



Tourism and Economic Growth on Employment in Central Java: A Panel Data Regression Analysis

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Abstract

The tourism sector is one of the main drivers of the economy in Indonesia, contributing to GRDP, job creation, and regional development. Central Java Province, with a significant contribution to employment absorption and economic growth from the tourism sector, has great potential in terms of nature, culture, and history. This study aims to analyze the tourism and economic growth on employment absorption in the tourism sector of Central Java. Quantitative analysis with panel data from 35 regencies/cities in Central Java from 2019-2023 uses panel data regression. Data was obtained from Central Statistics Agency (BPS) and Department of Youth, Sport, and Tourism of Central Java. The findings show that the F-statistic value is 4.66 with a probability value of 0.011 (<0.05), indicating that the independent variables significantly affect employment absorption. However, of the two independent variables, only the tourism sector has a positive and significant effect. Strengthening the tourism sector through destination promotion and infrastructure is necessary to support economic recovery post-pandemic.

Keywords: Tourism, Labor, Economic Growth, Panel Data

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INTRODUCTION

The tourism sector has experienced extraordinary growth in recent decades.

Specifically, the development of the tourism industry has several benefits for society, such as increasing job opportunities, optimizing

transportation, increasing residents' income, and protecting cultural heritage. In addition, tourism can also serve as a source of foreign exchange and can act as a catalyst for environmental and wildlife protection with the increasing efforts of green tourism (Cahyaningsih et al., 2023; Shahzad et al., 2017).

Global tourism has shown a significant recovery trend post-COVID-19 pandemic. According to UNWTO (2023), international tourist arrivals in 2023 reached 80% of pre-pandemic levels, with the fastest growth occurring in the Southeast Asian region, including Indonesia. At the national level, the tourism sector contributes 4.5% to Indonesia's GRDP and manages to absorb more than 13 million workers (Ministry of Tourism and Creative Economy of the Republic of Indonesia, 2023).

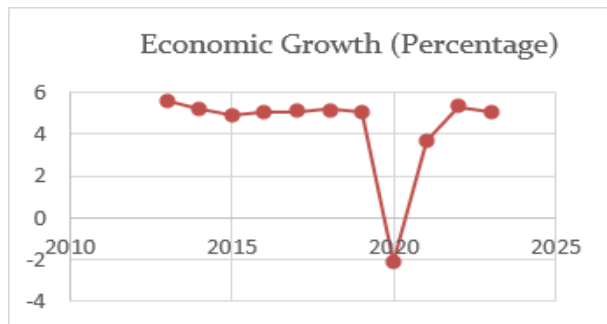


Figure 1. Economic Growth of Indonesia 2013-2023.

Source: BPS, 2013 - 2023

The graph shows the economic growth figures of Indonesia for the period 2013-2023, which mostly hovers around 5%. However, in 2020, Indonesia's economic growth declined to 2% due to the COVID-19 pandemic. Subsequently, in the following years, Indonesia's economic growth returned to a positive trend. This recovery is an important momentum for

regions with superior tourism potential, such as Central Java Province. However, the recovery is not free from challenges, especially related to employment. A recent study by the ILO (2023) revealed that although tourism creates extensive employment, the sector is still faced with issues of low wages and seasonal employment instability. Central Java Province has diverse tourism potential, ranging from natural tourism, culture, to culinary.

In 2022, Central Java ranked among the top 5 provinces with the highest GDP contribution in Indonesia (BPS, 2023). Although the COVID-19 pandemic caused a 60% decrease in tourist visits in 2020 (Department of Youth, Sport, and Tourism of Central Java, 2021), the recovery of this sector is key to regional economic recovery, thus, it is necessary to examine its relationship with labor absorption. According to Octavianto et al. (2024), this recovery has a positive impact on employment, where every 10% increase in the number of tourist attractions correlates with a 3.2% increase in employment, especially in the accommodation sector and culinary MSMEs.

Table 1. Tourism of Central Java Province 2019-2023

Year	Local Tourist	Foreign Tourist	Amount (person)
2019	57,900,863	691,699	58,592,562
2020	22,629,085	78,290	22,707,375
2021	21,332,409	1,793	21,334,202
2022	44,949,504	144,429	45,093,933
2023	56,485,087	464,719	56,949,806

Source: BPS, 2019 - 2023

Moreover, tourism has become one of the priority sectors in the Regional Medium-Term

Development Plan (RPJMD). In addition, initiatives such as the “Pesona Jawa Tengah” program were launched to enhance destination promotion through digital platforms (Ministry of Tourism and Creative Economy of the Republic of Indonesia, 2023).

