

## **Tourism Scenario Based SARIMAX Forecasting of MSMEs Sales in Mandalika SEZ**

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### **ABSTRACT.**

*This study aims to forecast the sales performance of Micro, Small, and Medium Enterprises (MSMEs) in the Mandalika Special Economic Zone (SEZ) by integrating tourism dynamics into the analysis. Employing the Seasonal Autoregressive Integrated Moving Average with Exogenous Factors (SARIMAX) model, external variables such as the COVID-19 pandemic, MotoGP policies, and tourist arrivals were included to enhance predictive accuracy. The analysis covered four major MSME sectors: HoReCa, Fashion & Crafts, Transport & Services, and Agro-based Products. The results demonstrate that the HoReCa and Fashion & Crafts sectors are the most responsive to increases in tourist arrivals, while the Transport & Services and Agro-based Products sectors exhibit more stable growth patterns. These findings contribute to the theoretical advancement of micro-level forecasting in the MSME context and highlight the strategic role of tourism dynamics in shaping entrepreneurial performance. From a practical perspective, the study provides evidence-based recommendations for policymakers to design tourism-driven MSME development strategies in Mandalika SEZ. The novelty of this research lies in its application of SARIMAX forecasting to tourism-related MSME performance, integrating crisis events and international sports policies into the model, thus offering a robust framework for anticipating business fluctuations in tourism-dependent regions.*

**Keywords:** *MSMEs, Mandalika SEZ, Policy development, SARIMAX forecasting, Tourism dynamics*

### **INTRODUCTION**

Micro, Small, and Medium Enterprises (MSMEs) constitute the backbone of Indonesia's national economy, contributing more than 60 percent to the country's Gross Domestic Product (GDP) and employing over 97 percent of the workforce (BPS, 2024). Within the tourism sector, MSMEs play a pivotal role as providers of local goods, creative products, and services that sustain regional economic structures. In the Mandalika Special Economic Zone (SEZ), which has been designated by the government as one of Indonesia's super-priority tourism destinations, MSMEs not only support the tourism ecosystem but also serve as key indicators of local economic vitality. Since Mandalika gained international recognition as the official host of MotoGP 2022, the destination has experienced accelerated infrastructure development, broader global exposure, and stronger linkages between the tourism and creative economy sectors (Pahrudin et al., 2023). However, external shocks such as the COVID-19 pandemic have revealed the vulnerability of MSMEs to declines in tourist arrivals and sudden shifts in tourism policies that lie beyond their control (Caraka et al., 2023).

Tourism is globally recognized as a key driver of post-pandemic economic recovery (Kenji, 2024; Kibtiah & Assgaf, 2024; Zhang, Yang, et al., 2024). Accurate forecasting of tourism recovery trends is therefore essential to support evidence-based policymaking and adaptive destination management (Prasetyo et al., 2024). In this context, tourism-oriented MSMEs hold strategic importance as catalysts of

inclusive growth through job creation, entrepreneurship, and community empowerment (Aryasih, 2024). Despite this significance, empirical studies focusing on MSME performance in tourism destinations remain limited, especially those employing quantitative forecasting techniques.

Globally, the sophistication of tourism forecasting has advanced from classical statistical models toward the adoption of artificial intelligence-based approaches. Previous studies have shown that the integration of data decomposition techniques with neural network algorithms can enhance the precision of tourism demand forecasting (Chen et al., 2012). In a similar line of research, the application of deep learning methods has been proven effective in capturing complex patterns and predicting daily variations in tourist volumes (Bi et al., 2020). Collectively, these studies underscore the growing significance of data-driven analytical frameworks in understanding and anticipating tourism dynamics. Despite such progress, the majority of existing research remains concentrated on macro-level indicators, including aggregate tourist arrivals and overall tourism revenues, whereas micro-level dimensions such as MSME sales performance have received limited scholarly attention (Chandra, 2024; Hodijah, 2022).

In the Indonesian context, forecasting studies have increasingly contributed to understanding tourism recovery and policy planning. Prasetyo et al. (2024) applied multivariate big data models to predict Bali's post-pandemic tourism recovery and found substantial improvements in accuracy. Aryasih (2024) identified that tourist satisfaction with public facilities directly influences revisit intentions and MSME revenue stability. Meanwhile, Anisah (2024) emphasized the importance of regulatory frameworks in strengthening the economic resilience of tourism-based MSMEs in Singhasari SEZ. Although these studies enrich national discourse on tourism development, they have not yet examined MSME-level sales forecasting using integrated quantitative models. This gap demonstrates the absence of micro-level forecasting applications that link tourism fluctuations with MSME performance.

