Indonesian Interdisciplinary Journal of Sharia Economics (IIJSE)
e-ISSN: 2621-606X
Vol. 9. No. 2 (2026)
Page: 15113-15123

IMPACT EVALUATION OF THE GRESIK SPECIAL ECONOMIC ZONE ON UNEMPLOYMENT RATE IN GRESIK REGENCY

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Abstract

This study evaluates the causal effect of the Gresik Special Economic Zone (SEZ) on open unemployment in Gresik Regency. The article responds to the apparent paradox between rapid industrial expansion and a persistently elevated unemployment rate in a region expected to absorb local labor. Using a quantitative quasi-experimental design, the study applies the Difference-in-Differences method with Gresik as the treatment group and Sidoarjo-Lamongan as the control group over the 2015-2025 period. The model includes mean years of schooling, population, and economic growth as control variables. The findings show that the implementation of the Gresik SEZ significantly reduced the open unemployment rate relative to the control regions, indicating that the policy contributed to local employment creation.

Keywords: Special Economic Zone, Unemployment Rate, Difference in Differences

INTRODUCTION

Special Economic Zones (SEZs) have become an increasingly important development strategy adopted by many countries to accelerate industrialization, attract investment, enhance regional competitiveness, and expand employment opportunities. In Indonesia, SEZs are expected to stimulate local economic activities and generate labor demand through industrial agglomeration and investment expansion. One of the strategic SEZs established by the Indonesian government is the Gresik SEZ, which has rapidly developed as an integrated industrial and logistics hub supported by substantial investment commitments and industrial activities. Therefore, the establishment of the Gresik SEZ is expected to create new job opportunities and improve labor market conditions in the host region.

Despite the rapid development of the Gresik SEZ, labor market conditions in Gresik Regency remain a concern. According to Statistics Indonesia (BPS), the open unemployment rate in Gresik Regency has gradually declined following the implementation of the Gresik SEZ. However, Gresik recorded the second-highest open unemployment rate among regencies in East Java in 2025, indicating that the reduction in unemployment has not been substantial (Badan Pusat Statistik Provinsi Jawa Timur, 2025). This phenomenon suggests that the presence of an SEZ does not automatically lead to a proportional decline in unemployment, as labor market outcomes are also influenced by demographic conditions, educational attainment, and regional economic performance.

Several factors may explain this condition. Newly created jobs in industrial areas often require specific skills that may not fully match the characteristics of the local labor force. In addition, industrial expansion may attract job seekers from neighboring regions, thereby intensifying labor market competition in the host area. Economic growth also plays an important role in shaping labor demand, while population growth and educational attainment may affect the availability and quality of labor supply. Consequently, changes in unemployment cannot simply be inferred from the number of workers employed within the industrial zone. These conditions indicate that the labor market implications of industrial-based SEZs are more complex than commonly assumed and warrant further empirical investigation.

Previous studies have reported mixed evidence regarding the effectiveness of SEZs in reducing unemployment. While some studies find that SEZ development contributes positively to labor absorption, others suggest that SEZs do not always generate favorable labor market outcomes. These inconsistencies indicate the need for further empirical evaluation, particularly in the context of the Gresik SEZ, which has not been extensively examined using a causal inference approach.

Previous studies have primarily focused on tourism-oriented SEZs such as Mandalika and industrial-based SEZs such as Kendal, whereas empirical evidence on the labor market consequences of the Gresik SEZ remains limited. Furthermore, most existing studies rely on descriptive approaches and rarely employ quasi-experimental methods to estimate causal effects. By applying a Difference-in-Differences framework while controlling for average years of schooling, population size, and regional economic growth, this study contributes to the literature by providing causal evidence on whether industrial-based SEZ development effectively reduces open unemployment in host regions.

Therefore, this study aims to evaluate the causal impact of the Gresik Special Economic Zone on the open unemployment rate in Gresik Regency. To estimate the policy effect, this

study employs the Difference-in-Differences approach by comparing labor market outcomes before and after the implementation of the Gresik SEZ with those of comparable regions. The findings are expected to enrich the empirical literature on the labor market effects of industrial-based SEZs, particularly in developing countries. In addition, the results may provide useful insights for policymakers in designing strategies to enhance local labor absorption and improve the effectiveness of SEZ development.

