Analysis of economic structural change and its impact on community welfare in Bali province

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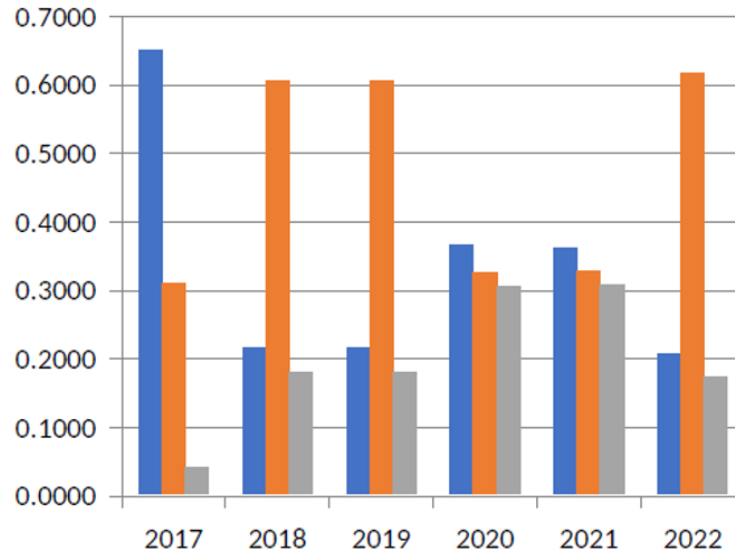
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Abstract: This study examines the economic structural changes and their impact on community welfare in Bali Province from 2017 to 2022. Structural change is assessed through sectoral contributions to GRDP, focusing on agriculture, tourism, and industry, and linked to welfare indicators such as the Gini ratio, poverty rate, wages, and employment absorption. This study employs the Adjusted Mazziotta Pareto Index (AMPI) as the analytical tool. Results show a significant shift in Bali's economic structure, with tourism becoming increasingly dominant and agriculture's share declining. This shift contributes to spatial welfare disparities, as only Denpasar City consistently falls into the high-welfare category, while most regencies remain in the low-welfare category. Persistent inequality and poverty hinder the improvement of equitable welfare. The study emphasizes the importance of economic diversification, revitalizing agriculture and local industries, and enhancing human capital development. Policy recommendations include reducing interregional disparities through balanced investment, developing the creative economy, and enhancing the empowerment of rural communities. Academically, this research advances the application of AMPI in regional development studies, while practically offering guidance for inclusive and sustainable economic policy in Bali.

Keywords: Community welfare, Economic structure, Income inequality.

1. Introduction

The economy of Bali possesses unique characteristics, with the tourism sector serving as the primary driver of regional development. The tertiary sector, particularly accommodation, food and beverages, transportation, and tourism-related trade, dominates the province's economic structure. However, this heavy reliance on tourism renders Bali highly vulnerable to external shocks, whether global crises or the COVID-19 pandemic. Research Ariyani and Fauzi [1] highlights that excessive dependence on tourism puts Bali in a fragile position, underscoring the urgent need for economic diversification. This finding is consistent with Lestari et al. [2], which emphasizes the challenges of social transformation and the necessity of developing alternative sectors, including vocational education, to support changes in the labor structure. The outbreak of the COVID-19 pandemic in 2020 marked a dramatic turning point. The sharp contraction in tourism led to significant declines in regional income, rising unemployment, and widening socioeconomic inequality [3, 4]. Even areas previously dependent on primary sectors, such as agriculture, plantations, and fisheries, were adversely affected due to their close integration with the tourism supply chain [5, 6]. This situation highlights the need for a more resilient and multisectoral approach to economic development, as argued by Ariyani and Fauzi [1] in their study on the economic resilience of rural tourism.

Figure 1.
Sectoral Contributions to Economic Growth in Bali Province (2017–2022).
Note: Blue: Contribution of the agricultural sector, Orange: Contribution of the tourism sector, Gray: Contribution of the industrial sector.