The Mandalika SEZ offers an ideal case for addressing this gap. As a rapidly developing tourism hub supported by international events and national investment, Mandalika presents both opportunities and challenges for MSME growth. However, no prior study has specifically modeled MSME sales projections in Mandalika using exogenous factors such as tourist arrivals, pandemic shocks, and international event policies. Therefore, this study develops a forecasting model using the *Seasonal Autoregressive Integrated Moving Average with Exogenous Factors* (SARIMAX) approach to project MSME sales under various tourism growth scenarios.

## **LITERATURE REVIEW**

### **Tourism-Led Growth Hypothesis (TLGH)**

The Tourism-Led Growth Hypothesis (TLGH) posits that tourism acts as a catalyst for overall economic expansion by stimulating consumption, employment, and investment across related sectors (Alcalá-Ordóñez et al., 2024; Brida et al., 2016). Tourism inflows generate substantial multiplier effects, particularly in destinations where small enterprises and local industries form the backbone of the economy (Kim & Kim, 1998). Song and Li (2008) emphasize that destinations with strong tourism ecosystems experience accelerated income generation within micro and small enterprises, as tourist spending directly strengthens the local economic structure. This theoretical linkage is highly relevant for super-priority tourism destinations

such as Mandalika SEZ, where MSMEs play a pivotal role in shaping regional economic performance.

Empirical research across Asia and Europe has consistently supported the TLGH framework. Schubert et al. (2011) demonstrate that tourism demand contributes significantly to GDP growth in small and tourism-dependent economies. In Indonesia, several studies have identified tourism as a critical pillar in regional development, particularly in Bali and other rapidly expanding tourism clusters (Prasetyo et al., 2024). However, most of these studies focus on macro-level outcomes such as total arrivals or aggregate tourism revenue. The present study advances this literature by applying TLGH at the micro-enterprise level, specifically examining how tourism growth translates into MSME sales performance across distinct economic sectors. This micro-level operationalization represents an important theoretical contribution, extending TLGH beyond the traditional macroeconomic perspective.

### **Demand Shock Theory and Exogenous Event Impact**

Demand Shock Theory explains how external disruptions—whether positive or negative—alter consumption patterns and economic performance (Guerrieri et al., 2022; Lorenzoni, 2009). Negative shocks such as pandemics drastically reduce mobility, travel frequency, and discretionary spending. Studies on COVID-19 (Kenji, 2024; H. Yang et al., 2021) show that tourism-dependent businesses suffer significant declines when travel restrictions are imposed, demonstrating the vulnerability of MSMEs to macro-level crises. In contrast, positive shocks, particularly mega-events, act as catalysts for rapid demand acceleration. Large international events, including MotoGP, have been shown to enhance destination visibility, attract new tourist segments, and stimulate short-term consumption surges within local economies (Pahrudin et al., 2023).

Within the Mandalika SEZ context, both types of shocks have been prominent: the pandemic caused substantial contraction in tourism flows, while MotoGP provided unprecedented global exposure and record visitor spikes. Caraka et al. (2023) illustrate that increased connectivity and mega-event promotion significantly reshape economic performance in Mandalika. Despite these insights, existing studies have rarely incorporated exogenous shocks into quantitative forecasting models at the MSME level. The present study fills this gap by embedding pandemic effects and MotoGP-related policy interventions into a SARIMAX framework, thus offering a more realistic and shock-responsive forecasting model. This integration strengthens the theoretical grounding of the study and contributes to the broader discourse on tourism resilience and shock-sensitive economic prediction.

### **Tourism Demand Elasticity Across Business Sectors**

Tourism demand elasticity explains the variation in responsiveness of different sectors to fluctuations in tourism volume (Peng et al., 2015; Smeral, 2017). Prior research indicates that industries directly linked to visitor consumption—such as accommodation, food services, and craft retail—tend to exhibit high elasticity, meaning their revenue rises sharply with increased tourist arrivals (Song & Li, 2008). Conversely, transport services and agro-based sectors typically show lower elasticity due to their reliance on habitual consumption patterns, diversified user bases, or limited exposure to discretionary tourist spending.

