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# Analyzing Economic Resilience of Rural Tourism in Indonesia Using Synthetic Composite Index

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**Abstract**

**Research Originality:** This study used a new method, namely the Adjusted Mazziotta-Pareto Index (AMPI) to measure and categorize economic resilience using clustering analysis. In addition, the innovative method had not been previously applied to tourism resilience in Indonesia, making this study the first to measure tourism village resilience.

**Research Objectives:** This study aimed to analyze economic resilience of tourism village destinations in Indonesia from 2019 to 2022 during the COVID-19 pandemic.

**Research Methods:** The procedures were carried out using a quantitative method to determine resilience index of tourism village in Indonesia during the COVID-19 pandemic. Data were obtained from form management documents as well as 24 tourism villages across Java, Bali, and West Nusa Tenggara Provinces.

**Empirical Results:** The results showed that the majority of villages were significantly impacted in the initial year of COVID-19, but were able to recover, demonstrating strong capacity and performance in recovering from the pandemic shock. In addition, economic aspects of capacity and performance showed high adaptability after the pandemic, indicating relative resilience to the shock.

**Implications:** The results of this study could inform policies to enhance tourism village resilience in Indonesia.

**Keywords:**

adjusted mazziotta-pareto index (AMPI); economic resilience; rural development; rural tourism

**How to Cite:**

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## INTRODUCTION

Rural tourism, also known as tourism village, is a series of activities that have been proven to be an essential dimension of rural development (Liu et al., 2023; Shi et al., 2022; Huang et al., 2023; Jamini & Dehghani, 2022; Bayrak, 2022; Stepanova et al., 2023). These activities are also considered innovative for overcoming various problems in rural areas and facilitating sustainable development (Lv et al., 2021). Several studies reported that tourism villages had developed into a new element and kinetic energy for revitalization and development (Neumeier & Pollermann, 2014). Despite believing in its vital role, some parties argue that tourism is vulnerable to various pressures and disruptions (C. Huang et al., 2021; Qin & Chen, 2022; Gallego & Font, 2019). These include financial crises (Chan, 2011), social disruption (Kılıçlar et al., 2018), natural disasters (Rosselló et al., 2020), political conflicts (Zhou et al., 2021), and pandemics (Altuntas & Gok, 2021). The sector vulnerability is closely related to the structure and function of the system, which is easily damaged due to the inability to adapt quickly to disturbances originating from in and outside the system (Qin & Chen, 2022).

According to previous studies, the COVID-19 outbreak from 2020 to 2022 has exerted immense pressure on global tourism (Gössling et al., 2020), leading to an unprecedented crisis (Marco-Lajara et al., 2022). UNWTO recognized 2020 as the worst year in the industry due to a disturbing crisis with significant impacts (Mazilu et al., 2023). The pandemic mainly affected tourism compared to other industries (Henseler et al., 2022) and was the last sector to recover (OECD, 2020). In addition, it was among the first sectors to experience the flagrant consequences of the COVID-19 crisis (Lamhour et al., 2023), with varying levels of impact (Jamini & Dehghani, 2022). The pandemic also raised awareness about the importance of paying particular attention to resilience in facing various external tensions and shocks (Higgins-Desbiolles, 2020; Feng et al., 2021; Hu et al., 2021; Ohe, 2022; Ibanescu et al., 2022). Resilience is an important variable in facilitating the sector's recovery (Pocinho et al., 2022) and maintaining the sustainability of rural tourism (Yu et al., 2023). In addition, it indicates a system's ability to cope and adapt positively to future social and ecological changes (Heslinga et al., 2020) and return to normal conditions after an event that disrupts its state (Hosseini et al., 2016). Several studies also showed that resilience was related to events that caused risks and shocks to a system. Risks are the possibility of adverse events and negative consequences, while shocks occur when risks become a reality (OECD, 2014). Resilience also provides a valuable framework for building bridges between emergencies, contingencies, competitiveness, and sustainable development (Béné et al., 2014).

Since the 21st century, resilience has increasingly become accepted as a framework for understanding world systems, including tourism. Studies exploring this framework in the context of tourism have also experienced growth in complexity and comprehensiveness (Ibanescu et al., 2020). These studies consistently focused on tourism resilience to climate change (Dogru et al., 2019), community resilience, and the importance of involving community leaders with local knowledge to build destination resilience (Kwok et al., 2016), tourism resilience and recovery from COVID-19 (McCartney et al., 2021),


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resilience and welfare of households that base the livelihoods on tourism (Munanura et al., 2021), communities in tourism village (Lew et al., 2016), the impact of COVID-19 on rural resilience (Yu et al., 2023), and tourism village in Japan during the new normal (Ohe, 2022).

Despite the availability of studies on tourism resilience, there still needs to be gaps in assessing resilience and accounting for temporal fluctuations in tourism shocks (Lamhour et al., 2023). Several reports, such as those conducted by Gaki and Koufodontis (2022), used the resistance index to measure regional tourism resilience using statistical data. Cirer Costa (2024) and (Manner-Baldeon et al., 2024) also focused on community resilience. Therefore, this study measures tourism villages at the destination scale by integrating temporal variations of resilience indicators. A novel method, the Adjusted Maziotta-Pareto Index (AMPI), was introduced to evaluate tourism village resilience based on temporal changes. This research is the first study in Indonesia to address the gap in tourism resilience measurement in the context of tourism villages.

As a nation with abundant potential for rural tourism, the proliferation of tourism villages in Indonesia is anticipated to bolster rural tourism's contribution to enhancing economic growth, fostering community welfare, and conserving nature and rural heritage (Ariyani & Fauzi, 2023). Consequently, the results hold the potential to serve as a guiding framework for fortifying tourism village resilience in Indonesia when confronting various shocks and risks. The results can also be extrapolated to regions sharing similar characteristics to facilitate broader applications beyond Indonesian borders.