REVIEW OF LITERATURE

The establishment of the Gresik SEZ can be explained through Growth Pole Theory proposed by Perroux. According to this theory, economic development tends to concentrate in regions possessing leading industries capable of stimulating growth in surrounding areas through various linkage effects. Industrial agglomeration encourages production expansion, increases demand for intermediate inputs, and creates additional employment opportunities. Hirschman et al. (2023) further argue that industrial concentration may generate multiplier effects through backward and forward linkages, allowing economic benefits to spread beyond the core industrial area.

Nevertheless, the concentration of economic activities does not always produce balanced regional development. Myrdal's cumulative causation theory suggests that growth centers may generate backwash effects that outweigh spread effects. Economic activities concentrated in a particular region can attract capital, skilled labor, and productive resources from neighboring areas, potentially widening regional disparities. In the labor market, industrial expansion may increase labor demand without substantially reducing local unemployment if firms prefer skilled workers or recruit employees from outside the region.

Human capital theory also provides a useful perspective for understanding labor market outcomes in industrial regions. Becker in Deming (2022) argues that education, training, and skill acquisition increase workers' productivity and employability. In SEZ development, the availability of qualified labor determines the extent to which local communities benefit from newly created employment opportunities. Mismatches between industrial labor requirements and workers' qualifications may limit the ability of local residents to participate in industrial expansion.

The relationship between investment expansion and employment creation can also be interpreted through Keynesian theory. Increases in aggregate demand stimulate output expansion and encourage firms to hire additional workers (Mankiw, 2016). As industrial activities grow, firms require more labor to support higher levels of production and business operations. Acemoglu (2009) further argues that investment in human capital is equally important because workforce quality determines workers' ability to adapt to technological change and industrial development.

Empirical evidence regarding the labor market impact of SEZs remains inconclusive. Rosyadi (2022) reported that the implementation of the Mandalika SEZ reduced unemployment in Central Lombok Regency by 4.98 percentage points compared with the control region. Similarly, Tafese et al. (2025) found that industrial expansion supported by foreign direct investment in Vietnamese SEZs significantly increased labor demand and improved local employment conditions. These findings indicate that SEZs may serve as an effective instrument for labor market improvement when accompanied by sustained industrial growth.

Beyond Vietnam, evidence from other developing countries also indicates that the labor market effects of SEZs are heterogeneous. Durongkaveroj (2022) examined the employment effects of Special Economic Zones in Thailand and found that SEZ development generated heterogeneous labor market outcomes across regions. The study reported that some SEZs experienced improvements in employment conditions, while others showed limited or even negative effects on local workers. These differences were associated with variations in industrial structures, labor mobility, and the characteristics of the local workforce. The findings imply that the effectiveness of SEZs in reducing unemployment depends not only on industrial expansion but also on the capacity of surrounding areas to absorb economic spillovers.

Additional studies also suggest that the employment effects of SEZs may emerge gradually over time. Ambroziak & Hartwell (2018) reported that investments in Polish SEZs generated heterogeneous regional outcomes depending on industrial specialization and local absorptive capacity. These findings imply that the success of SEZ policies in reducing unemployment is closely related to regional labor characteristics and the ability of local economies to capture industrial spillovers.

In contrast, Purnomosidi et al. (2025) documented that the establishment of the Kendal SEZ was associated with an increase in unemployment in the treatment area, while unemployment declined in neighboring control regions. The estimated Difference-in-Differences effect reached 0.25 percentage points after policy implementation. These contrasting findings imply that the effectiveness of SEZs in reducing unemployment is highly context-specific and may depend on local labor characteristics, industrial structure, and complementary employment policies. To date, empirical evidence regarding the impact of the Gresik SEZ on unemployment remains limited, particularly studies employing a quasi-experimental framework. This study attempts to fill this gap by estimating the causal effect of the Gresik SEZ on the open unemployment rate in Gresik Regency.

RESEARCH METHOD

This study employs a quantitative approach to examine the impact of policy intervention through the statistical analysis of numerical data (Creswell & Creswell, 2023). A quantitative approach is considered appropriate because it enables the objective measurement of policy impacts through hypothesis testing and the application of systematic empirical models. In addition, this approach facilitates the identification of patterns and relationships among variables based on empirical evidence. According to Wajdi et al. (2024), quantitative research aims to test theories by measuring variables numerically and analyzing them using statistical techniques, thereby generating findings with broader generalizability.