Empirical evidence aligns with these theoretical expectations. Studies in coastal and island destinations reveal that the hospitality and creative sectors

consistently demonstrate high sensitivity to tourism growth, while primary-product sectors remain comparatively stable (Aryasih, 2024). Similarly, research in Bali and Singhasari SEZ shows that tourism infrastructure development disproportionately benefits sectors closest to the visitor experience (Anisah, 2024). The present study confirms and extends this body of literature by quantifying sector-specific elasticities through SARIMAX forecasting simulations. The identification of HoReCa and Fashion & Crafts as high-elasticity sectors—and Transport & Agro-based Products as stable-growth sectors—contributes new empirical evidence to elasticity theory, specifically within the context of Indonesian super-priority destinations.

### **Scenario Planning Theory**

Scenario Planning Theory provides a strategic framework for anticipating multiple possible futures, particularly in environments characterized by uncertainty and volatility (Oliver & Parrett, 2018; Ramírez & Selsky, 2016; Tapinos, 2012). Tourism destinations, especially those heavily dependent on international flows, are inherently susceptible to macroeconomic shocks, policy changes, and mobility disruptions (UNWTO, 2021). Thus, scenario-based forecasting enables policymakers and businesses to prepare for alternative trajectories rather than relying on a single deterministic projection.

In tourism research, scenario planning has been applied to climate change impact assessments, crisis response planning, and demand forecasting under uncertain conditions (WTTC, 2020). However, its integration with quantitative forecasting models at the MSME level remains limited. The present study contributes to this gap by constructing three scenario-based SARIMAX projections—conservative (4%), baseline (7%), and optimistic (10%) tourism growth—allowing stakeholders to understand potential variations across economic conditions. This combination of scenario planning and exogenous-variable forecasting enhances the strategic relevance of the study, offering a practical and theoretically grounded tool for future MSME development in Mandalika SEZ.

### **Tourism Resilience Theory**

Tourism Resilience Theory emphasizes the capacity of destinations and enterprises to absorb shocks, adapt, and reorganize to maintain long-term sustainability (Cochrane, 2010; Espiner et al., 2017). Resilience is influenced by factors such as diversified revenue structures, digital adaptation, supply chain flexibility, and institutional support (Zhang, Sun, et al., 2024). COVID-19 accelerated global discussions on resilience, revealing that businesses with stronger local linkages and innovation capabilities recovered more rapidly than those reliant on seasonal tourism or international markets (Kibtiah & Assgaf, 2024).

Studies in disaster-prone destinations have demonstrated that MSMEs with high resilience benefit from collaborative governance, community networks, and adaptive strategies (Patadjenu et al., 2023; Zhang, Yang, et al., 2024). The present study contributes to resilience literature by highlighting sectoral differences in MSME stability under varying tourism growth scenarios. The relatively stable trajectories of Transport & Services and Agro-based Products across all SARIMAX scenarios provide empirical evidence of inherent sectoral resilience. Conversely, the heightened volatility observed in HoReCa and Fashion & Crafts underscores the need for policy interventions to enhance resilience in demand-sensitive sectors. This micro-level

resilience analysis enriches existing literature by linking forecasting outcomes with the theoretical underpinnings of tourism resilience.

## **Hypotheses**

Based on the literature and contextual background, two hypotheses are proposed:

H1: Tourism growth significantly affects MSME sales performance in Mandalika SEZ.

H2: Exogenous factors such as pandemics and international event policies moderate the magnitude of MSME sales performance.

Conceptually, the novelty of this study lies in applying the SARIMAX model to the micro-enterprise level by integrating tourism-related external factors with MSME sales data. Academically, it advances the tourism forecasting literature by bridging the gap between macroeconomic modeling and micro-level enterprise analysis. Practically, the study provides evidence-based insights for policymakers, Mandalika SEZ managers, and MSME stakeholders to design more adaptive, resilient, and sustainable strategies for tourism-driven local economic development.

## **RESEARCH METHOD**

### **Setting**

This study was conducted in the Mandalika Special Economic Zone (SEZ), West Nusa Tenggara, which has been designated as a national super-priority destination and the official venue of MotoGP since 2022. The research focused on four main MSME sectors, namely:

1. HoReCa (Hotels, Restaurants, Cafés & Culinary),
2. Fashion & Crafts (Handicrafts, Souvenirs, Apparel),
3. Transport & Services (Transportation, Rental, and Related Services), and
4. Agro-based Products (Agriculture and Agricultural Outputs).