## METHODS

This study used a quantitative method that focused on tourism villages as participants. It aimed to analyze the economic resilience of tourism villages in Indonesia during the COVID-19 pandemic over different periods and whether there were discernible patterns in village resilience. Economic resilience in this study was defined as the tourism village's ability to maintain and improve performance while facing COVID-19. The parameters to measure the resilience index consisted of the capacity and performance dimensions, which were proxies for the phenomenon of tourism village. These parameters were determined based on focused group discussions with tourism village managers. The capacity dimension was related to resources that were part of the tourism village system, and the performance dimension was related to the results of the work of the tourism village during and after the disturbance occurred. Indicators of capacity and performance dimension are presented in Table 1.

The data used in this study was obtained from tourism village management documents. Twenty-four tourism villages scattered in Java, Bali, and West Nusa Tenggara Provinces were analyzed. The selection process employed a purposive sampling method based on the following criteria: availability of data, presumably impacted by the COVID-19 shock, considered to have an economic and social impact on rural economics, and represented tourism destinations in the three main islands of tourism in Indonesia.

A composite index was used to measure tourism village resilience. This method was appropriated for measuring concepts that one indicator could not capture (Scaccabarozzi et al., 2022), such as tourism. Mazziotta and Pareto (2013) stated that several socio-economic phenomena, including tourism, could not be measured with a single descriptive indicator but must be represented through several dimensions or a combination of different dimensions, with varying degrees, which must be robust. Composite indexes were a valid method for measuring multidimensional phenomena because they allowed the reduction and consideration of different dimensions of a phenomenon (Mazziotta & Pareto, 2017a; Mazziotta & Pareto, 2017b).

**Table 1. Resilience Economic Indicators of Tourism Village**

| Parameters | |
|---|---|
| **Capacity** | **Performance** |
| • Capacity building: number of training conducted in a year (times) | • Tourist: number of tourists during the year (person) |
| • Employee: number of employees in a year (person) | • Income: total income for a year (IDR) |
| • Village Development Index (VDI): index to maintain villages' potential and ability to achieve sustainable development and prosper village life covering social, economic, and ecological aspects (district) | • Cost: total cost for a year (IDR) |

In this study, tourism village resilience was measured using a synthetic indicator known as AMPI, developed by Mazziotta and Pareto (2016). This index was carried out with a spatiotemporal method, which had additional benefits over purely spatial or time-series analyses because it allowed the investigator to simultaneously study the persistence of patterns over time and illuminate any unusual patterns. Including space-time interaction terms could also detect data clustering that could indicate emerging environmental hazards or persistent errors in the data recording process.

AMPI was a variant of the Maziotta-Pareto Index (MPI), developed by Mazziotta and Pareto (2013). MPI was a formative composite index summarizing a series of indicators that were considered irreplaceable; all components must be balanced (de Muro et al., 2011). In addition, it was based on a non-linear function starting from the arithmetic mean, introducing a penalty for units with unbalanced indicator values. The index was designed to meet the following characteristics: (1) normalization of indicators with special criteria that removed units of measurement and effects of variability, (2) independent synthesis of ideal units, since the set of optimal values was arbitrary, non-univocal and could vary over time, (3) easy calculation, and (4) easy interpretation (Mazziotta & Pareto, 2016)..

AMPI was a non-compensatory composite index that allowed comparability of the data across units and over time. The method started with normalizing data or indicators using the following formula:


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$$r_{ij} = \left[\frac{(x_{ij} - Minx_j)}{Maxx_j - Minx_j}\right] * 60 + 70$$

In this study, $x_{ij}$ represented a matrix of n rows which contained unit analysis, and m columns containing indicators. $max_{xj}$ and $Min_{xj}$ were the goalspots for indicator j. Such a normalization was a refinement of MPI designed to appreciate absolute changes over time (Mazziotta & Pareto, 2104). The range of normalization was varied between 70 and 130. When $M_{ri}$ and $S_{ri}$ were denoted as mean and standard deviation of normalized value of unit i, respectively, the generalized form of AMPI was given by the following equation:

$$AMPI_i^{+/-} = M_{ri} \pm S_{ri}cv_i$$

In the equation, $cv_i = S_{ri}/M_{ri}$ represented the coefficient of variation of the unit *i*. The sign $\pm$ indicated whether the phenomenon to be measured was maximized (the higher, the better) or minimized (the lower, the better).

As previously mentioned, AMPI needed a "goalspot" to facilitate interpretation of the results. The reference point of 100, which was the average indicator in a given year, was employed. The higher or lower AMPI value than this reference point indicated whether the unit being analyzed was progressing or regressing. In this case, whether the units were more resilient or vice versa, the procedure to set the goalspot included the following:

$$Ref_{x_j \pm \Delta} \text{ where } \Delta = \frac{(Sup_{x_j} - Inf x_j)}{x}$$

$Sup_{xj}$ and $Inf_{xj}$ represented the maximum and the minimum of indicator $j$ across all periods and the reference value of indicator $j$ (Mazziotta & Pareto, 2017a).

In addition to AMPI, this study used the traditional MPI to compare resilience level of tourism village without using "goalspot" years, such as those used in AMPI. Therefore, MPI measured the level of resilience independent of time (year), indicating that MPI score was calculated for every year from 2019 to 2022.