This study adopts a quasi-experimental design because the treatment under investigation arises from policy implementation rather than random assignment by the researcher. Consequently, causal effects are identified by exploiting variation in treatment exposure within the data. In impact evaluation, the primary objective is to estimate the causal effect of a policy by comparing observed outcomes with a counterfactual outcome, namely the condition that would have occurred in the absence of the intervention (Gertler et al., 2016). Because the counterfactual cannot be directly observed, an appropriate comparison group is required to approximate the outcome that would have been experienced by the treatment group had the policy not been implemented. To overcome this limitation, the

Difference-in-Differences (DiD) approach provides a framework for constructing the counterfactual by using changes in outcomes observed in the comparison group over time. Accordingly, the quasi-experimental design in this study is estimated using Difference-in-Differences (DiD) method, which estimates policy impacts by comparing changes in outcomes between the treatment group and the control group before and after the policy intervention (Cunningham, 2021).

This study focuses on the Gresik Special Economic Zone (SEZ) as the primary object of analysis. The Gresik SEZ was purposively selected due to the apparent discrepancy between its objective of promoting employment and the persistently high unemployment rate observed in Gresik Regency. Despite substantial investment inflows and labor absorption within the SEZ, the unemployment rate in Gresik remains relatively high compared to other regencies in East Java. This phenomenon makes the Gresik SEZ a relevant case for evaluating whether the policy has generated a measurable impact on unemployment. To facilitate the impact evaluation, Gresik Regency is designated as the treatment group, while Sidoarjo Regency and Lamongan Regency serve as the control group.

The selection of Sidoarjo and Lamongan Regencies as comparison regions was based on similarities in industrial structure, labor market characteristics, and geographical proximity to Gresik Regency. Both regencies are located within the Gerbangkertosusila metropolitan area and experienced comparable macroeconomic conditions during the study period. Therefore, these regions provide a reasonable approximation of the counterfactual outcome that would have been observed in Gresik in the absence of the SEZ policy.

Data were collected from secondary sources obtained from publications of Statistics Indonesia (BPS). The dataset includes the unemployment rate, economic growth, population, and Mean Years of Schooling (MYS) for the period 2015–2025. The observation period is divided into the pre-implementation period (2015–2020) and the post-implementation period (2021–2025) to satisfy the requirements of the Difference-in-Differences (DiD) framework. Data processing and statistical analyses were conducted using STATA to estimate the causal impact of the Gresik SEZ on the variables of interest.

Before conducting the Difference-in-Differences estimation, a comparison group was selected to represent the counterfactual condition for Gresik Regency. Subsequently, the parallel trends assumption was tested to ensure that the treatment and control groups exhibited comparable outcome trends during the pre-treatment period. After confirming that the pre-treatment trends were comparable, the policy impact was estimated using the Difference-in-Differences (DiD) method (Cunningham, 2021).

Research Hypothesis

This study evaluates the causal effect of the Gresik Special Economic Zone (SEZ) on unemployment rate in Gresik Regency. Based on the review of the literature and previous research, the hypothesis proposed in this study is as follows:

- H1: There is a causal impact of the Gresik Special Economic Zone (SEZ) on the Unemployment Rate in Gresik Regency.

Research Model

In general, the baseline DiD regression model is specified as:

$$Y_{it} = \alpha + \beta Treat_i + \gamma Post_t + \delta(Treat_i \times Post_t) + \varepsilon_{it}$$

where Yit denotes the outcome variable for unit i at time t, while the interaction coefficient δ represents the estimated policy effect. Based on this framework, the empirical model incorporating control variables is specified as:

$$UR_{it} = \alpha + \delta(Treat_i \times Post_t) + \theta_1 MYS_{it} + \theta_2 ln_Pop_{it} + \theta_3 EG_{it} + \varepsilon_{it}$$

where MYS_{it} represents mean years of schooling, ln_Pop_{it} denotes population, and EG_{it} refers to economic growth in region i at time t. Finally, the statistical significance of the DiD interaction coefficient (δ) was tested to determine whether the implementation of the Gresik SEZ had a statistically significant causal effect on the unemployment rate.