The data employed in this study were obtained from official regional sources, including publications from the West Nusa Tenggara Statistics Agency (BPS, 2024), the NTB and Central Lombok Tourism Offices, the NTB Handicraft Council, the NTB Department of Transportation, the NTB Department of Agriculture, and the West Nusa Tenggara Office of Bank Indonesia. These datasets provide information on MSME activities across four main sectors—HoReCa, Fashion & Crafts, Transport & Services, and Agro-based Products—within the Mandalika SEZ. The historical data cover the period 2015–2023, while the forecasting projections extend over the next ten years (2024–2033), integrating external variables to reflect tourism-related dynamics.

### **Instruments/Measures**

The forecasting model applied in this study is the Seasonal Autoregressive Integrated Moving Average with Exogenous Factors (SARIMAX), selected for its capacity to integrate historical trends with relevant external variables.

### **Endogenous variable:**

- Annual MSME sales (per sector), measured in Indonesian Rupiah.

### **Exogenous variables:**

- *Pandemic\_effect*: dummy variable, coded as 1 for the period 2020–2021 and 0 otherwise.

- *Motogp\_policy\_era*: dummy variable, coded as 1 starting in 2022 to capture the influence of MotoGP-related policies and international events.
- *Tourist\_arrivals\_ntb*: total domestic and international tourist arrivals to West Nusa Tenggara (in millions), serving as the primary indicator of market demand.

## SARIMAX Model Formulation

In general, the SARIMAX model can be expressed as follows:

$$Y_t = c + \sum_{i=1}^p \phi_i Y_{t-i} + \sum_{j=1}^q \theta_j \varepsilon_{t-j} + \sum_{k=1}^m \beta_k X_{k,t} + \varepsilon_t$$

where:

- $Y_t$  : endogenous variable (MSME sales at time  $t$ )
- $X_{k,t}$  :  $k$ -th exogenous variable at time  $t$
- $\phi_i$  : autoregressive parameter
- $\theta_j$  : moving average parameter
- $\varepsilon_t$  : white noise error term

The model configuration applied is  $(p,d,q) = (1,1,0)$ , which indicates one autoregressive lag, first-order differencing to achieve stationarity, and no moving average component.

## Data Collection and Analysis

The data processing stages were conducted as follows:

1. Data preprocessing  
Raw sales data in Excel format were cleaned of currency symbols and punctuation marks (Rp, dots, commas) and subsequently converted into numeric type. The year column was set as the time-series index.
2. Sector mapping  
Data columns were mapped into four main MSME sectors based on product and service categories, with keywords applied to classify variables accordingly.
3. Model configuration  
Forecasting was performed separately for each MSME sector by incorporating exogenous variables (*pandemic\_effect*, *motogp\_policy\_era*, *tourist\_arrivals\_ntb*).
4. Tourist projection scenarios  
For the period 2024–2033, tourist arrivals were projected under three annual growth scenarios:
  - *Baseline scenario*: 7% annual growth,
  - *Optimistic scenario*: 10% annual growth,
  - *Conservative scenario*: 4% annual growth.

## Analytical software

Model estimation was conducted using Python (*Statsmodels library*), which supports SARIMAX modeling. The outputs comprised numerical forecasts and sector-specific graphical projections under the three tourist growth scenarios.

## RESULT AND DISCUSSION

The SARIMAX (1,1,0) model with exogenous variables (pandemic, MotoGP policy, and tourist arrivals) produced projections of MSME sales in the Mandalika SEZ for the period 2024–2033. The projections were categorized into three scenarios: baseline (7%), optimistic (10%), and conservative (4%), based on the assumed annual growth of tourist arrivals.

Overall, the results indicate that all MSME sectors follow a consistently upward trend, though with varying levels of responsiveness. HoReCa and Fashion & Crafts emerge as the most sensitive to tourist growth, while Transport & Services and Agro-based Products display steadier but more moderate increases. These variations across scenarios provide an overview of how different tourism growth trajectories may shape MSME performance, which is elaborated in the subsequent analysis.

