

## **Tourism Revenue Dynamics In The Special Region of Yogyakarta: A Panel Data Analysis**

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### **ABSTRAK**

Sektor pariwisata di Daerah Istimewa Yogyakarta (DIY) merupakan salah satu penyumbang utama Pendapatan Asli Daerah (PAD). Namun, dinamika yang terjadi sebelum, selama, dan setelah pandemi COVID-19 telah menciptakan ketidakpastian mengenai kontribusi berbagai faktor yang mendorong pariwisata. Pengetahuan empiris tentang variabel-variabel yang paling berpengaruh terhadap pendapatan pariwisata masih terbatas, terutama pada tingkat kabupaten/kota di DIY. Penelitian ini bertujuan untuk menganalisis pengaruh jumlah wisatawan, jumlah desa wisata, jumlah objek wisata alam, dan jumlah museum terhadap pendapatan sektor pariwisata di empat kabupaten dan satu kota madya di DIY, serta mengidentifikasi faktor-faktor yang berperan signifikan dalam membentuk kinerja pariwisata daerah. Penelitian ini menggunakan pendekatan kuantitatif dengan metode analisis data panel yang mencakup periode sebelum, selama, dan setelah pandemi COVID-19. Variabel dependen dalam penelitian ini adalah pendapatan pariwisata, sedangkan variabel independen terdiri dari jumlah wisatawan, jumlah desa wisata, jumlah objek wisata alam, dan jumlah museum. Hasil penelitian menunjukkan bahwa jumlah desa wisata ( $p = 0,0112$ ) dan jumlah wisatawan ( $p = 0,0130$ ) memiliki pengaruh positif dan signifikan terhadap pendapatan pariwisata. Di sisi lain, jumlah objek wisata alam dan wisata edukasi tidak menunjukkan pengaruh yang signifikan. Variabel jumlah museum menunjukkan pengaruh positif dengan nilai signifikansi yang mendekati ambang batas ( $p = 0,0527$ ), yang mengindikasikan adanya potensi kontribusi. Temuan ini menekankan bahwa faktor berbasis komunitas dan tingkat kunjungan wisatawan merupakan determinan utama pendapatan pariwisata di DIY. Kesimpulannya, pendapatan pariwisata di DIY lebih dipengaruhi oleh aspek partisipatif melalui desa wisata dan intensitas kunjungan wisatawan dibandingkan dengan jumlah objek wisata formal. Oleh karena itu, strategi pembangunan pariwisata daerah sebaiknya difokuskan pada penguatan desa wisata dan peningkatan daya tarik bagi wisatawan, serta mendorong pemanfaatan museum sebagai potensi yang belum tergarap secara optimal.

**ABSTRACT**

The tourism sector in the Special Region of Yogyakarta (DIY) is a significant contributor to the Regional Gross Domestic Product (PAD). However, the dynamics occurring before, during, and after the COVID-19 pandemic have created uncertainty regarding the contributions of various factors driving tourism. Empirical knowledge about the variables that most influence tourism revenue remains limited, particularly at the district/city level in DIY. This study aims to analyze the impact of the number of tourists, the number of tourist villages, the number of natural tourist attractions, and the number of museums on tourism revenue in four districts and one municipality in DIY, as well as to identify the factors that play a significant role in shaping the region's tourism performance. This research employs a quantitative approach using panel data analysis covering the period before, during, and after the COVID-19 pandemic. The dependent variable in this study is tourism revenue. In contrast, the independent variables include the number of tourists, the number of tourist villages, the number of natural tourist attractions, and the number of museums. The results indicate that the number of tourist villages ( $p = 0.0112$ ) and the number of tourists ( $p = 0.0130$ ) have a positive and significant impact on tourism revenue. Conversely, the number of natural tourist attractions and educational tourism does not show a significant effect. The variable for the number of museums shows a positive influence with a significance value approaching the threshold ( $p = 0.0527$ ), indicating potential contribution. These findings emphasize that community-based factors and the level of tourist visits are the primary determinants of tourism revenue in DIY. In conclusion, tourism revenue in DIY is more influenced by participatory aspects through tourist villages and the intensity of tourist visits than by the number of formal tourist attractions. Therefore, regional tourism development strategies should focus on strengthening tourist villages and enhancing attractions for visitors.