This is evidenced by the increasing number of tourists in Central Java during the period 2019-2023, as shown in table 1. Based on the table, after Covid-19, which caused a decrease in tourist visits and layoffs in related sectors, Indonesian tourism gradually experienced significant improvement until 2023, with a total number of tourists amounting to 59,949,806.

According to BPS data, the top 5 districts/cities most visited by foreign tourists are Magelang Regency (252,957), Klaten Regency (163,882), Jepara Regency (15,251), Semarang City (12,669), and Surakarta City (10,120). Meanwhile, the top 5 districts/cities most visited by domestic tourists are Semarang City (6,470,037), Klaten Regency (6,293,175), Surakarta City (4,019,566), Semarang Regency (3,531,786), and Banyumas Regency (3,526,643).

Tourism itself is a travel activity carried out by an individual or a group of people by visiting certain places for recreational purposes, personal development, or to learn about the unique attractions of the visited tourist sites temporarily (Kasdi et al., 2021). The tourism sector is labor-intensive, so it can absorb labor both directly (hotels, travel agents, tour guides) and indirectly (culinary businesses, transportation).

Previous researchers' studies explain that the development of a sustainable tourism sector is very important in improving the economy of the community, opening job opportunities, and reducing the unemployment rate (Gómez López

& Barrón Arreola, 2019; Octavianto et al., 2024; Solís & Gil, 2024). Meanwhile, Suhardi's (2022) research shows that the number of tourists does not affect labor absorption. In contrast, Hafizha et al. (2024) indicate that the number of tourist attractions has a significant effect on labor absorption.

Meanwhile, for the GRDP variable, other research shows that GRDP does not significantly affect labor absorption (Hafiz & Haryatiningsih, 2021; Hartono et al., 2018). The research gap is now explicitly stated, although some studies confirm the positive impact of tourism on employment, others find no significant effect, and the role of economic growth (GRDP) is still debated. This study aims to resolve these inconsistencies by analyzing both variables simultaneously in the context of Central Java in pandemic era.

This study aims to analyze the impact of the tourism sector and economic growth on labor absorption in Central Java Province during 2019–2023, a period encompassing pre-pandemic, pandemic, and recovery phases. Using quantitative panel data regression (Fixed Effect Model) from 35 regencies/cities, the research evaluates the effectiveness of tourism in job creation and economic recovery. The findings will inform policy recommendations to strengthen the sector's role in sustainable regional development.

RESEARCH METHODS

This research aims to analyze the role of the tourism sector in labor absorption and economic growth in Central Java Province during the period 2019 – 2023. The approach used is quantitative, combining descriptive analysis and econometrics based on panel data

from BPS for the years 2019 to 2023 in 35 districts/cities in Central Java.

The panel data itself is a combination of cross-sectional data and time series data. Panel data regression analysis is a combination of time series data and cross-sectional data. The use of panel data can explain two types of information, namely information across units and over time (Ayu et.al., 2023). According to Baltagi & Baltagi (2021), the advantages obtained from the use of panel data are: (1) able to control individual

heterogeneity; (2) provides broader information, reduces collinearity among variables, increases degrees of freedom, and is more efficient; (3) panel data is better for dynamic adjustment research; (4) can better identify and measure effects that cannot be detected in cross-sectional or time series data models; and (5) is more suitable for studying and testing complex behavioral models compared to cross-sectional or time series data models.