**Table 1 Baseline Scenario**

	HoReCa	Fashion & Crafts	Transport & Services	Agro-based Products
01/01/2024	232.474.117.6	171.141.744.5	118.355.350.5	95.177.684.42
4	47	43	66	6
01/01/2025	244.752.712.4	181.277.682.4	125.768.657.0	100.278.672.5
5	57	45	48	66
01/01/2026	257.724.215.7	191.524.548.7	133.203.761.6	105.645.428.6
6	06	49	53	03
01/01/2027	271.577.755.2	202.288.045.5	140.997.467.1	111.368.874.9
7	44	70	80	30
01/01/2028	286.396.994.4	213.737.728.0	149.284.034.9	117.489.015.7
8	50	14	75	84
01/01/2029	302.252.949.3	225.966.342.5	158.133.505.4	124.036.745.9
9	73	47	18	27
01/01/2030	319.218.722.7	239.043.402.6	167.596.852.7	131.042.646.5
0	75	46	92	74
01/01/2031	337.372.084.9	253.033.323.6	177.720.815.7	138.538.924.7
1	82	48	96	96
01/01/2032	356.796.180.1	268.001.689.9	188.552.864.0	146.559.935.1
2	52	41	83	18
01/01/2033	377.579.961.6	284.017.557.2	200.142.962.9	155.142.414.6
3	12	25	66	29

As shown in Table 1, the baseline scenario with an assumed annual tourist growth rate of 7% produces stable sales projections across all MSME sectors in Mandalika. The HoReCa sector leads the trend, increasing from IDR 232.47 billion in 2024 to IDR 377.58 billion in 2033. Fashion & Crafts also demonstrate substantial growth, rising from IDR 171.14 billion to IDR 284.01 billion over the same period. Meanwhile, the Transport & Services and Agro-based Products sectors record gradual increases, although their growth rates are more moderate compared to the two leading sectors. Overall, the baseline scenario reflects the most realistic condition, characterized by a consistently positive trend.

In addition, the baseline scenario provides a useful benchmark for policymakers and stakeholders, as it illustrates the likely trajectory of MSME performance under normal tourism growth. This scenario highlights the potential for

steady expansion and reinforces the importance of maintaining consistent tourist flows to sustain MSME development in Mandalika SEZ.

**Table 2 Conservative Scenario**

	<b>HoReCa</b>	<b>Fashion &amp; Crafts</b>	<b>Transport &amp; Services</b>	<b>Agro-based Products</b>
01/01/2024	227.629.117.6	167.408.244.5	115.653.550.5	93.176.984.42
01/01/2025	47	43	66	6
01/01/2026	234.529.762.4	173.399.997.4	120.067.859.0	96.057.195.56
01/01/2027	57	45	48	6
01/01/2028	241.545.307.2	179.057.272.1	124.181.640.9	98.964.491.09
01/01/2029	06	99	13	3
01/01/2030	248.816.357.0	184.748.379.9	128.304.640.4	101.969.756.3
01/01/2031	69	17	33	90
01/01/2032	256.374.333.6	190.602.618.8	132.541.986.4	105.091.422.9
01/01/2033	80	32	99	25
01/01/2034	264.234.019.0	196.669.402.1	136.932.360.7	108.337.164.1
01/01/2035	37	11	36	06
01/01/2036	272.407.996.6	202.971.607.8	141.492.989.0	111.712.570.2
01/01/2037	71	24	58	65
01/01/2038	280.908.918.5	209.523.471.8	146.234.297.1	115.222.958.4
01/01/2039	79	91	20	34
01/01/2040	289.749.875.0	216.336.596.0	151.164.689.2	118.873.755.0
01/01/2041	52	11	39	12
01/01/2042	298.944.469.4	223.421.972.0	156.292.112.0	122.670.581.9
01/01/2043	24	68	28	72

As presented in Table 2, the conservative scenario with an assumed annual tourist growth rate of only 4% yields positive yet more modest sales projections across all MSME sectors. By 2033, the HoReCa sector is projected to reach only IDR 298.94 billion, approximately 20% lower than the baseline scenario. Fashion & Crafts are expected to attain IDR 223.42 billion, while the Transport & Services and Agro-based Products sectors also exhibit upward trends, albeit at more limited growth rates. This scenario underscores that a slowdown in tourist arrivals directly constrains the potential sales growth of MSMEs.

In addition, the conservative scenario provides an important cautionary perspective for policymakers. It highlights the vulnerability of MSME sales to lower-than-expected tourist growth and suggests the need for risk mitigation strategies, such as diversifying market segments, strengthening digital platforms, and enhancing domestic demand to reduce overdependence on international tourism.