Data from the Central Statistics Agency or Badan Pusat Statistik (BPS), as shown in Figure 1, further confirms this pattern of sectoral dependence. Between 2017 and 2022, the tourism sector consistently recorded the highest contribution, reaching around 0.60 in 2018–2019. However, due to the COVID-19 pandemic, its contribution sharply declined in 2020 and 2021 before recovering in 2022. Meanwhile, agriculture exhibited fluctuations, with relatively high levels in 2017 (>0.65), a decline in 2018–2019, and a slight rebound during the pandemic. The industrial sector, in contrast, remained the lowest contributor throughout the period, stagnating with only marginal increases during the pandemic. This trend illustrates that Bali has not yet achieved optimal economic diversification. While tourism has indeed been the engine of growth, it has simultaneously created high vulnerability. The 2020 pandemic highlighted this dependence, resulting in an economic contraction of −9.33%, the most profound decline nationwide, and it directly contributed to increases in poverty, unemployment, and social inequality.

Moreover, Bali's economic transformation has a direct impact on spatial disparities. Research by Mahendra et al. [7] shows significant interregional inequality, with southern regions (Denpasar, Badung, Gianyar) developing much faster than the northern and eastern regions (Buleleng, Jembrana, Karangasem, Bangli). These findings are consistent with the structural change theory proposed by Chenery [8] and Lewis [9], which argues that economic development initially increases regional inequality before eventually achieving balance through sectoral and spatial transformation. Post-pandemic economic transformation efforts in Bali have increasingly focused on the development of creative industries, digital sectors, and locally based industries, Badan Ekonomi Kreatif [10]. Sari and Wardhana [6] assert that diversifying into more sustainable alternative sectors is necessary to improve the quality of employment in tourism. Similarly, Puspita et al. [11] emphasize the importance of employment absorption in non-tourism sectors in enhancing regional economic resilience.

From a methodological perspective, a composite index approach enhances the analysis of economic structural change and community welfare. Mazziotta and Pareto [12] introduced the Adjusted Mazziotta Pareto Index (AMPI), which is relevant for measuring inclusive development by incorporating both sectoral and social indicators. This approach enables a more holistic analysis of regional economic dynamics, particularly when resilience and community welfare are the primary

objectives [6, 13]. Therefore, research on the structural transformation of Bali's economy and its implications for employment, income inequality, and community welfare from 2017 to 2022 is both timely and crucial. In addition to providing empirical insights into the impacts of crisis and recovery processes, this study also offers policy directions to promote a more equitable, sustainable, and adaptive economic transformation, in line with the concept of inclusive development [14, 15].

2. Literature Review

2.1. Theories of Economic Growth and Development

Economic growth is one of the leading indicators used to assess the success of development. According to Todaro and Smith [16], economic development is a multidimensional process encompassing growth in per capita income, structural transformation, and improvements in quality of life. Adam Smith emphasized the importance of capital accumulation, specialization, and the division of labor as key drivers of growth. Meanwhile, endogenous growth theory [4] highlights the role of investment in education, innovation, and human capital as the main determinants of long-term growth.

In the regional development context, Sukirno [17] argues that the development of Gross Regional Domestic Product (GRDP) at constant prices is a measure of economic growth. However, economic growth alone is insufficient; inclusive development must accompany it to reduce poverty, unemployment, and income inequality [16]. Thus, growth theories are relevant for understanding the dynamics of Bali's development, particularly in terms of the roles of agriculture, industry, and tourism in driving growth.

2.2. Theories of Economic Structural Change

Economic structural change refers to the shift in sectoral contributions to GDP/GRDP. According to Jhingan [18], economic transformation typically follows a pattern of transition from the primary sector (agriculture) to the secondary sector (industry), and eventually to the tertiary sector (services). This pattern is consistent with the Clark-Fisher hypothesis, which posits that as national income rises, the share of agriculture in GDP declines while industry and services become increasingly dominant.