Table 2. Operational Definition of Variables

Variable	Operational Definition	Source	Unit
Labor	Number of workers in tourism	Central Statistics Agency (BPS)	Person
GDRP	Tourism sector's Gross Regional Domestic Product Value	Central Statistics Agency (BPS)	Billion IDR
Tourist Attraction	Registered tourist attractions	Department of Youth, Sport, and Tourism of Cental Java	Units
Tourist	Annual domestic and international tourist arrivals	Department of Youth, Sport, and Tourism of Cental Java	Person

Source: Data Processed 2025

This research analyzes panel data using the Fixed Effect Model. The Fixed Effect Model uses the technique of adding dummy variables, so this method is often referred to as the Least Squares Dummy Variable (LSDV) model. The regression equation in this research refers to the estimation model used (Runtiningsih et al., 2024) as follows:

$$Labor_{it} = \alpha + \beta_1 GRDP_{it} + \beta_2 NTA_{it} + \beta_3 Tourist + \mu_{it}$$

Where Y_{it} is the labor in the District/City i in the year t , is an economic growth variable that is the amount of GRDP of the District/City, is a tourism sector variable that consists of the number of Tourist Attractions (NTA) and is number of tourist as a control variable used in this study. The period of the variables used in this

study is from 2019 to 2023. This research uses two stages of testing, namely the selection between CEM and FEM with the Chow test.

The results of model selection through the Chow test produced a probability of 0.0000 (smaller than $\alpha=0.05$) which indicates that Fixed Effect Model (FEM) specification is statistically more appropriate for analyzing the relationship between the variables in this study. And then the selection of FEM and REM with the Hausman test.

The results of model selection through the Hausman test resulted in a probability of 0.0094 (which is smaller than $\alpha=0.05$) which confirmed that the Fixed Effect Model specification was statistically more appropriate than the Random Effect Model to analyze the relationship between

the variables in this study. In recent studies, applying the Fixed Effect Model (FEM) without testing classical assumptions has become an increasingly common approach. This is based on some strong methodological considerations.

Table 3. Chow Test Results

Test	Prob>F
Chow	0.0000

Source: Data Processed, 2025

As Wooldridge (2019) explains, FEM is inherently able to control for unobserved heterogeneity through the use of dummy variables or within- group transformation, so in many cases it does not require classical assumption testing to ensure consistency of estimates. This approach is particularly effective when the researcher is more focused on estimating the fixed effects themselves rather than fulfilling the basic assumptions of regression.

Table 4. Hausman Test Results

Test	Wald chiz (3)	P>chiz
Hausman	11.47	0.0094

Source: Data Processed, 2025

The study by Hsiao (2022) reinforces this opinion by showing that FEM still provides valid results even when the data does not meet some classical assumptions. In his study, Hsiao explains that autocorrelation issues can be addressed by using clustered standard errors (Cameron & Trivedi, 2021), while heteroscedasticity issues can be managed through the application of robust standard errors (Arellano, 2003). Some empirical examples support this approach, such as Baltagi's (2021) study on employment in Europe which

successfully applied FEM without normality test, relying on the asymptotic properties of the model in large samples. Similarly, Apriyanti et al. (2023) in analyzing the impact of tourism in Bali used direct FEM with robust standard errors without conducting multicollinearity tests, because time and individual variables were well controlled in the model.

RESULTS AND DISCUSSION

This study analyzes panel data comprising 175 observations across 35 regencies/cities in Central Java Province, Indonesia, focusing on four key variables: labor absorption in the tourism sector (Labour), Gross Regional Domestic Product (GRDP), number of tourist attractions (DTA), and tourist arrivals (Tourists). The descriptive statistics reveal substantial regional disparities in tourism development and economic performance.

Table 5. Descriptive Statistics Results

Variable	Mean	Std.Dev.	Min	Max
Labour	646.189	1071.565	13	6334
GDRB	2.92e+07	2.65e+07	6312054	1.62e+08
NTA	30.743	20.467	3	99
Tourist	3372629	1612858	748431	1.10e+07

Source: Data Processed, 2025

The Labour variable exhibits a mean of 646,189 workers with Standard Deviation 1,071,565, with extreme values ranging from 13 to 6,334 workers, indicating pronounced interregional inequality in employment opportunities. Similarly, GRDP demonstrates significant variation, averaging IDR 29.15 billion with Standard Deviations IDR 26.54 billion, with values spanning from IDR 631 million to IDR 162.8 billion. This wide dispersion reflects the

substantial economic disparities among the studied regions, where certain urban centers dominate economic output while rural areas lag behind.

Tourism infrastructure, measured by NTA, averages 30.74 destination per region with Standard Deviations 20.467, with a minimum of 3 and maximum of 99 destination. The distribution of tourists is equally uneven, averaging 3.37 million visits with Standard Deviations 1.61 million and ranging from 748,431 to 10.97 million. The high standard deviations across all variables (exceeding 50% of mean values) confirm substantial heterogeneity in tourism development and economic conditions among Central Java's regencies/cities.