## 1. PENDAHULUAN

The United Nations World Tourism Organization (UNWTO) affirms that tourism makes a significant contribution to economic growth, job creation, and cultural exchange between countries [1]. Furthermore, tourism is also closely related to the achievement of the Sustainable Development Goals (SDGs), especially SDG 8 (Decent Work and Economic Growth), SDG 11 (Sustainable Cities and Communities), and SDG 12 (Responsible Consumption and Production) [2]. The three goals emphasize that tourism is not only an economic tool, but also a means to strengthen social development, environmental conservation, and local community empowerment. However, the COVID-19 pandemic that has occurred since 2020 has caused a major contraction in global tourist mobility, destination closures, and a decrease in the contribution of the tourism sector to the world economy, thus hindering the achievement of the SDGs in various countries, including Indonesia [3]. At the national level, the direction of Indonesia's development for the period 2024–2029 is articulated in Asta Cita, which consists of eight development missions initiated by President Prabowo Subianto and Vice President Gibran Rakabuming Raka, aimed at realizing Indonesia emas 2045[4]. Asta Cita includes, among other things, strengthening national resilience, enhancing productivity and economic independence, creating job opportunities, developing human resources and technology, industrial downstreaming, equitable development through villages, bureaucratic reform, and cultural and environmental harmonization. The sixth point, which emphasizes

development from villages for economic equity, is particularly relevant to the development of tourist villages as a foundation for sustainable and community-based tourism [5]. Thus, regional tourism development not only catalyzes post-pandemic recovery but also serves as a tool to support national priorities within the framework of Asta Cita.

The Special Region of Yogyakarta (DIY) holds a strategic position as one of the national leading tourist destinations, characterized by a combination of cultural, historical, natural, and educational attractions [6]. Prior to the COVID-19 pandemic, the tourism sector made a significant contribution to the Regional Gross Product (PAD), particularly through taxes on hotels, restaurants, entertainment, and tourism destination fees. However, the pandemic led to a sharp decline in the number of tourists, operational restrictions on destinations, and a contraction in regional income. Various recovery efforts have been undertaken, including diversifying tourist attractions, digitalizing promotions, and strengthening community-based tourist villages. Museums and educational tourism are also being positioned as alternative attractions in the post-pandemic era, although their contribution to regional income has yet to be optimally measured. Previous literature has discussed a lot of determinants of tourism performance at various levels. Majid et al. (2024) [7] highlight the relationship between the number of tourists and tourism income at the provincial level, while Fernández-Palacios et al [8] analyze the impact of natural tourism on the local economy. Research by Ariyani et al [9] emphasizes the role of tourism villages in strengthening the community-based economy, while Ratni [10] raises the potential of museums as a post-pandemic educational attraction. Furthermore, Lin and Yeh [11] used a spatial approach to analyze the distribution of tourists in Central Java. [12] emphasized the importance of panel data analysis in understanding tourism dynamics comparatively. However, it is still rare to find an integrative study that simultaneously examines the influence of the number of tourists, tourist villages, natural attractions, and museums on tourism income with a panel data approach, especially at the district/city level in Yogyakarta in the period before, during, and after the COVID-19 pandemic.

The gap identified in this research serves as a foundation for the conducted study. This research aims to analyze the impact of the number of tourists, tourist villages, natural tourist attractions, and museums on the income of the tourism sector in four districts and one city in DIY, utilizing panel data analysis [13]. This approach offers an advantage as it can capture both spatial variations across regions and temporal variations across periods. Theoretically, this research contributes to the empirical literature on region-based tourism by integrating various determinants into a single quantitative analysis model [14]. Practically, this research is beneficial for DIY local government in formulating more adaptive tourism development strategies in the post-pandemic era [8]. The recommended policy focus is on strengthening community-based tourist villages and increasing the number of tourist visits, while also optimizing the potential of museums as additional attractions. Thus, this research not only addresses the gap in the literature but also supports the achievement of the SDGs and the implementation of Asta Cita within the framework of national development.