In AMPI, the calculation of MPI also involved normalizing the data through the z-score method. The formula for normalizing the matrix was in the form of:

$$z_{ij} = 100 + \frac{(x_{ij} - M_{xj})}{S_{xj}} 10$$

Where:
$x_{ij}$ = original matrix value
$M_{xj}$ = average value of the indicator (individual column)
$S_{xj}$ = standard deviation of the indicator (individual column)

Once the normalized values had been calculated, the next step of MPI was to find the aggregation of the index using the following formula:

$$MPI^{+/-} = M_{Zi} \pm S_{Zi}cv_i$$

Where:
$M_{zi}$ = mean value of the standardized values (horizontally)
$S_{zi}$ = standard deviation of the standardized value (horizontally)
$cv_i$ = coefficient of variation of the standardized

The plus or minus signs in the formula were due to the polarity of the indicators concerning one of the phenomena under study.

In order to capture resilience from COVID-19 shock, the data were collected from 2019 (pre-COVID-19) to 2022 (during and after COVID-19). The original data for all indicators during 2019-2022 from 24 tourism villages, which were the basis for calculating AMPI/MPI, were presented in Appendix A to D.

## RESULTS AND DISCUSSION

Before the onset of the COVID-19 pandemic, tourism villages in Indonesia were experiencing promising growth. This growth was evidenced by the emergence of numerous new tourism destinations and the expansion of tourism villages as operators in various regions. Indonesian tourism villages reached 1,831 before the COVID-19 pandemic (Ariyani et al., 2023). However, following the government's official declaration in March 2020 that Indonesia was impacted by the pandemic and the subsequent implementation of large-scale social restrictions, tourism destinations in Indonesia witnessed a significant decrease in visitors and income (Sasongko et al., 2022). Despite these challenges, some tourism villages managed to recover, as indicated by the results of this study.

Table 2 illustrates that one year after the pandemic, all tourism villages experienced a decline in performance, as indicated by a decrease in AMPI scores. The delta (Δ) score from 2019-2020 reflected the changes in the resilience index of 24 tourism villages during this period, which was the most critical for the tourism village sector. Villages examined experienced a decrease in resilience index (negative delta AMPI). However, the impact varied among villages, with some experiencing a minor decrease in resilience scores while others were significantly affected.

From 2019 to 2020, Pentingsari Tourism Village experienced the most significant decline in the resilience index compared to all villages. The government's travel ban policy led to a substantial decrease in tourism arrivals. As a result, villages known for rural and agricultural cultural attractions decided to suspend the services to avoid incurring costs that outweighed the income. Despite abruptly declining visitor numbers and revenue, several other tourism villages were selected to remain open. Some villages continued the operations to uphold tourism village status, engaging in activities like staff training and facility maintenance.

When comparing the 2019-2022 and 2021-2022, significant differences were observed in the tourism resilience index. In 2020-2021, following the COVID-19 pandemic, nearly all villages, except for Tambaksari Village, displayed a notable recovery as evidenced by positive changes in AMPI scores (positive delta AMPI). The result suggested that during this time frame, tourism village successfully adjusted to the challenges posed by the pandemic. The overall increase in the resilience index could be attributed to the implementation of health protocols in the tourism sector (CHSE Protocol), service-related training during the new normal, and adapting tourism destinations into digital formats through travel packages. Digital tourism was introduced to cater to visitors who could


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not physically visit or were concerned about COVID-19 transmission. Furthermore, government policy's gradual reopening of tourism activities further supported the recovery, leading to a gradual rise in visitor numbers.

According to Table 2, the largest rise in the resilience index was observed in Karangrejo Village between 2020 and 2021. Karangrejo was known for its community-based tourism offerings, focusing on rural and agricultural cultural experiences. With strong community backing, particularly in providing accommodation and adherence to CHSE protocol for visitor health safety, this village had effectively increased visitor numbers, improving other resilience metrics.

**Table 2. Comparison of Tourism Village Resilience Index Pre to During the COVID-19 Pandemic**

| Tourism Village | AMPI | | | | | |
|---|---|---|---|---|---|---|
| | 2019 | 2020 | $\Delta_1$ | 2020 | 2021 | $\Delta_2$ |
| Pentingsari | 107,543 | 92,728 | -14.815 | 92,728 | 99,363 | 6.635 |
| Karangrejo | 103,401 | 94,608 | -8.793 | 94,608 | 108,836 | 14.228 |
| Wanurejo | 99,358 | 96,037 | -3.321 | 96,037 | 99,233 | 3.196 |
| Bleberan | 103,293 | 102,091 | -1.202 | 102,091 | 101,050 | 1.041 |
| Tinalah | 98,628 | 92,423 | -6.205 | 92,423 | 101,606 | 9.183 |
| Gunung Gajah | 96,659 | 95,469 | -1.19 | 95,469 | 96,610 | 1.368 |
| Pulau Cemara | 97,094 | 95,242 | -1.852 | 95,242 | 98,471 | 3.229 |
| Mandiraja | 96,557 | 95,666 | -0.891 | 95,666 | 95,744 | 0.078 |
| Wana Wisata | 99,879 | 97,276 | -2.603 | 97,276 | 102,027 | 4.751 |
| Tlogoweru | 99,090 | 94,181 | -4.909 | 94,181 | 95,247 | 1.066 |
| Wonosari | 96,174 | 95,931 | -0.243 | 95,931 | 99,775 | 3.844 |
| Tlogowero | 98,003 | 95,103 | -2.9 | 95,103 | 97,693 | 2.59 |
| Bilebante | 104,705 | 94,876 | -9.829 | 94,876 | 100,928 | 6.052 |
| Tambaksari | 98,129 | 96,477 | -1.652 | 96,477 | 96,436 | -0.041 |
| Pampang | 96,381 | 94,768 | -1.613 | 94,768 | 97,326 | 2.558 |
| Bendolawang | 97,041 | 94,443 | -2.598 | 94,443 | 95,986 | 1.543 |
| Malangjiwan | 101,882 | 97,627 | -4.255 | 97,627 | 107,394 | 9.767 |
| Beji | 99,838 | 96,154 | -3.684 | 96,154 | 96,206 | 0.052 |
| Tetebatu | 104,052 | 98,319 | -5.733 | 98,319 | 107,203 | 8.884 |
| Sade | 100,603 | 96,692 | -3.911 | 96,692 | 101,590 | 4.898 |
| Bonjeruk | 99,790 | 95,858 | -3.932 | 95,858 | 102,940 | 7.082 |
| Hanjeli | 97,321 | 96,095 | -1.226 | 96,095 | 95,607 | 0.488 |
| Tepus | 96,584 | 94,218 | -2.366 | 94,218 | 98,353 | 4.135 |
| Cibuntu | 97,597 | 93,544 | -4.053 | 93,544 | 98,162 | 4.618 |