In the Indonesian context, particularly in Bali, this structural shift is evident. Agriculture was initially the backbone of the economy. However, with the rapid growth of tourism, the tertiary sector has come to dominate, while agriculture's contribution has declined. This situation reflects Chenery's [8] perspective that industrialization and economic diversification are hallmarks of modern development, though in practice, many developing countries still face structural dualism.

2.3. Theories of Structural Transformation

The classical model of structural transformation was introduced by Mahendra et al. [7] Through the dual-sector theory, which distinguishes between the traditional sector (subsistence agriculture) and the modern sector (industry/services), transformation occurs when surplus labor from agriculture shifts into the modern sector, characterized by higher productivity, thereby driving economic growth. Later, Kristriantono [5] refined this theory by emphasizing the importance of balance between agricultural and industrial growth. If transformation into non-agricultural sectors occurs too rapidly without corresponding gains in agricultural productivity, problems of food security and disguised unemployment may arise.

In Bali's case, structural transformation has occurred from agriculture directly into tourism (a service sector) rather than into industry. This condition creates an imbalanced transformation, since while tourism generates employment, excessive dependence has heightened vulnerability to external shocks such as the COVID-19 pandemic.

2.4. Theories of Regional Inequality

Regional development disparities are a logical consequence of uneven growth. According to Sukirno [17] in the early stages of development, regional inequality tends to increase due to the emergence of

"growth poles" that absorb investment and labor. At more advanced stages, diffusion effects typically reduce inequality. In Bali, disparities are evident between the southern region (Denpasar, Badung, Gianyar), which enjoys rapid tourism-driven growth, and the northern and eastern areas (Karangasem, Jembrana, Bangli), which remain relatively underdeveloped. These disparities are consistent with the findings of Mahendra et al. [7], who argued that the concentration of tourism in specific areas intensifies spatial inequality in Bali.

2.5. Theories of Multidimensional Well-being

Well-being is no longer measured solely in terms of income, but across multiple dimensions. The Capability Approach Amrizal [19] asserts that well-being is determined by individuals' capabilities to achieve lives they value, rather than merely by the possession of resources.

The United Nations Development Programme (UNDP) subsequently developed the Human Development Index (HDI), which incorporates dimensions of education, health, and income. In Indonesia, the BPS also utilizes indicators such as poverty, the Gini coefficient, employment opportunities, and other social aspects to assess community well-being. Therefore, the analysis of welfare in Bali must adopt a multidimensional perspective to provide a more comprehensive assessment.

3. Methods

3.1. Research Location

This study examines Bali Province, which consists of nine regencies/municipalities: Jembrana, Tabanan, Badung, Gianyar, Klungkung, Bangli, Karangasem, Buleleng, and Denpasar City. The analysis encompasses all regions, as each has distinct economic structural characteristics. Bali was chosen as the research location due to its high dependence on the tourism sector, while agriculture and industry remain relatively underdeveloped. This dependence has created spatial disparities, with southern regions (Denpasar, Badung, Gianyar) more advanced compared to northern and eastern regions (Buleleng, Jembrana, Karangasem, Bangli). Using regencies/municipalities as the unit of analysis allows this study to comprehensively illustrate Bali's structural economic changes and their implications for community welfare at the regional level.

3.2. Scope of the Study

The study covers all nine regencies/municipalities in Bali Province. The southern region, comprising Denpasar, Badung, and Gianyar, is primarily driven by tourism and experiences relatively high economic growth. In contrast, the northern and eastern regions, such as Buleleng, Jembrana, and Karangasem, remain less developed and more reliant on agriculture. This contrast is essential for analyzing Bali's development disparities. The study period spans 2017–2022, which captures three critical phases: (1) the pre-pandemic "normal" period, (2) the COVID-19 crisis, and (3) the early recovery in 2022. This timeframe enables a more comprehensive understanding of how structural changes impacted welfare under varying conditions. Two main dimensions are analyzed.
1. Economic structural change, measured by the sectoral contribution to GRDP, specifically agriculture, industry, and tourism.
2. Socioeconomic indicators, including poverty rates, the Gini ratio, wages, and employment absorption.