RESULTS AND DISCUSSION

The following are the research results of the study.

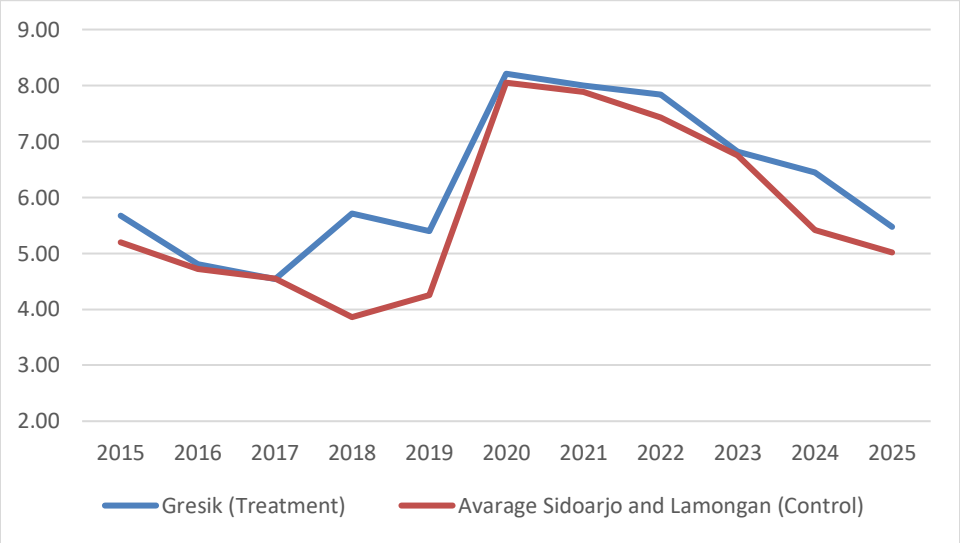

Figure 1.
Parallel Trend Asumption Unemployment Rate
Source: Data processed (2026)

Figure 1 illustrates that the period prior to 2021 serves as the baseline period for this study. During this stage, Gresik Regency, as the treatment group, and Sidoarjo and Lamongan Regencies, as the control group, exhibited relatively similar unemployment rate trends. The observed similarity suggests that unemployment rate dynamics across the regions evolved in a comparable manner before the implementation of the Gresik SEZ policy. The graphical evidence suggests that the parallel trends assumption holds, supporting the use of the Difference-in-Differences (DiD) approach to evaluate the policy impact during the post-treatment period.

Table 1.
Difference-in-Differences Regression Results

UR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
DiD	-.705	.23	-3.07	.092	-1.693	.283	*
MYS	1.48	1.955	0.76	.528	-6.932	9.892	

UR	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
ln_ Pop	-15.557	3.272	-4.75	.042	-29.636	-1.477	**
EG	-.384	.126	-3.06	.092	-.925	.157	*
Constant	108.065	7.176	15.06	.004	77.188	138.941	***

Mean dependent var	5.915	SD dependent var	1.901
R-squared	0.880	Number of obs	33
F-test	.	Prob > F	0.0246
Akaike crit. (AIC)	56.356	Bayesian crit. (BIC)	59.349

*** $p<.01$, ** $p<.05$, * $p<.1$

Source: Data processed (2026)

Based on Table 1, the model produces an *R-squared* value of 0.880, indicating that 88% of the variation in the unemployment rate can be explained by the DiD variable, mean years of schooling (MYS), population, and economic growth, while the remaining 12% is attributable to factors outside the model. The joint significance test yields a Prob > F value of 0.0246, suggesting that the explanatory variables collectively have a significant effect on the unemployment rate. At the individual level, the DiD variable is statistically significant at 10%, population significant at 5%, and economic growth significant at 10%, with p-values of 0.092, 0.042, and 0.092, respectively. In contrast, mean years of schooling (MYS) does not exhibit a statistically significant effect on the unemployment rate, as indicated by its p-value of 0.528.