Source: AMPI Analysis

Table 3 compared AMPI scores representing resilience levels before, during, and after the COVID-19 pandemic, spanning from 2019 to 2022, using 2022 as a reference point. Analysis from Table 7 revealed a notable overall increase in AMPI scores leading up to 2022, which signaled a robust recovery trend post-shock. This trend indicated

that tourism villages had effectively adapted to the challenges posed by COVID-19 and could be considered fully recovered. Among these villages, Karangrejo stood out for its exceptional resilience, as evidenced by the significant positive change in Delta values. The success of Karangrejo could be attributed to the strategic partnerships, particularly with State-Owned Enterprises, which established the Village Economic Center (Balkondes).

Furthermore, the Tourism Awareness Group (Pokdarwis) played a pivotal role in enhancing resilience to the pandemic. The synergy between these entities fostered creativity, driving increased visitor arrivals. The village's strong community engagement in offering homestays and other amenities aligned with health protocols further boosted visitor numbers and revenue performance. These achievements underscored the effective implementation of community-based tourism, successfully navigating external disruptions. Karangrejo's accomplishments had been recognized by the Indonesian government, earning it an award as a sustainable tourism village.

**Table 3. Comparison of Tourism Village Resilience Index Post the COVID-19 Pandemic**

| Tourism Village | AMPI | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2019 | 2022 | $\Delta_1$ | 2020 | 2022 | $\Delta_2$ | 2021 | 2022 | $\Delta_3$ |
| Pentingsari | 107,543 | 118,566 | 11.023 | 92,728 | 118,566 | 25.838 | 99,363 | 118,566 | 19.203 |
| Karangrejo | 103,401 | 130,491 | 27.09 | 94,608 | 130,491 | 35.883 | 108,836 | 130,491 | 21.655 |
| Wanurejo | 99,358 | 112,524 | 1.166 | 96,037 | 112,52 | 16.487 | 99,233 | 112,524 | 13.291 |
| Bleberan | 103,293 | 114,805 | 11.512 | 102,091 | 114,805 | 12.714 | 101,050 | 114,805 | 13.755 |
| Tinalah | 98,628 | 120,395 | 21.767 | 92,423 | 120,395 | 27.972 | 101,606 | 120,395 | 18.789 |
| Gunung Gajah | 96,659 | 109,813 | 13.154 | 95,469 | 109,813 | 14.344 | 96,610 | 109,813 | 13.203 |
| Pulau Cemara | 97,094 | 112,095 | 15.001 | 95,242 | 112,095 | 16.853 | 98,471 | 112,095 | 13.624 |
| Mandiraja | 96,557 | 109,006 | 12.449 | 95,666 | 109,006 | 13.34 | 95,744 | 109,006 | 13.262 |
| Wana Wisata | 99,879 | 115,969 | 16.09 | 97,276 | 115,969 | 18.693 | 102,027 | 115,969 | 13.942 |
| Tlogoweru | 99,090 | 110,458 | 11.368 | 94,181 | 110,458 | 16.277 | 95,247 | 110,458 | 15.211 |
| Wonosari | 96,174 | 113,914 | 17.74 | 95,931 | 113,914 | 17.983 | 99,775 | 113,914 | 14.139 |
| Tlogowero | 98,003 | 110,091 | 12.455 | 95,103 | 110,091 | 14.988 | 97,693 | 110,091 | 12.398 |
| Bilebante | 104,705 | 120,750 | 16.045 | 94,876 | 120,750 | 25.874 | 100,928 | 120,750 | 19.822 |
| Tambaksari | 98,129 | 111,619 | 13.49 | 96,477 | 111,619 | 15.142 | 96,436 | 111,619 | 15.183 |
| Pampang | 96,381 | 112,194 | 15.813 | 94,768 | 112,194 | 17.426 | 97,326 | 112,194 | 14.868 |
| Bendolawang | 97,041 | 109,545 | 12.504 | 94,443 | 109,545 | 15.102 | 95,986 | 109,545 | 13.559 |
| Malangjiwan | 101,882 | 124,144 | 22.262 | 97,627 | 124,144 | 26.517 | 107,394 | 124,144 | 16.75 |
| Beji | 99,838 | 109,628 | 9.79 | 96,154 | 109,628 | 13.474 | 96,206 | 109,628 | 13.422 |
| Tetebatu | 104,052 | 120,301 | 16.249 | 98,319 | 120,301 | 21.982 | 107,203 | 120,301 | 13.098 |
| Sade | 100,603 | 118,571 | 17.968 | 96,692 | 118,571 | 21.879 | 101,590 | 118,571 | 16.981 |
| Bonjeruk | 99,790 | 124,534 | 24.744 | 95,858 | 124,534 | 28.676 | 102,940 | 124,534 | 21.594 |
| Hanjeli | 97,321 | 109,075 | 11.754 | 96,095 | 109,075 | 12.98 | 95,607 | 109,075 | 13.468 |
| Tepus | 96,584 | 113,240 | 16.656 | 94,218 | 113,240 | 19.022 | 98,353 | 113,240 | 14.887 |
| Cibuntu | 97,597 | 111,961 | 14.364 | 93,544 | 111,961 | 18.417 | 98,162 | 111,961 | 13.799 |

Source: AMPI Analysis


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Table 4 displays the resilience index calculated through the traditional MPI method. Unlike AMPI, MPI evaluated the resilience of individual units (tourism villages) for each year without setting a specific target year like 2022. As illustrated in Table 4, Pentingsari Village achieved the highest MPI score, while Wonosari Village scored the lowest. The high resilience index of Pentingsari could be attributed to the relatively high income than other tourism villages. In 2019, Pentingsari was a popular tourism spot known for the environmentally friendly theme tourism, which was in high demand before the COVID-19 pandemic. However, in 2020, Pentingsari had to cease operations based on a decrease in visitor numbers caused by the rapid spread of COVID-19 and government-imposed restrictions on outdoor activities, as detailed in the preceding section.