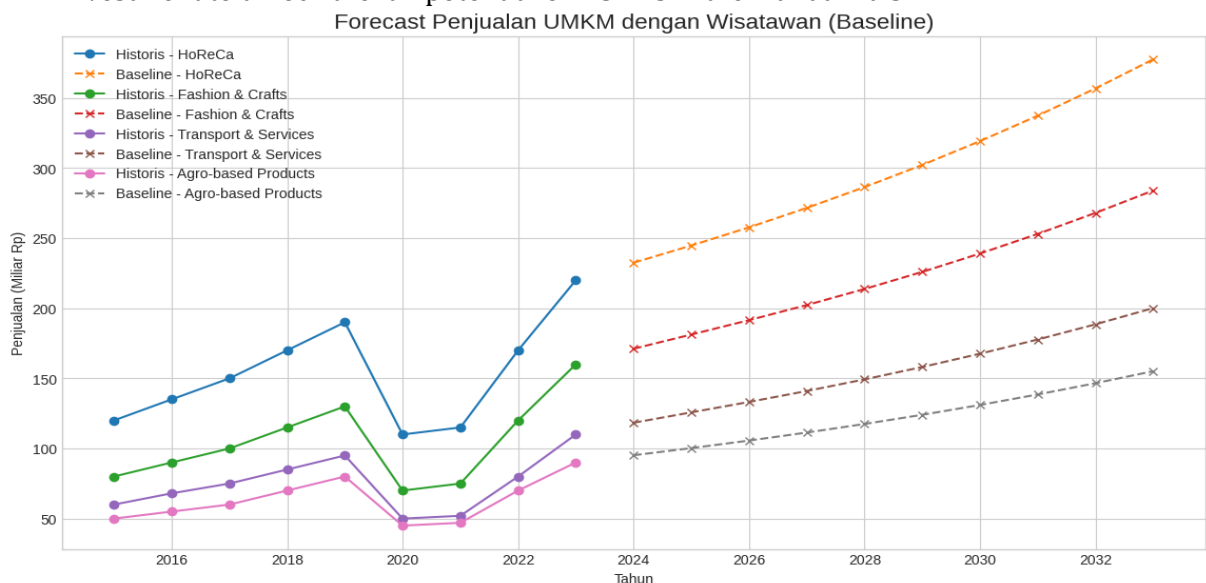
**Table 3 Optimistic Scenario**

	<b>HoReCa</b>	<b>Fashion &amp; Crafts</b>	<b>Transport &amp; Services</b>	<b>Agro-based Products</b>
01/01/2024	237.319.117.6	174.875.244.5	121.057.150.5	97.178.384.42
01/01/2025	47	43	66	6
01/01/2026	255.266.362.4	189.379.377.4	131.631.563.0	104.620.191.5
01/01/2027	57	45	48	66

01/01/2026	274.836.271.2	204.710.897.3	142.746.249.0	112.711.700.9
6	06	99	73	33
01/01/2027	296.336.349.6	221.366.727.1	154.804.024.5	121.592.718.0
7	29	25	19	23
01/01/2028	319.982.254.9	239.618.134.6	168.012.756.7	131.357.752.7
8	42	28	08	64
01/01/2029	345.992.099.0	259.671.216.7	182.524.513.5	142.098.441.8
9	50	09	90	52
01/01/2030	374.602.825.9	281.721.740.9	198.481.635.0	153.913.023.3
0	74	93	46	07
01/01/2031	406.074.609.7	305.974.680.9	216.032.576.6	166.909.026.2
1	54	72	69	02
01/01/2032	440.693.569.4	332.652.031.1	235.337.996.4	181.204.621.7
2	43	00	64	54
01/01/2033	478.774.424.7	361.996.819.9	256.573.757.6	196.929.775.2
3	16	70	85	75

As shown in Table 3, the optimistic scenario with an assumed annual tourist growth rate of 10% generates substantial increases in MSME sales across all sectors. The HoReCa sector is projected to nearly double, rising from IDR 237.31 billion in 2024 to IDR 478.77 billion in 2033. Fashion & Crafts also record a sharp increase, from IDR 174.87 billion to IDR 361.99 billion over the same period. Transport & Services are forecasted to reach IDR 256.57 billion, while Agro-based Products are expected to grow to IDR 196.92 billion. These results reflect the maximum potential that could be achieved if tourism promotion strategies and international events are successfully implemented.

In addition, the optimistic scenario underscores the opportunities available to MSMEs when tourism growth is strongly supported by external drivers such as international events, improved infrastructure, and effective promotional strategies. This highlights the importance of proactive policy interventions and sustained investment to unlock the full potential of MSMEs in the Mandalika SEZ.