## 2. METODE

### Data

This research focuses on the tourism sector across four districts and one municipality in the Special Region of Yogyakarta (DIY), specifically Sleman Regency, Bantul Regency, Gunungkidul Regency, Kulon Progo Regency, and Yogyakarta City [15]. The object of this study is the regional tourism revenue (PAD tourism) for the period of 2018–2024. The

dependent variable utilized is tourism revenue, while the independent variables include the number of tourists, the number of tourist villages, the number of natural tourist attractions, and the number of museums. This study assumes that the selected independent variables are the primary determinants of tourism sector revenue in DIY, and the relationships among these variables can be modeled linearly using panel data regression [16]. Furthermore, it is assumed that the data used is homogeneous and can be compared across regions within the specified time frame.

The data employed in this research is secondary data obtained from the Central Statistics Agency (BPS) of DIY, the DIY Tourism Office, and the budget realization reports of the districts/municipalities. The research period spans from 2018 to 2024, encompassing the time before, during, and after the COVID-19 pandemic. Data on the number of tourists, the number of tourist villages, the number of natural tourist attractions, and the number of museums is compiled based on the official annual reports from the local government. In contrast, tourism revenue data is sourced from components of the PAD in the tourism sector, including hotel taxes, restaurant taxes, entertainment taxes, and fees for recreational and sports facilities. The data is listed in Table 1 as follows.

Table 1. Variable Operational Definition

Variable	Symbol	Operational Definition	Unit / Transformation	Data Source
Tourism Revenue	PADtourism	Amount of regional original revenue (PAD) derived from the tourism sector in each regency/city of DIY	Million Rupiah (IDR)	Budget Realization Report (BPKAD, BPS)
Number of Tourism Villages	DESWIS	Number of officially registered tourism villages recognized by the Tourism Office	Unit (village)	Tourism Office of Yogyakarta Special Region
Tourist Arrivals	tourist	Total number of tourist arrivals (domestic and international) per year	Person (natural logarithm, ln)	BPS & Tourism Office of Yogyakarta
Natural Tourist Attractions	WISLAM	Number of nature-based tourist attractions (beaches, mountains, caves, forests, etc.)	Unit	Local Tourism Office of Regency/City
Number of Museums	WISMUS	Number of active museums officially designated as tourism destinations	Unit	Department of Culture & Tourism Office
Historical Tourist Attractions	WISEJ	Historical Tourist Attractions	Historical Tourist Attractions	Historical Tourist Attractions

## Data Analysis

The analysis was conducted using econometric software (Eviews), following these steps: (1) testing for the stationarity of panel data, (2) performing the Chow test to compare the Common Effect Model (CEM) with the Fixed Effect Model (FEM), (3) conducting the Hausman test to choose between FEM and the Random Effect Model (REM), and (4) testing the significance of parameters using t-statistics and p-values [17], [18]. The estimation results indicate that FEM is the best model, with the number of tourist villages and the number of tourists being significant at the 5% level. The regression equation of the panel data used can be written as follows:

$$\log(PADtourism_{it}) = \alpha + \beta_1 deswis_{it} + \beta_2 \log(tourist)_{it} + \beta_3 wisej_{it} + \beta_4 wislam_{it} + \beta_5 wismus_{it} + \epsilon_{it} \quad (1)$$