Table 4 illustrates that the effects of COVID-19 were experienced diversely among villages, as evidenced by the fluctuation in MPI rankings from 2019 to 2022. The shift in MPI scores rankings was linked to how villages responded to COVID-19 policies, including restricted mobility and stringent travel protocols. Therefore, tourism village resilience was shaped by the capacity to adapt, innovate, and cooperate with partners, influencing public trust in engaging in tourism activities during a pandemic.

**Table 4. Resilience Index 2019-2022 Use MPI Method**

| Tourism Village | MPI | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2019 | Rank | 2020 | Rank | 2021 | Rank | 2022 | Rank |
| Pentingsari | 116 | 1 | 96 | 19 | 101 | 10 | 99 | 3 |
| Karangrejo | 104 | 5 | 104 | 4 | 110 | 1 | 97 | 4 |
| Wanurejo | 99 | 10 | 100 | 7 | 99 | 12 | 94 | 8 |
| Bleberan | 106 | 2 | 111 | 2 | 103 | 5 | 94 | 9 |
| Tinalah | 99 | 12 | 103 | 5 | 102 | 6 | 96 | 5 |
| Gunung Gajah | 96 | 18 | 98 | 15 | 95 | 20 | 92 | 16 |
| Pulau Cemara | 94 | 23 | 97 | 17 | 96 | 17 | 89 | 21 |
| Mandiraja | 95 | 22 | 95 | 20 | 93 | 22 | 92 | 15 |
| Wana Wisata | 99 | 9 | 97 | 16 | 101 | 8 | 92 | 18 |
| Tlogoweru | 95 | 19 | 92 | 24 | 92 | 24 | 87 | 24 |
| Wonosari | 93 | 24 | 98 | 14 | 97 | 15 | 88 | 23 |
| Tlogowero | 98 | 13 | 98 | 13 | 98 | 14 | 92 | 19 |
| Bilebante | 106 | 3 | 100 | 6 | 101 | 9 | 100 | 2 |
| Tambaksari | 97 | 15 | 98 | 11 | 96 | 19 | 94 | 7 |
| Pampang | 95 | 20 | 98 | 12 | 97 | 16 | 93 | 14 |
| Bendolawang | 95 | 21 | 93 | 23 | 95 | 21 | 92 | 17 |
| Malangjiwan | 102 | 6 | 112 | 1 | 109 | 2 | 95 | 6 |
| Beji | 101 | 7 | 100 | 9 | 96 | 18 | 89 | 22 |
| Tetebatu | 105 | 4 | 108 | 3 | 108 | 3 | 93 | 13 |
| Sade | 100 | 8 | 100 | 8 | 101 | 7 | 93 | 11 |
| Bonjeruk | 99 | 11 | 99 | 10 | 103 | 4 | 103 | 1 |
| Hanjeli | 96 | 17 | 94 | 22 | 93 | 23 | 89 | 20 |
| Tepus | 97 | 16 | 96 | 18 | 99 | 11 | 93 | 12 |
| Cibuntu | 97 | 14 | 95 | 21 | 98 | 13 | 93 | 10 |

Source: MPI Analysis

Although Pentingsari performed well in 2019, the village faced significant challenges when COVID-19 emerged, which led to an abrupt decline in its MPI score from initial place in 2019 to 19th place in 2020. The same year, Malangjiwan emerged as a tourism village with the highest MPI score. The primary attraction of Malangjiwan was the natural spring water therapy, which included elevated pH and oxygen levels (reaching pH 7.5), set amidst picturesque views of rice fields near Mount Merapi, known as Umbul Brintik. Approximately 90% of visitors did not seek only pure water tourism but also a relaxing health retreat. The alignment of this product and the health-focused pandemic context has made Malangjiwan a highly appealing destination. The substantial visitor numbers and revenue generation drove the village's strong resilience index.

In 2021, Karangrejo tourism village stood out as a destination with the highest resilience index. Managed by Balkondes and Pokdarwis, the village actively promoted tour packages showcasing local life and attractions that captivated tourists. Government policies supported the implementation of the CHSE protocol for tourism sites and contributed to its success. Village's commitment to cleanliness and environmental preservation was noteworthy, which led to its designation as a model clean village, a community-wide effort. Additionally, Karangrejo offered meeting rooms, culinary experiences, and hotel and homestay accommodations for out-of-town visitors.

In 2022, Bonjeruk secured the top rank in the resilience index. This village exemplified how the efficiency of financing, alongside income, played a crucial role in determining the resilience of a tourism destination. Bonjeruk Village offered cultural and historical tourism experiences, showcasing rural landscapes, unique culinary delights, and a serene environment that allowed visitors to unwind amidst nature and rich traditions. Following the relaxation of tourism restrictions by the government and the gradual decline of the pandemic, this destination has emerged as a popular choice for tourists locally and internationally. As a result, visitor numbers in the village have surged by up to 300% while maintaining operational efficiency in staffing and costs.