**Figure 1 Forecast of MSME Sales in Mandalika SEZ – Baseline Scenario**

Figure 1 not only visualizes the stability of MSME sales under baseline growth assumptions but also underscores the sectoral differentiation in responsiveness to tourism dynamics. The steeper slope of HoReCa and Fashion & Crafts curves indicates higher elasticity to demand shocks, whereas the gentler trajectory of Transport & Services and Agro-based Products reflects resilience with lower volatility. This contrast highlights the structural composition of MSMEs in Mandalika SEZ and emphasizes the necessity of sector-specific strategies to optimize tourism-driven growth. Such sectoral disparities resonate with the broader literature, as Song & Li (2008) emphasized that tourism demand modeling must account for heterogeneous responses across industries, while Schubert et al (2011) demonstrated how variations in tourism dependency shape the stability of local economic performance. These findings are also consistent with global perspectives, where UNWTO (2021) stressed the uneven recovery paths of tourism-dependent sectors after COVID-19, and WTTC (2020) highlighted the structural role of tourism in stabilizing employment and sustaining local enterprises during periods of global uncertainty.

Figure 2 illustrates the conservative scenario, where slower tourist growth of only 4% annually results in subdued trajectories for MSME sales. This situation highlights the vulnerability of demand-sensitive sectors such as HoReCa and Fashion & Crafts, which expand at a far slower pace compared to the baseline, while Transport & Services and Agro-based Products remain relatively stable. These findings align with Gunter & Önder (2016), who emphasized that forecasting models must capture heterogeneous sectoral responses in tourism demand, and Yang et al (2021), who demonstrated that shocks such as COVID-19 create asymmetrical recovery patterns across industries. At the policy level, UNWTO (2021) underlined the uneven recovery across tourism-dependent economies, while WTTC (2020) stressed that small enterprises are disproportionately exposed to risks when global travel is constrained. Collectively, the conservative scenario serves as a cautionary lens, reminding stakeholders of the importance of diversification, risk management, and resilience-building strategies in MSME development.

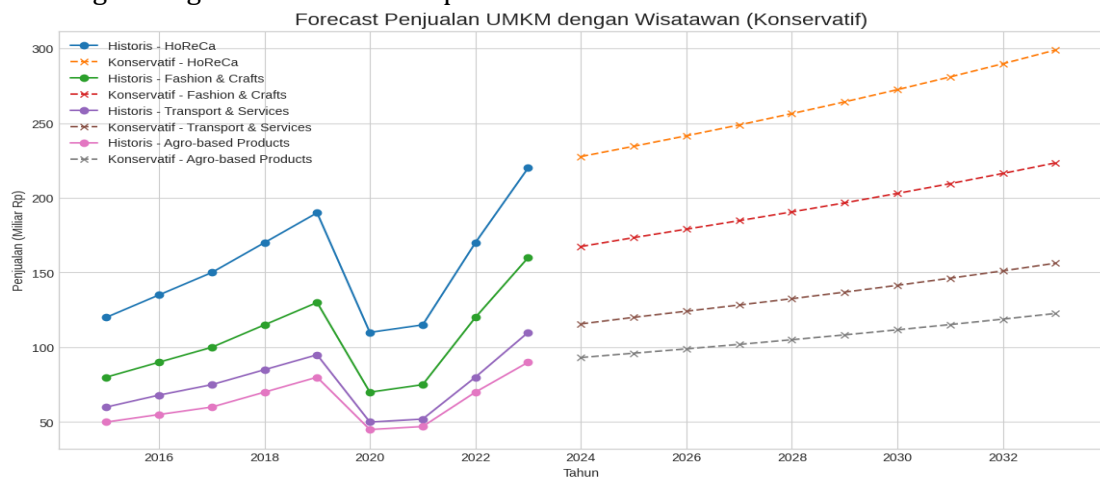
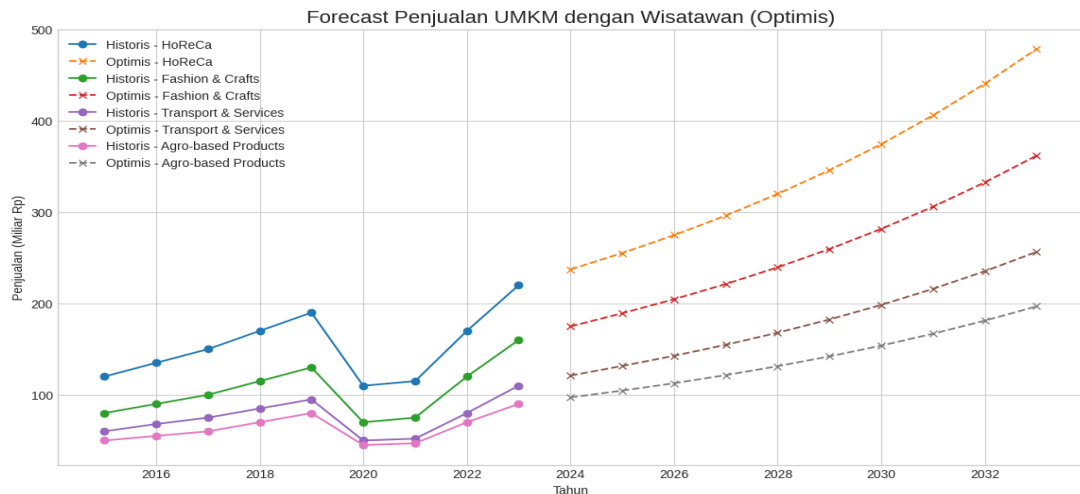