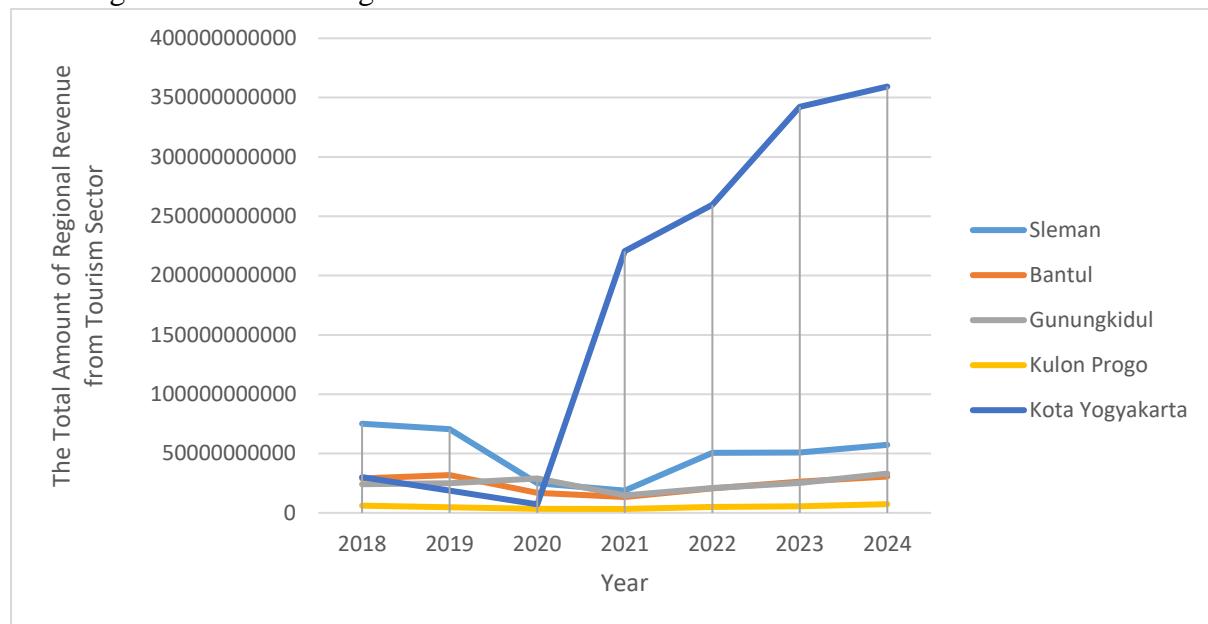
The explanation between variables and units can be seen in Table 1. Consequently, the model specification offers a thorough framework to account for the impact of both demand-side elements (such as tourist arrivals) and supply-side factors (including the number of tourist villages, historical sites, natural attractions, and museums) on regional tourism revenue. The application of the Fixed Effect Model guarantees that unobserved heterogeneity among regencies and cities is managed, thus improving the reliability of the estimation outcomes. Furthermore, this specification lays the groundwork for subsequent discourse in the Results and Discussion section, where the empirical results are analyzed in the context of existing literature and policy implications.

### 3. RESULT AND DISCUSSION

The primary empirical results of the study are presented, followed by a comprehensive discussion in relation to prior research, theoretical frameworks, and policy priorities. The findings are obtained through the estimation of panel data utilizing the Fixed Effect Model (FEM) [19]. The selection of the Fixed Effect Model (FEM) for this research is grounded in both statistical evaluations and theoretical reasoning. Initially, the Chow test suggested that FEM outperforms the Common Effect Model (CEM). In contrast, the Hausman test indicated that FEM is more suitable than the Random Effect Model (REM), as the unobserved effects are correlated with the explanatory variables.