The result of the analysis of the role of the tourism sector and economic growth on labor absorption in Central Java Province in the years 2019-2023, with panel data regression calculations as shown in table 6.

Table 6. FEM Test Results

Variable	Coefficient	t	P> t
GDRB	6.34e-06	1.06	0.293
NTA	2.464383	2.67	0.09
Tourist	.0000164	1.23	0.233
Cons	385.5598	2.28	0.028
R²	0.3345		
F-test	0.011		

Source: Data Processed, 2025

The F test results show that the F-statistic value is 4.66 with a probability value of 0.011 (<0.05), so the independent variables (GDRB, NTA) have a significant effect simultaneously on the labor absorption variable. In the coefficient of determination test (adjusted R²) to measure the extent to which the independent variables in

the model can explain variations in the dependent variable.

A coefficient of determination that is close to 0 indicates that the independent variable has a very limited influence on the dependent variable. Conversely, the higher the R² value (closer to 1), the stronger the independent variable's ability to explain the dependent variable. In this study, the Adjusted R-Squared value was 0.3345, meaning that 33.45% of the variation in labor force participation was influenced by the GRDP, NTA and tourist, while the remaining 66.55% was explained by other factors outside the model.

The t-test results, variable GDRB has a t-statistic value of 1.06 with a probability value of 0.293 (>0.05), which can be concluded that the GRDP variable does not have a significant effect on the labor variable. This is in line with research (Lube et al., 2021; Putri et al., 2022; Tasyim et al., 2021) simultaneously shows results that GRDP does not have a significant effect on labor absorption.

Variable NTA shows different results from variable GRDP, where variable NTA has a t-statistic value of 2.67 with a probability value of 0.009 (<0.05), indicating that the tourist attraction variable has a significant effect on the labor variable. The positive effect of increasing tourist attraction on labor absorption contributes significantly to economic development and social welfare.

In primary terms, the expansion of the tourism sector is able to open various job opportunities, both in the form of direct employment in the fields of accommodation, culinary, and tourist services, as well as indirectly through supporting industries such as logistics and local crafts. This phenomenon has an impact on reducing the unemployment rate as well as

increasing the economic capacity of the community.

Furthermore, the development of the tourism industry also accelerates the circulation of the regional economy which in turn encourages the growth of Micro, Small and Medium Enterprises (MSMEs). In addition, the demand for human resource competence in this sector encourages the implementation of various job training programs, which ultimately improve the qualifications and competitiveness of the local workforce. The research results from (Aldama, 2023; Apriyanti et al., 2023; Rapii, 2022) identify that the tourism sector has a significant effect on labor absorption.

CONCLUSION

Based on the results obtained from research conducted on the role of the tourism sector and economic growth on labor in Central Java Province in 2019-2023 with the FEM model, it shows that the increase in the tourism sector as measured by tourist attraction and economic growth represented by GRDP simultaneously has a positive and significant effect on labor absorption. However, individually, an increase in economic growth does not have a significant effect on employment, while tourist attraction shows a significant effect.

The recovery of the tourism sector after the COVID-19 pandemic, which is characterized by increased tourist visits, is the key to encouraging economic and employment recovery. Therefore, local governments need to strengthen the tourism sector through various strategies, including: (1) Encourage collaboration between governments and private investors to fund new attractions, ensuring sustainable development while generating direct (tour guides, hospitality staff) and indirect (transport, MSMEs). (2)

Simplify licensing processes for tourism-related startups and enforce fair labor practices to ensure job stability and quality employment and mandate that businesses near tourist attractions prioritize hiring from the local workforce and sourcing goods/services locally, reinforcing economic benefits. (3) Partner with technical schools and NGOs to offer courses in hospitality, customer service, language skills, and tour operations, aligning training with industry demands and collaborate with hotels, attractions, and tour companies to create hands-on training opportunities, bridging the gap between education and employment.

By strengthening inter-sector collaboration, new jobs can be created in various fields. These measures are expected to strengthen the contribution of the tourism sector to economic growth and job creation in a sustainable manner in the future. In addition, it is also necessary to conduct a more in-depth study of other factors that can support the synergy between economic growth and employment outside the tourism sector.

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