seasonal* ARIMA (0,1,0) with the predicted TPT values of 8.48; 8.91; 9.35; 9.79; 10.25; 10.70; and 11.17. The accuracy of the resulting model has been proven by the results of the MAPE number worth 21.385%, so the accuracy of this forecasting is 78.615%.

The follow-up research suggestions to the Sidoarjo Regency Government for consideration include the following.

1) The Sidoarjo district government should be serious and focused on addressing the issue of open unemployment. Directly, the district government should attract as many investors as possible to add new jobs for the Sidoarjo community. Indirectly, the district government should intensify training and work-ready technical skills for the people of Sidoarjo Regency that are tailored to the competency needs of industrial communities in East Java in general, so that the expertise of the community can be optimally absorbed by the business and industrial world in Sidoarjo Regency and its surroundings.
2) The Sidoarjo District Government should provide direction and relaxation to businesses that have not been able to fully comply with the MSE regulations, and mediation between parties, which includes the Regional Apparatus Organization (OPD) in charge of manpower, business and industry, trade unions, and law enforcement officials so that the Sidoarjo District employment climate runs conducive. Thus, businesses and industries will not relocate to areas that have lower MSEs than the Sidoarjo Regency MSE on a massive scale, so that it remains a "place" for all Sidoarjo people to work in their "own home".
3) The Sidoarjo District Government should make it easier to invest in businesses and industries in terms of administrative and operational business legality regulations, and help reduce costs such as reducing income tax and others

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