From a theoretical perspective, FEM is appropriate because the dataset encompasses five regencies/cities in DIY over a span of seven years (2018–2024), where each unit is likely to possess distinct and time-invariant characteristics such as cultural heritage, governance capacity, and infrastructure quality that systematically influence tourism revenue [20]. These unobserved elements, if overlooked, could skew the estimation results. FEM addresses such heterogeneity by permitting each cross-sectional unit to have its own intercept, thereby ensuring that the estimated coefficients accurately reflect within-unit variations, which was determined to be the most suitable specification based on statistical assessments. In addition to presenting the estimated coefficients and their statistical significance, this section emphasizes the patterns and trends of tourism revenue across regencies/cities in the Yogyakarta Special Region (DIY) during the period from 2018 to 2024. The discussion is structured around principal considerations. The consistency of the findings with broader development agendas, such as the Sustainable Development Goals (SDGs) at the international level and the Asta Cita program at the national level, both of which prioritize inclusive, sustainable, and locally driven economic growth [21]. The provincial context of DIY, where tourism has historically been a key sector contributing not only to regional income but also to community empowerment and cultural preservation.

Total regional revenue from the tourism sector in 5 districts and cities in Yogyakarta tends to fluctuate and decrease in 2020 due to COVID-19, as shown in Figure 1. The graph depicts the total regional revenue generated by the tourism sector across five regions of the Yogyakarta Special Region from 2018 to 2024. Overall, the data indicate a notable increase following 2020, especially in Kota Yogyakarta. During the years 2018–2019, Sleman and Kota Yogyakarta achieved the highest revenues compared to the other regions, whereas Kulon Progo consistently reported the lowest figures. However, in 2020, a significant decline was observed in all regions, likely attributable to the effects of the COVID-19 pandemic on the tourism industry [22]. Starting from 2021, Kota Yogyakarta saw an impressive rise in tourism revenue, climbing sharply and attaining the highest level among all regions by 2024. Sleman and Gunungkidul also exhibited a gradual upward trend, although their revenues remained significantly lower than those of Kota Yogyakarta. In contrast, Bantul and Kulon Progo experienced only modest increases during the same timeframe. This trend underscores the robust recovery and growth of the tourism sector in Kota Yogyakarta, which greatly surpassed other regions in terms of regional revenue.



**Figure 1.** The Total Amount of Regional Revenue from the Tourism Sector between 2018 - 2024.

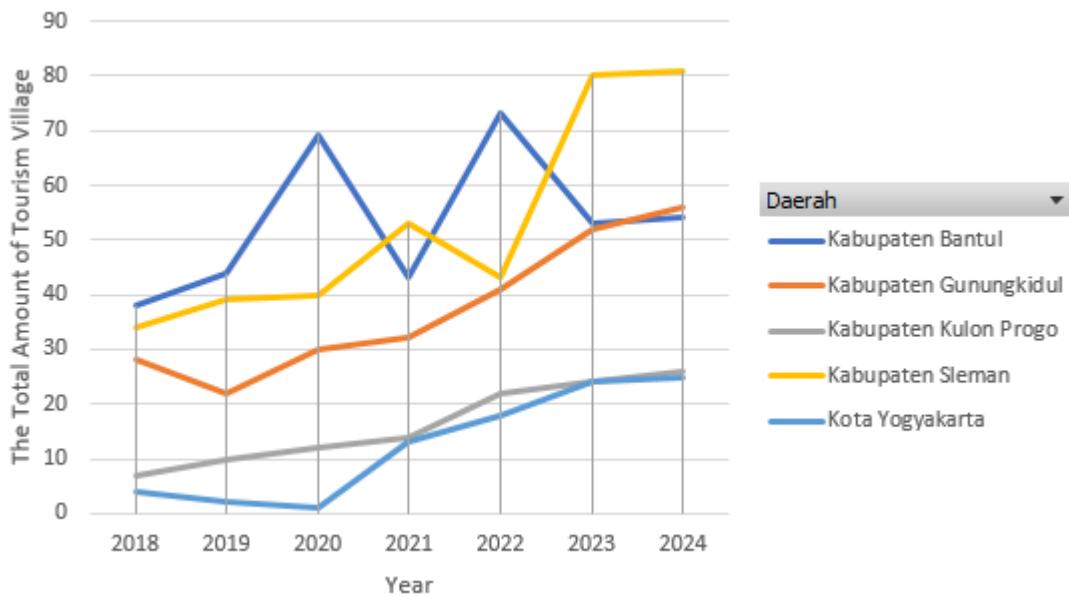
This number is influenced by several factors in the tourism sector, including: the number of visitors, the number of tourist villages, and the number of museum units, as shown in the regression results of the panel data in Table 2. Where the probability values for the variables of the number of visitors and the number of tourist villages are less than 5% and 10%. The table is then explained further in equation (2).