By integrating sectoral and socioeconomic dimensions, the study aims to provide a more comprehensive picture of welfare conditions in Bali.

3.3. Operational Definition of Variables

To ensure clarity, objectivity, and consistency, the variables in this study are defined as follows: Agriculture Sector Contribution is the percentage share of agriculture in GRDP at constant prices for each regency/municipality in Bali (BPS data). Higher values indicate the continued importance of agriculture in the regional economy; Industry Sector Contribution is the percentage share of

manufacturing in GRDP, which reflects the degree of industrialization. Lower values indicate limited industrial development as a driver of economic growth; Tourism Sector Contribution is the percentage share of trade, hotels, restaurants, and tourism-related services in GRDP, indicating the region's dependence on tourism; Gini Ratio is a measure of income distribution inequality, ranging from 0 (perfect equality) to 1 (perfect inequality), based on BPS data; Poverty Rate is the percentage of the population living below the poverty line (as defined by the BPS standard) and reflects the extent to which economic development reduces poverty; Average Wage is the mean nominal wage of workers/laborers in Bali, as reported by BPS, serving as an indicator of workers' welfare; and Employment Absorption is the share of the labor force employed relative to the total labor force, reflecting the economy's capacity to generate jobs.

3.4. Data Analysis Technique

This study employs a quantitative approach using the Adjusted Mazziotta Pareto Index (AMPI). AMPI is a composite index method used to measure multidimensional phenomena by integrating multiple indicators into a single value. Its advantage lies in addressing imbalances across indicators through a penalty mechanism, producing more objective results. The steps of the data analysis are as follows:

1. Data collection. Secondary data were collected from official publications of the BPS Bali Province and district/city offices, covering the period 2017 to 2022. The study selected seven indicators, grouped as positive indicators (higher values are better), which consist of the contribution of agriculture (% of GRDP), the contribution of industry (% of GRDP), the contribution of tourism (% of GRDP), employment absorption (%), and the average wage (Rp). Meanwhile, negative indicators (lower values are better) consist of the Gini ratio and the poverty rate (%).

2. Data Normalization. Indicators were normalized for comparability using formulas:

   - For positive indicators:

   $$z_{ij} = \frac{x_{ij} - \mu_j}{\sigma_j}$$

   - For negative indicators:

   $$z_{ij} = \frac{\mu_j - x_{ij}}{\sigma_j}$$

3. Calculation of the Mazziota-Pareto Index (MPI). After normalization, indicators were standardized to a mean of 100 and a standard deviation of 10. MPI values were then calculated.

   $$M_i = \frac{\sum_{j=1}^{n} z_{ij}}{n}$$

   $$S_i = \sqrt{\frac{\sum_{j=1}^{n}(z_{ij} - M_i)^2}{n}}$$

4. Calculation of the Adjusted Mazziota Pareto Index (AMPI). AMPI values for each region were computed as:

   $$AMPI_i = M_i \pm (S_i \times cv)$$

   as "+" is applied to positive indicators and "−" to negative indicators, and *cvcvcv* represents the coefficient of variation for each indicator.

5. Interpretation of Results. Higher AMPI values indicate better community welfare. Results are mapped into four quadrants to examine interregional disparities:

a.   Quadrant I: Strong economic structure, high welfare
b.   Quadrant II: Strong economic structure, low welfare
c.   Quadrant III: Weak economic structure, high welfare
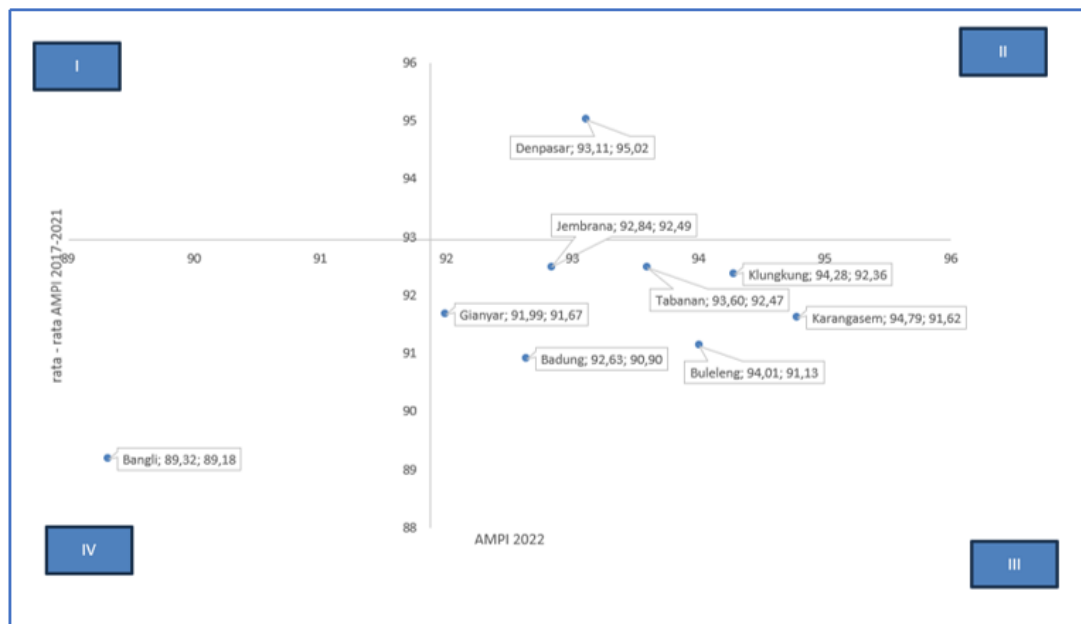d.   Quadrant IV: Weak economic structure, low welfare

4. Findings

4.1. Research Results

The four-quadrant approach maps the performance of regencies/municipalities in Bali Province based on two axes:

a) The vertical axis represents the average Adjusted Mazziotta Pareto Index (AMPI) for the period 2017–2021, reflecting medium-term economic structure and social welfare performance.
b) The horizontal axis represents the AMPI value in 2022, reflecting current conditions following various economic dynamics, including the impact of the COVID-19 pandemic and the subsequent recovery process.

This quadrant classification helps to identify performance differences across regions, distinguishing areas with consistently strong performance, regions experiencing improvement, and those facing stagnation or decline. Based on this mapping, the quadrant approach illustrates the dynamics of structural transformation and its relationship with social welfare in Bali Province. The comparison between the average AMPI (2017–2021) and the AMPI value in 2022 reveals three main quadrants, each reflecting distinct performance variations and trajectories of change.

Figure 2.
Four-Quadrant Approach to AMPI Values in Bali Province.

4.1.1. Quadrant II – High and Stable Performance (High–High)

Denpasar City (93.11; 95.02) is the only region in this quadrant that consistently demonstrates high performance and shows improvement in 2022, indicating structural stability and resilience in maintaining development quality. Key supporting factors include:

a. Advanced physical and digital infrastructure compared to other regencies, improving efficiency in productive sectors.

   b. Strength in the tertiary sector, particularly trade, services, and tourism, with broader domestic and international market networks.
   c. Higher education levels and workforce quality enhance productivity and innovation.
   d. Better economic diversification at the urban level, allowing shocks in one sector to be mitigated by others.

   Denpasar thus serves as Bali's economic growth hub and a benchmark for other regions in the province. However, its concentration of growth also risks widening spatial disparities if spillover effects fail to spread evenly across regions.