The outcomes of AMPI analysis could be used to categorize tourism villages based on four key characteristics. These included (1) tourism village with a high resilience index (≥100) that experienced a decline during the COVID-19 pandemic (quadrant 1), (2) tourism village with a high and consistent resilience index during the COVID-19 pandemic (Quadrant 2), (3) tourism village with a low level of resilience heavily affected by the COVID-19 pandemic (Cluster 3 - C3), and (4) tourism village with a high level of resilience significantly impacted by the COVID-19 pandemic (Quadrant 4). The classification process was conducted using a X-Y diagram, as depicted in Figure 1.

According to Figure 1, there were 3 villages in Quadrant 1, 7 villages in Quadrant 2, 14 villages in Quadrant 3, and none in Quadrant 4. Tourism villages in Quadrant 2 were characterized by being well-established, having sufficient human resources, high motivation, and creativity. These villages also engaged in adequate capacity development and were situated in a district/subdistrict with a developing village index in the independent and advanced village category. In Quadrant 1, although the capacity was less stable than in Quadrant 2, the determination and creativity of


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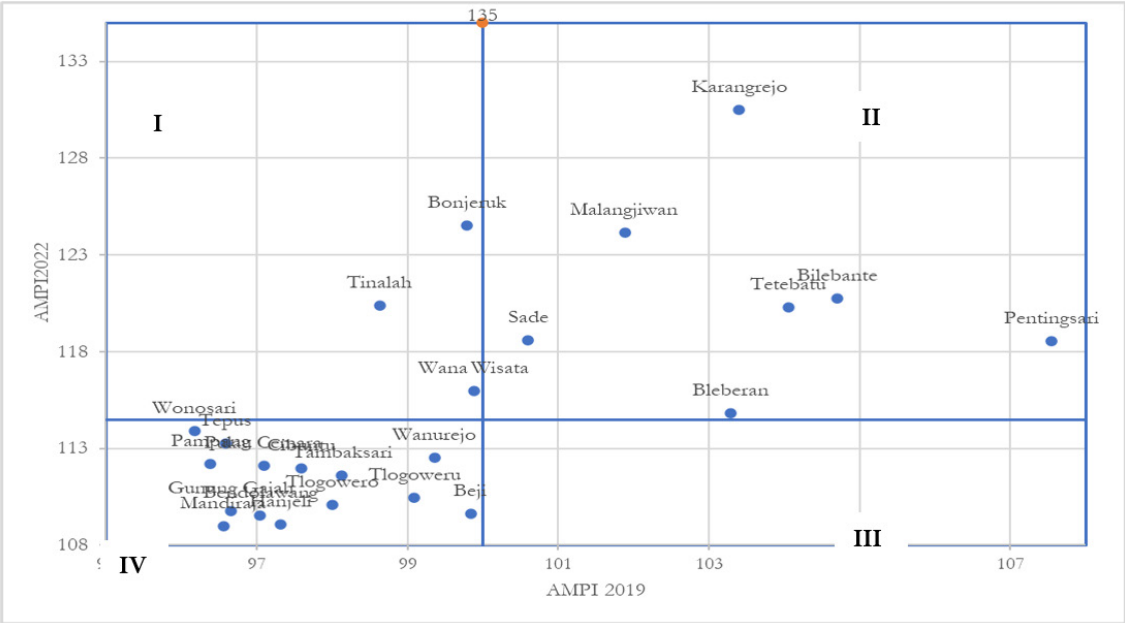
the managers led these villages to possess a high level of resilience. These tourism villages have implemented various strategies to address the challenges posed by the COVID-19 pandemic, particularly by embracing digital technology for promotion and development, which had emerged as a popular tool for capacity enhancement. These initiatives had successfully instilled public trust in visiting rural areas, as evidenced by the rising number of visitors.

**Figure 1. Tourism Village Typology Based on Resilience Category**




This study provided insight into two things from resilience analysis results using AMPI and the quadrant methods. First, understanding tourism village resilience could be presented more comprehensively through temporal variations before and after COVID-19. Temporal variations through synthetic indicators could describe the dynamics that occurred in performance indicators and the capacity of tourism villages to face shocks. Synthetic indicators were a way to combine multiple individual measurements into a single score that reflected the overall resilience of a tourism destination. These results help policymakers and tourism stakeholders understand a destination's strengths and weaknesses when dealing with disruptions. The individual indicators were then statistically combined into a single score. Using synthetic indicators had benefits in terms of providing a quick and easy way to compare the resilience of different destinations. It could also be used to track changes in resilience over time.

Second, quadrant mapping allowed the study to visualize the relative standing of each tourism village compared to the others. This comparative analysis was crucial for evaluating the current state of villages and the potential trajectories after absorbing the shock. Recognizing this perspective was essential for addressing identified weaknesses and gaining insights from the resilience demonstrated by other tourism villages during

challenging times. The quadrant mapping conducted in this study not only aids in enhancing the management of tourism villages but also serves as a valuable tool for local and national decision-makers to assess and enhance the resilience and sustainability of tourism village.

## CONCLUSION

This study aimed to assess tourism village resilience in facing the external shock of COVID-19 in different periods and analyze resilience patterns of tourism villages facing the COVID-19 pandemic. The synthetic composite index was selected as an easy-to-use tool to assess resilience, making it easy for policymakers to understand and allowing comparisons across regions and periods. This method was selected to evaluate tourism village resilience in developing countries such as Indonesia. Applying typology analysis through quadrant mapping could unveil resilience patterns across villages. This information served as a valuable foundation for tackling challenges in tourism villages. Quadrant mapping visually represented each village's relative position compared to others. In addition, it was a powerful tool for assessing the current state and the dynamic changes (temporal variations) that each village experiences. This analysis empowered policymakers to identify benchmarks – villages demonstrating relative resilience towards external shocks.