Table 2. Panel Data Regression Results.

Variable	Coefficient	Prob.
C	16.72679	0.0000
DESWIS	0.032028	0.0112**
tourist	0.501256	0.0130**
WISEJ	0.006518	0.5777
WISLAM	0.002276	0.3623
WISMUS	0.077109	0.0527*

$$\begin{aligned}
 \log(PAD_{tourism_{it}}) &= 16.72679 + 0.032028 \text{deswis}_{it} + 0.501256 \log(\text{tourist})_{it} + 0.006518 \text{wisej}_{it} \\
 &+ 0.002276 \text{wislam}_{it} + 0.077109 \text{wismus}_{it} + \epsilon_{it} \quad (2)
 \end{aligned}$$

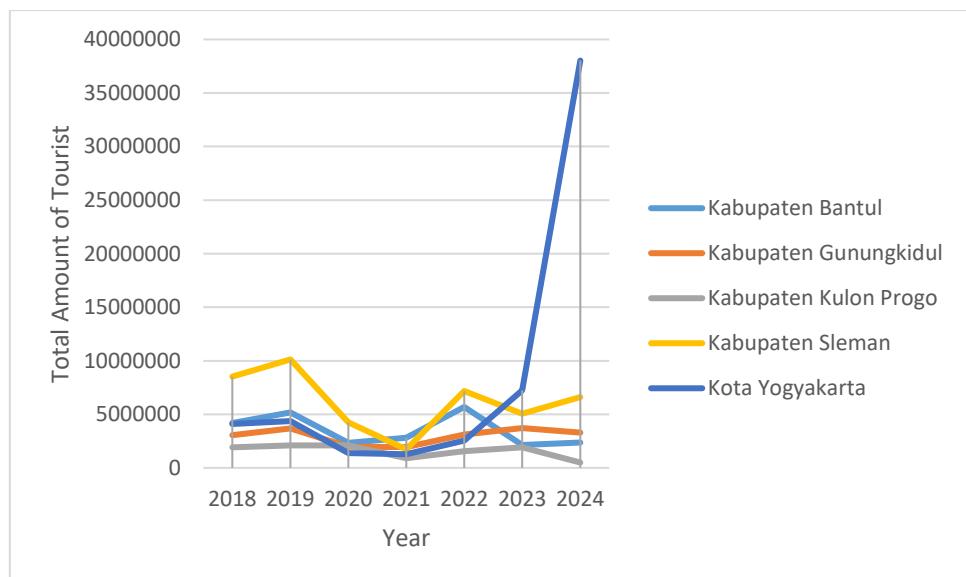
Tourist villages are one of the tourist destinations that have caused an increase in visitors in Yogyakarta. Each addition of 1 unit of tourism village contributes to the addition of regional opinions in the tourism sector by 0.03%. Tourist villages are among the destinations that have led to an increase in DIY visitor numbers. Each addition of one tourist village contributes to a 0.03% rise in the local revenue (PAD) from the tourism sector. This can be explained by the fact that tourist villages not only provide attractions based on nature and culture but also offer authentic experiences that involve direct participation from local communities, as shown in Figure 2. The existence of tourist villages extends the length of stay for tourists, increases spending per visit through homestays, traditional cuisine, and creative economic products such as handicrafts [23]. Therefore, tourist villages serve as a driving force for the local economy, directly enhancing fiscal contributions to PAD. Furthermore, the development of tourist villages also strengthens the resilience of the tourism sector in the post-COVID-19 pandemic era. While mass tourism has faced stagnation due to mobility restrictions, tourist villages have emerged as alternative destinations that provide an open, safe atmosphere, aligning with the trends of experiential tourism and sustainable tourism [24]. With these characteristics, tourist villages are a primary focus in the regional economic recovery strategy, in harmony with the sustainable development agenda (SDGs), particularly in creating decent jobs, reducing inequalities, and building sustainable communities.