4.1.2. Quadrant III – Improving Performance (Moderate–High)

   Regions in this quadrant exhibited moderate AMPI averages from 2017 to 2021 but demonstrated improvement in 2022. These include Jembrana (92.84; 92.49), Klungkung (94.28; 92.36), Tabanan (93.60; 92.47), Gianyar (91.99; 91.67), Badung (92.63; 90.90), Buleleng (94.01; 91.13), and Karangasem (94.79; 91.62). Although these values have not yet reached the high-performance category, the trend indicates gradual recovery and structural adaptation. Notable dynamics include:
   a. Jembrana, Klungkung, and Tabanan – relatively stable, with minor gains in employment absorption and local agricultural/industrial contributions.
   b. Gianyar – leveraging creative industries and culture-based enterprises to offset tourism declines.
   c. Badung – despite being the central tourism hub, recovery lags behind pre-pandemic levels, exposing its vulnerability to sectoral dependency.
   d. Buleleng – gains from fisheries, agriculture, and alternative tourism, though not yet significantly lifting AMPI scores.
   e. Karangasem – relatively stagnant despite a strong primary sector, highlighting the need for innovation in managing local economic potential.

   This quadrant represents regions in transition, requiring stronger economic diversification strategies, enhanced human capital development, and infrastructure support to sustain their progress.
   3. Quadrant IV – Low and Consistently Weak Performance (Low–Low)

   Bangli Regency falls in this quadrant, with a 2017–2021 AMPI average of 89.32 and a 2022 value of 89.18, indicating stagnation. The region faces significant challenges in strengthening productive sectors and improving welfare indicators. Contributing factors include:
   a. Limited infrastructure and connectivity restrict market access and investment.
   b. Dependence on low-value traditional agriculture.
   c. Weak industrialization and a lack of modern service sectors.
   d. Minimal economic diversification leaves the region vulnerable to fluctuations in prices and weather.

   Bangli's position highlights the need for targeted policy interventions, including the development of locally resource-based industries, the adoption of advanced agricultural technologies, and investments in education and workforce development.

   Overall, the quadrant mapping highlights spatial disparities in Bali's economic transformation. Denpasar emerges as a stable growth center, most regencies show gradual recovery yet remain below pre-crisis levels, and Bangli faces persistent stagnation. Future development strategies must therefore strengthen interregional connectivity, expand non-tourism sectors, and ensure equitable access to resources and opportunities to achieve inclusive and sustainable transformation across Bali.

5. Discussion

5.1. Dynamics of Structural Economic Change in Bali's Regencies/Municipalities (2017–2022)

   Bali's economic structure between 2017 and 2022 reveals a complex and uneven transformation across sectors and regions. External shocks such as the COVID-19 pandemic, global tourism pressures, and food crises intersect with internal factors, including sectoral dependency, institutional capacity, and

adaptive resilience. Overall, three sectors dominated the economy: tourism (encompassing accommodation, food, transport, and trade), agriculture (mainly in northern and eastern regions), and manufacturing (concentrated in urban centers such as Denpasar and Gianyar). However, their relative contributions shifted significantly.

a. 2017: Tourism dominated the south (Badung, Denpasar, Gianyar), while agriculture remained strong in the west and east (Tabanan, Jembrana, Karangasem, Bangli).

b. 2018–2019: An early slowdown occurred, as the agricultural share declined, and tourism faced saturation due to environmental and global pressures.

c. 2020 (COVID-19): Tourism collapsed, contracting Bali's GDP by −9.33%, with sharp spikes in unemployment. Badung and Gianyar, which are highly dependent on tourism, were hit the hardest. Agricultural regions also suffered as their outputs relied on tourism demand.

d. 2021–2022 (Recovery): Uneven rebound. Denpasar and Gianyar recovered faster due to modern services, trade, and digital adaptation. Jembrana, Bangli, and Karangasem lagged, constrained by primary-sector dominance and weak diversification.