The results revealed that external shocks, such as the COVID-19 pandemic in the early years, significantly impacted most rural tourism destinations. However, creative village managers were able to recover relatively quickly. The results demonstrated that the tourism village was developing innovative ideas to adapt to the new normal. These included developing virtual travel packages using digital technology, human resources training about the pandemic and creative ways to deal with it, and improving infrastructure by focusing on health, cleanliness, safety, and environmental sustainability protocols.

These results implied that resilience was essential for future success in rural tourism management. Understanding the composite index and the indicators could help implement appropriate policy measures for rural tourism. The synthetic resilience indicators obtained from this study could be used to assess village-level tourism resilience and design more effective policy measures to increase resilience. Though it had advantages, this study showed several limitations, specifically in selecting capacity and performance component variables. Including more variables in both components could provide a more comprehensive understanding of the level of resilience and the components. Likewise, broadening the unit of analysis could allow better comparisons in assessing the resilience of rural tourism.

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# Appendix

**Appendix A. Original Indicator 2019**

| Tourism Village | Capacity Building | Employee | VDI | Tourist | Income (IDR 000) | Cost (IDR 000) |
|---|---|---|---|---|---|---|
| Pentingsari | 7 | 42 | 0.784 | 21.263 | 22.353.430 | 1.609.445 |
| Karangrejo | 10 | 11 | 0.702 | 7.694 | 1.891.371 | 862.902 |
| Wanurejo | 4 | 9 | 0.702 | 1.200 | 655.586 | 398.852 |
| Bleberan | 1 | 101 | 0.744 | 64.943 | 350.973 | 951.042 |
| Tinalah | 2 | 39 | 0.709 | 11.157 | 427.421 | 169.812 |
| Gunung Gajah | 1 | 6 | 0.682 | 20.655 | 56.700 | 67.500 |
| Pulau Cemara | 2 | 17 | 0.611 | 37.563 | 197.537 | 104.705 |
| Mandiraja | 1 | 15 | 0.660 | 12.000 | 40.000 | 55.000 |
| Wana Wisata | 1 | 7 | 0.649 | 93.231 | 753.428 | 963.610 |
| Tlogoweru | 10 | 6 | 0.599 | 500 | 12.000 | 15.000 |
| Wonosari | 0 | 17 | 0.610 | 47.395 | 664.956 | 103.309 |
| Tlogowero | 1 | 11 | 0.746 | 27.740 | 82.125 | 217.800 |
| Bilebante | 5 | 150 | 0.689 | 22.638 | 1.079.000 | 679.140 |
| Tambaksari | 4 | 16 | 0.666 | 6.291 | 85.740 | 72.400 |
| Pampang | 0 | 30 | 0.689 | 60 | 4.428 | 228 |
| Bendolawang | 2 | 26 | 0.657 | 418 | 2.150 | 3.500 |
| Malangjiwan | 0 | 19 | 0.661 | 20.608 | 1.610.249 | 615.133 |
| Beji | 5 | 25 | 0.752 | 6.500 | 32.000 | 112.000 |
| Tetebatu | 5 | 178 | 0.681 | 3.638 | 960.000 | 480.000 |
| Sade | 6 | 11 | 0.671 | 94.132 | 390.000 | 256.000 |
| Bonjeruk | 7 | 27 | 0.674 | 2.300 | 1.548.800 | 80.500 |
| Hanjeli | 2 | 25 | 0.657 | 1.400 | 65.000 | 85.000 |
| Tepus | 0 | 15 | 0.749 | 106 | 210.000 | 20.000 |
| Cibuntu | 1 | 10 | 0.709 | 28.964 | 354.295 | 201.879 |

**Appendix B. Original Indicator 2020**

| Tourism Village | Capacity Building | Employee | VDI | Tourist | Income (IDR 000) | Cost (IDR 000) |
|---|---|---|---|---|---|---|
| Pentingsari | 0 | 0 | 0.799 | 0 | 0 | 0 |
| Karangrejo | 0 | 11 | 0.720 | 5.930 | 757.500 | 812.053 |
| Wanurejo | 0 | 11 | 0.720 | 7.000 | 486.200 | 355.858 |
| Bleberan | 2 | 96 | 0.756 | 35.939 | 724.360 | 434.616 |
| Tinalah | 11 | 31 | 0.745 | 2.503 | 43.589 | 34.871 |
| Gunung Gajah | 0 | 9 | 0.706 | 31.671 | 98.190 | 95.703 |
| Pulau Cemara | 0 | 30 | 0.632 | 39.288 | 106.517 | 141.498 |
| Mandiraja | 0 | 20 | 0.665 | 15.000 | 75.000 | 60.000 |
| Wana Wisata | 2 | 7 | 0.662 | 19.004 | 175.600 | 155.314 |
| Tlogoweru | 1 | 6 | 0.607 | 50 | 2.000 | 1.500 |
| Wonosari | 1 | 17 | 0.623 | 36.045 | 440.582 | 102.408 |
| Tlogowero | 0 | 5 | 0.771 | 11.315 | 101.835 | 99.000 |
| Bilebante | 6 | 50 | 0.707 | 975 | 53.625 | 26.812 |
| Tambaksari | 2 | 16 | 0.738 | 6.459 | 76.120 | 66.000 |
| Pampang | 4 | 30 | 0.717 | 1.765 | 5.295 | 420 |
| Bendolawang | 0 | 17 | 0.660 | 65 | 650 | 800 |
| Malangjiwan | 0 | 19 | 0.701 | 132.832 | 1.062.658 | 985.251 |
| Beji | 2 | 25 | 0.793 | 3.800 | 76.000 | 68.000 |
| Tetebatu | 5 | 156 | 0.681 | 3.337 | 656.685 | 320.000 |
| Sade | 4 | 20 | 0.686 | 41.150 | 100.000 | 70.000 |
| Bonjeruk | 4 | 29 | 0.714 | 1.200 | 70.250 | 55.000 |
| Hanjeli | 1 | 15 | 0.647 | 950 | 70.000 | 50.000 |
| Tepus | 0 | 15 | 0.749 | 106 | 25.000 | 20.000 |
| Cibuntu | 0 | 10 | 0.730 | 0 | 0 | 0 |