**Figure 2.** The Total Amount of Tourism Village between 2018 - 2024

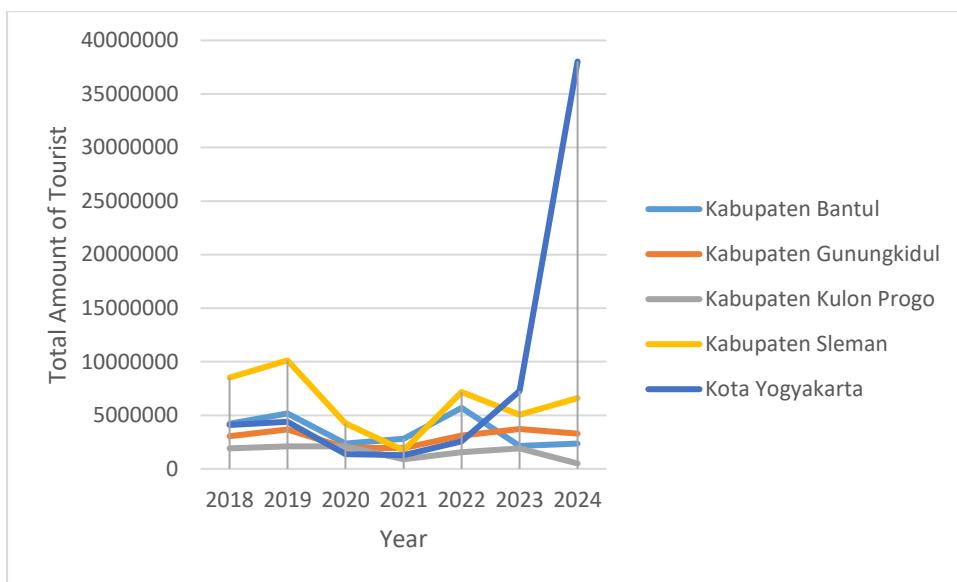
Consequently, tourist villages can serve as a primary policy strategy for enhancing local revenue from the tourism sector in DIY [25]. The local government can strengthen the role of tourist villages by providing support in the form of destination management assistance, enhancing the capacity of human resources in tourism, and ensuring the provision of essential infrastructure such as road access, digital promotion, and sanitation facilities. Furthermore, the integration of tourist villages with other sectors such as agriculture, creative industries, and education can create a broader multiplier effect. This policy is also aligned with the national development direction that positions tourism as a key driver of regional economic growth. Practically, tourist villages facilitate a more equitable distribution of economic benefits, as the direct profits are enjoyed by the local community rather than being concentrated in large commercial destinations. Thus, the development of tourist villages not only boosts local

revenue but also strengthens community empowerment, social-economic resilience, and environmental sustainability [26]. In the long term, a policy focus on tourist villages can become a cornerstone of sustainable tourism in DIY, enabling it to confront global challenges such as fluctuations in tourist visits, disruptions due to health crises, and changing tourist preferences that increasingly emphasize authentic experiences and sustainability.