Based on Table 1, the econometric regression model used to test the hypothesis is specified as follows:

$$UR_{it} = 108.065 - 0.705(Treat_i \times Post_t) + 1.48MYS_{it} - 15.557ln_Pop_{it} - 0.384EG_{it} + \varepsilon_{it}$$

The estimation results indicate that the implementation of the Gresik SEZ causally reduced the unemployment rate by 0.705 percentage points relative to the control regions, Sidoarjo and Lamongan Regency. The coefficient of mean years of schooling (MYS) is 1.48, suggesting that an additional year of schooling is associated with an increase of 1.48 percentage points unemployment rate. The coefficient of ln(Population) is −15.557, indicating that a one point percent increase in population is associated with an approximately 0.156 percentage-point decrease in the unemployment rate, ceteris paribus. Furthermore, the coefficient of economic growth is −0.384, indicating that a one percentage point increase in economic growth is associated with a reduction of 0.384 percentage points in the unemployment rate.

The regression estimates indicate that the implementation of the Gresik Special Economic Zone (SEZ) has a negative and statistically significant effect on the unemployment rate in Gresik Regency. This finding suggests that the decline in the unemployment rate in Gresik was greater than that observed in the control regions that were not exposed to a similar policy intervention. Therefore, the relatively high unemployment rate in Gresik should not be interpreted as evidence that the SEZ has failed to generate employment opportunities. Instead, the results imply that the presence of the Gresik SEZ helped mitigate a potentially larger increase in unemployment that might have occurred in the absence of the policy. The reduction in unemployment reflects increased economic activity that expanded employment

opportunities through industrial production, supporting services, distribution activities, and other related economic sectors. These findings are consistent with growth pole theory, which posits that the concentration of investment and industrialization can generate multiplier effects that stimulate economic activity in surrounding areas (Hirschman et al., 2023).

In addition to the role of the Gresik SEZ, local labor protection policies may have further supported employment absorption in Gresik Regency. Pursuant to Gresik Regent Regulation No. 71 of 2024 on Local Labor Protection, companies are required to employ at least 60% local workers. To support the implementation of this policy, the local government provides training and certification programs to enhance the competitiveness of local job seekers in meeting industrial labor demands. Evidence of its implementation can be observed at PT Xinyi Glass Indonesia, where 56.6% of employees are residents of Gresik Regency. The company has also prioritized local residents in subsequent recruitment processes (Diskominfo, 2025).

Although the estimated impact of the Gresik SEZ is statistically significant, its magnitude remains relatively modest. The Difference-in-Differences coefficient of 0.705 percentage points is equivalent to approximately 5.188 unemployed individuals who potentially obtained employment opportunities following the implementation of the Gresik SEZ. Considering that the labor force in Gresik Regency exceeded 830 thousand people during the post-treatment period, the reduction accounts for only a small proportion of the total labor market. This finding suggests that the contribution of the SEZ to alleviating unemployment pressures remains limited and may not yet be sufficient to substantially influence broader regional economic performance. Therefore, complementary policies are needed to maximize the employment effects of the Gresik SEZ.

Another possible explanation for the relatively modest reduction in unemployment is the industrial structure of the Gresik SEZ itself. Several major industries operating within the zone, including smelting, glass manufacturing, and petrochemical processing, are characterized by relatively high capital intensity and advanced production technologies. Such industries tend to generate lower employment elasticity, meaning that increases in output and investment do not necessarily translate into proportional increases in labor demand. As a result, although the Gresik SEZ has successfully attracted substantial investment and expanded industrial activities, the number of jobs created may still be insufficient to significantly alleviate unemployment pressures in the regional labor market. This condition is consistent with the notion of jobless growth, whereby economic expansion occurs without a commensurate increase in employment opportunities, particularly in regions dominated by capital-intensive industries (Todaro & Smith, 2020).

To enhance the employment impact of the Gresik SEZ, policies should focus on strengthening industry-labor linkages rather than solely expanding educational attainment. These measures may include demand-driven vocational training, apprenticeship programs coordinated with firms operating within the SEZ, periodic labor market assessments, and stricter enforcement of local hiring regulations. Such interventions would help reduce skill mismatches and improve the capacity of local workers to compete for industrial jobs generated within the SEZ.

The relatively modest effect of the Gresik SEZ may also reflect the time required for industrial investments to generate broader labor market benefits. Large-scale industrial projects generally undergo lengthy construction, installation, and operational adjustment

phases before reaching full production capacity. Consequently, the employment impact observed during the 2021–2025 period may represent only the initial stage of labor market adjustment. As more firms within the SEZ become fully operational and production networks continue to expand, the employment effects are expected to become more pronounced over the longer term. This argument is supported by Alder et al. (2016) who found that the benefits of place-based industrial policies often materialize gradually rather than immediately after implementation.