Quantitatively, AMPI results reinforced these patterns: most regions scored relatively high in 2017, but values fell sharply from 2018, bottoming in 2020. By 2022, only Denpasar exceeded its 2017 level, while other regencies remained below their five-year averages, revealing four key insights: Bali's vulnerability due to over-reliance on tourism, lack of economic diversification in most regencies, unequal adaptive capacity across regions, and underutilized local industry and creative economy in driving recovery. Hence, future transformation requires multisectoral, spatially balanced, and adaptive strategies, not just growth, but resilience and equity across regions.

5.2. Impact of Structural Economic Change on Employment, Income Inequality, and Welfare in Bali (2017–2022)

The structural shifts of 2017–2022 produced mixed effects on three key dimensions: employment, income distribution, and welfare. AMPI mapping across four quadrants highlights the adaptive disparities.

1. Quadrant II – Denpasar (High and Consistent Performance):
   a. Employment: Diversified modern services (trade, digital, logistics, finance, education) buffered shocks. Unemployment spiked in 2020 but fell sharply by 2022.
   b. Inequality: Relatively contained, as digital and platform-based jobs expanded inclusivity.
   c. Welfare: In 2022, AMPI exceeded the averages of 2017–2021, signaling a robust recovery.

2. Quadrant III – Moderate Recovery (Jembrana, Klungkung, Tabanan, Gianyar, Badung, Buleleng, Karangasem):
   a. Tourism-based regencies (Badung, Gianyar): Jobs rebounded, but informality persisted; inequality temporarily widened; welfare improved, albeit at levels below those seen before 2019.
   b. Agrarian-maritime regencies (Buleleng, Karangasem): Agriculture and fisheries absorb workers, but with low value-added; inequality is low, but incomes are also low; welfare has improved gradually through agrotourism.
   c. Transitional agrarian regencies (Tabanan, Jembrana, Klungkung): Still reliant on farming; limited diversification; inequality moderate and stable; welfare modest, stagnating relative to others.

3. Quadrant IV – Bangli (Low and Stagnant Performance):
   a. Employment: Dominated by subsistence farming, lacking alternatives.
   b. Inequality: Low, but mainly due to uniformly low incomes.
   c. Welfare: Minimal progress; weak infrastructure, fiscal constraints, and underdeveloped eco-tourism.

Overall, Bali's structural transformation remains non-inclusive. No regency leapt from low to high categories. Spatial welfare gaps persist, with recovery concentrated in urban-service centers. Policy directions should therefore include: local resource-based diversification (agro-industry, integrated fisheries, cultural tourism), environmentally sustainable reindustrialization of the primary sector, human

capital upgrading via vocational education, strengthening interregional infrastructure and connectivity, and community empowerment through cooperatives and MSMEs. Such strategies could enable regencies currently in Quadrants III and IV to advance toward Quadrant II, ensuring more equitable, inclusive, and sustainable development across Bali.

6. Conclusion

Based on the findings, this study concludes that:

6.1. Structural Economic Dynamics

Bali's economy remains highly dependent on tourism, especially in the south (Badung, Denpasar, Gianyar), while the north and east rely on primary sectors (agriculture, fisheries). The 2020 pandemic exposed this vulnerability, causing severe contractions. Recovery in 2021–2022 was uneven: urban centers with modern service bases (e.g., Denpasar) rebounded more quickly, while primary-sector regions experienced stagnation. AMPI results show that only Denpasar surpassed its 2017 welfare levels, with other regencies lagging, underscoring low diversification, unequal adaptability, and weak local industry roles.

6.2. Impacts on Employment, Inequality, and Welfare

Denpasar balances job creation, controls inequality, and improves welfare through diversified services and growth in the digital economy. In contrast, tourism-dependent regencies (Badung, Gianyar) recovered only partially, with widened inequality. Agrarian regions (Buleleng, Karangasem, Tabanan, Jembrana, Klungkung) faced low productivity and slow welfare gains. Bangli was the most vulnerable, stagnating across indicators. Overall, no regency experienced a significant upward shift, confirming persistent spatial inequality in Bali's welfare outcomes.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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