**Figure 3.** The Total Number of Tourists from 2018 to 2024

The increase in the number of tourist villages has led to an increase in the number of tourists, which has increased PAD. The increase in the number of tourists by 1% affects the increase in the number of PAD in the tourism sector by 0.5%. The increase in the number of tourist villages has led to a rise in the number of visitors, ultimately impacting the increase in local revenue (PAD). Analysis results indicate that each 1% increase in the number of tourists correlates with a 0.5% rise in tourism sector PAD. This underscores the high elasticity of the DIY tourism sector in response to fluctuations in visitor numbers, as illustrated in Figure 3. Tourists contribute not only through entrance fees to destinations but also through various other economic activities such as food and beverage consumption, accommodation, transportation, souvenir shopping, and tourism support services [27]. Furthermore, tourists play a crucial role in fostering a creative economic ecosystem. For instance, the increase in visits to tourist villages stimulates the growth of local SMEs, expands job opportunities, and enhances the demand for regional arts, culture, and culinary products. Consequently, the effects generated are characterized by a multiplier effect, where a single tourist visit can trigger a series of economic transactions that significantly contribute to PAD. This trend has become increasingly evident in the post-COVID-19 pandemic period, when mobility restrictions suppressed tourist visits and led to a drastic decline in PAD [28]. However, the recovery period (2022–2024) has shown a rapid surge in tourist numbers, driven by massive promotions, the development of tourist villages, and the public's preference for experience-based and sustainable destinations. This indicates that the presence of tourist villages not only increases the quantity of visits but also enhances the quality of tourist spending, ultimately amplifying the contribution to PAD in the tourism sector.



**Figure 4.** The Total Amount of Museum 2018 in 2024

Furthermore, the increase in the number of museums also contributes to the local revenue in the tourism sector, as shown in Figure 4. Analysis results indicate that each additional museum unit can enhance local revenue by 0.077%. This can be understood as museums serve a dual purpose, acting as educational tourist destinations while also preserving culture and history. The existence of museums enriches the diversification of DIY tourism products, which does not solely rely on natural or recreational tourism but also emphasizes education, research, and cultural aspects [10]. The contribution of museums to local revenue is strategic as it encourages tourists with specific interests, such as students, researchers, and international visitors who are interested in local history and culture. Visits to museums tend to increase the length of stay for tourists, as they are often combined with visits to other destinations near the museum location [29]. This implies that the economic impact arises not only from entrance fees but also from increased tourist spending on accommodation, food, and transportation. In the context of the post-COVID-19 pandemic, museums are beginning to receive renewed attention as they offer interactive learning spaces along with safer and more controlled tourism experiences. The digitization of collections and virtual exhibitions also broadens promotional reach, which ultimately has the potential to attract more physical visits. Thus, the growth in the number of museums not only adds variety to tourist destinations but also strengthens the competitiveness of DIY as a center for cultural and educational tourism in Indonesia.

#### 4. CONCLUSION

This research aims to analyze the impact of the number of tourists, tourist villages, tourist attractions, and museums on the local revenue (PAD) of the tourism sector in the DIY region, utilizing a panel data approach with the Fixed Effect Model method. The findings indicate that three variables, namely, the number of tourist villages, the number of tourists, and the number of museums, significantly influence the increase in PAD for the tourism sector. In contrast, the variables of natural and historical tourist attractions do not show a substantial effect. This discovery emphasizes that community-based tourism development strategies through tourist villages, enhancing service quality to attract tourists, and strengthening educational and cultural tourism through museums are key factors that can drive PAD growth in DIY. From a methodological perspective, this study contributes to the enrichment of the literature by combining panel regression analysis and spatial mapping, thereby providing a more

comprehensive empirical picture of the determinants of PAD in the tourism sector at the district/city level. The results are not only relevant for local policymakers but also add value to the study of social sciences and regional economics, particularly in understanding the interconnections between socio-demographic factors, tourism infrastructure, and local fiscal performance. However, this research has limitations regarding the variables used, which focus more on quantitative aspects and have not sufficiently accommodated qualitative factors such as service quality, tourist satisfaction, or the role of tourism digitalization. Therefore, future research has the opportunity to explore additional variables and employ a mixed methods approach to produce a more in-depth analysis. Consequently, the results of this study are expected to serve as a foundational step in formulating more adaptive, inclusive, and sustainable tourism policies in the Special Region of Yogyakarta.

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