Although local labor absorption has increased, the unemployment rate in Gresik Regency remains relatively high compared to many other regencies in East Java. This condition suggests that the growth of employment opportunities may have been accompanied by an increase in labor force participation and the inflow of workers from outside the region. Large-scale industries operating within the SEZ may also attract more highly skilled workers, thereby intensifying competition in the local labor market. This phenomenon is consistent with Todaro & Smith (2020), who argue that industrialization in developing regions is often accompanied by a growing number of job seekers and labor migration flows. Similar labor market dynamics have also been documented in several SEZs across developing countries.

Similar evidence has been documented by Tafese et al. (2025) in Vietnam, who found that Special Economic Zones (SEZs) supported by foreign direct investment contributed to changes in local labor market conditions and increased employment opportunities. Their study shows that industrial expansion within SEZs can stimulate labor demand both directly through industrial employment and indirectly through related economic activities. A similar mechanism may explain the negative effect of the Gresik SEZ on the unemployment rate, as investment inflows and industrial development have expanded employment opportunities in the region. These findings suggest that SEZs can function as catalysts for labor absorption when supported by sustained industrial growth and investment. Therefore, the evidence from Vietnam reinforces the argument that the reduction in unemployment observed in Gresik is consistent with broader labor market outcomes associated with SEZ development (Tafese et al., 2025).

The impact of the Gresik SEZ extends beyond labor absorption within its core industries to the development of supporting economic activities in the surrounding area. Sectors such as transportation, trade, warehousing, consumption, and micro, small, and medium enterprises (MSMEs) may also benefit from the increased economic activity generated by the industrial zone. One example is the collaboration between the Gresik Regency Government and PT Freeport Indonesia to support MSME development through the Jawara, Bestari, and Srikandi Preneur programs, which reached approximately 6,500 MSMEs in Gresik during the first quarter of 2025 (Redaktur, 2025). This phenomenon is consistent with the multiplier effect theory, which suggests that economic activities can generate both backward and forward linkages (Hirschman et al., 2023). The backward linkage effect is reflected in increased employment opportunities across MSMEs, transportation services, and other supporting sectors. Meanwhile, a *forward linkage* can be observed in PT Hailiang Nova Material Indonesia, which utilizes refined copper produced by PT Freeport Indonesia's smelter as an input for manufacturing electrodeposited copper foil (Arthur Gideon, 2023).

The findings indicate that the implementation of the Gresik SEZ contributed to a reduction in the unemployment rate relative to the control regions. This result suggests that

industrial activities and investment within the SEZ have expanded employment opportunities while stimulating supporting economic activities in the surrounding area. Nevertheless, improvements in labor absorption have not fully alleviated pressures in the local labor market. This condition implies that economic growth and industrialization in Gresik Regency continue to be accompanied by increases in labor force participation and interregional labor mobility.

CONCLUSION

This study evaluates the causal impact of the Gresik Special Economic Zone (SEZ) on the unemployment rate in Gresik Regency using the Difference-in-Differences (DiD) approach. The results indicate that the implementation of the Gresik SEZ reduced the unemployment rate by approximately 0.705 percentage points relative to the control regions, suggesting that the policy contributed to local employment creation. These findings provide empirical evidence that SEZs can function as a policy instrument for promoting employment opportunities and supporting regional economic development. However, the relatively high unemployment rate observed in Gresik suggests that labor market challenges remain and require complementary policies to enhance workforce readiness and labor market integration.

From a policy perspective, the findings suggest that SEZ development alone is insufficient to substantially reduce unemployment in industrial regions. Strengthening linkages between industries and local workers through demand-driven vocational training, apprenticeship schemes, labor market information systems, and effective implementation of local hiring regulations is essential to maximize the employment benefits generated by the Gresik SEZ. Such measures may help ensure that future industrial expansion contributes more effectively to inclusive regional development. Future studies may investigate the long-term effects of the Gresik SEZ on broader development outcomes, including economic growth, income inequality, poverty reduction, labor productivity, and job quality.

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