**Appendix C. Original Indicator 2021**

| Tourism Village | Capacity Building | Employee | VDI | Tourist | Income (IDR 000) | Cost (IDR 000) |
|---|---|---|---|---|---|---|
| Pentingsari | 4 | 45 | 0.812 | 1.100 | 82.500 | 61.874 |
| Karangrejo | 11 | 12 | 0.724 | 6.192 | 1.048.052 | 927.398 |
| Wanurejo | 0 | 12 | 0.724 | 6.000 | 424.414 | 300.004 |
| Bleberan | 0 | 96 | 0.767 | 16.293 | 306.199 | 183.719 |
| Tinalah | 13 | 44 | 0.759 | 3.395 | 67.850 | 54.280 |
| Gunung Gajah | 0 | 5 | 0.709 | 19.505 | 61.798 | 61.107 |
| Pulau Cemara | 1 | 34 | 0.636 | 40.030 | 120.005 | 117.113 |
| Mandiraja | 0 | 10 | 0.665 | 10.000 | 50.000 | 45.000 |
| Wana Wisata | 2 | 8 | 0.669 | 46.813 | 561.860 | 335.82 |
| Tlogoweru | 2 | 6 | 0.638 | 100 | 4.000 | 6.000 |
| Wonosari | 1 | 17 | 0.627 | 48.153 | 488.063 | 83.321 |
| Tlogowero | 2 | 4 | 0.772 | 9.125 | 82.125 | 79.200 |
| Bilebante | 7 | 70 | 0.709 | 2.700 | 202.500 | 101.250 |
| Tambaksari | 0 | 16 | 0.740 | 4.202 | 51.100 | 62.000 |
| Pampang | 4 | 30 | 0.719 | 323 | 969 | 324.000 |
| Bendolawang | 1 | 17 | 0.729 | 128 | 1.500 | 1.280 |
| Malangjiwan | 0 | 21 | 0.724 | 107.060 | 856.528 | 684.963 |
| Beji | 0 | 12 | 0.793 | 760 | 15.000 | 14.860 |
| Tetebatu | 4 | 197 | 0.692 | 4.115 | 884.575 | 416.000 |
| Sade | 6 | 20 | 0.695 | 71.323 | 113.000 | 79.000 |
| Bonjeruk | 6 | 41 | 0.714 | 14.000 | 588.400 | 220.000 |
| Hanjeli | 1 | 15 | 0.655 | 500 | 40.000 | 33.000 |
| Tepus | 5 | 15 | 0.795 | 155 | 38.800 | 30.000 |
| Cibuntu | 1 | 10 | 0.754 | 17.181 | 146.905 | 112.500 |

**Appendix D. Original Indicator 2022**

| Tourism Village | Capacity Building | Employee | VDI | Tourist | Income (IDR 000) | Cost (IDR 000) |
|---|---|---|---|---|---|---|
| Pentingsari | 6 | 45 | 0.821 | 10.219 | 719.572 | 546.874 |
| Karangrejo | 15 | 18 | 0.749 | 12.006 | 2.8911 | 2.197.875 |
| Wanurejo | 0 | 9 | 0.749 | 20.000 | 655 | 333.008 |
| Bleberan | 0 | 84 | 0.796 | 18.524 | 350.973 | 210.583 |
| Tinalah | 15 | 44 | 0.802 | 9.009 | 427.421 | 406.049 |
| Gunung Gajah | 1 | 5 | 0.715 | 15.760 | 56.700 | 65.540 |
| Pulau Cemara | 2 | 30 | 0.658 | 29.091 | 197.537 | 107.910 |
| Mandiraja | 0 | 10 | 0.724 | 8.000 | 40.000 | 40.000 |
| Wana Wisata | 2 | 9 | 0.690 | 73.482 | 753.428 | 365.426 |
| Tlogoweru | 6 | 6 | 0.659 | 300 | 12.000 | 9.000 |
| Wonosari | 1 | 17 | 0.652 | 68.119 | 664.956 | 103.906 |
| Tlogowero | 1 | 4 | 0.772 | 9.125 | 82.125 | 79.200 |
| Bilebante | 5 | 100 | 0.796 | 13.000 | 1.079.000 | 431.600 |
| Tambaksari | 3 | 22 | 0.744 | 7.824 | 85.740 | 81.000 |
| Pampang | 5 | 30 | 0.760 | 1.476 | 4.428. | 396 |
| Bendolawang | 1 | 17 | 0.758 | 215 | 2.150 | 2.000 |
| Malangjiwan | 1 | 20 | 0.735 | 145.955 | 1.610.249 | 1.175.856 |
| Beji | 0 | 12 | 0.820 | 1.600 | 32.000 | 28.000 |
| Tetebatu | 2 | 176 | 0.770 | 6.257 | 960.000 | 448.000 |
| Sade | 5 | 20 | 0.722 | 110.540 | 390.000 | 273.000 |
| Bonjeruk | 9 | 62 | 0.758 | 32.000 | 1.548.800 | 816.600 |
| Hanjeli | 1 | 18 | 0.672 | 800 | 65.00 | 47.000 |
| Tepus | 4 | 24 | 0.817 | 909 | 210.000 | 168.000 |
| Cibuntu | 1 | 10 | 0.790 | 13.137 | 354.295 | 201.879 |


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