Figure 2 Forecast of MSME Sales in Mandalika SEZ - Conservative Scenario



**Figure 3 Forecast of MSME Sales in Mandalika SEZ – Optimistic Scenario**

Figure 3 depicts the optimistic scenario, where robust tourism growth of 10% annually accelerates MSME sales across all sectors. The steep climb of HoReCa and Fashion & Crafts demonstrates their ability to capture surging demand, while Transport & Services and Agro-based Products also benefit from positive spillovers. This acceleration is consistent with findings by Zhang et al (2020), who highlighted the effectiveness of advanced hybrid forecasting models in capturing strong demand surges, and Lee & Song (2012), who showed that rapid tourism growth can amplify sectoral disparities when demand responsiveness varies.

Taken together, Figures 1–3 provide a comparative illustration of how variations in tourist growth assumptions shape MSME performance trajectories in Mandalika SEZ. The baseline scenario reflects the most realistic path of stable expansion, the conservative scenario reveals the vulnerability of key sectors to slower demand, and the optimistic scenario demonstrates the potential acceleration that can be unlocked through strong tourism promotion and international event strategies. These visual comparisons highlight the critical role of tourism dynamics as a driver of MSME development and set the stage for further discussion on sectoral responsiveness and policy implications.

## Discussion

The findings of this study confirm that the HoReCa and Fashion & Crafts sectors are the most responsive MSME segments to the growth of tourist arrivals, whereas Transport & Services and Agro-based Products tend to experience more stable patterns of growth. The variations observed across the three forecasting scenarios (baseline, conservative, and optimistic) highlight the strong linkage between tourism demand dynamics and MSME sales performance in the Mandalika SEZ. These results emphasize that fluctuations in tourist arrivals represent a key determinant of small business growth in strategic tourism destinations.

When compared with prior literature, the results of this study reveal several points of alignment. Research in Bali by Prasetyo et al. (2024) underscored the importance of utilizing big data analytics to enhance the accuracy of tourism forecasting (Prasetyo et al., 2024). This finding resonates with the application of the SARIMAX model in the present study, which similarly enriches forecasting accuracy

through the integration of exogenous variables. Furthermore, the study on Singhasari SEZ by Anisah (2024) demonstrated that regulatory frameworks and policies play a critical role in strengthening tourism-driven local economic capacity (Anisah, 2024). This is consistent with the *motogp\_policy\_era* variable incorporated in this research, where international event policies were shown to drive improvements in MSME performance. In addition, the study on Likupang by Patadjenu et al (2023) highlighted the necessity of collaborative governance in the development of super-priority destinations (Patadjenu et al., 2023). The present study extends this discussion by introducing a novel dimension: forecasting MSME performance at the micro level, thereby complementing governance perspectives with evidence of economic performance projections.

From a practical standpoint, these findings provide valuable insights for local governments and the Mandalika SEZ Authority (ITDC) in formulating MSME empowerment strategies. The HoReCa and Fashion & Crafts sectors should be prioritized given their high sensitivity to tourism growth. Moreover, the three forecasting scenarios can serve as a basis for risk-informed planning, particularly in preparing mitigation strategies should tourist growth fall below expectations. At the same time, Agro-based Products may be strengthened through supply chain integration with tourism activities, such as farm-to-table initiatives or the development of agro-tourism programs.

From a theoretical perspective, this study reaffirms the relevance of SARIMAX in micro-level tourism analysis, particularly in the context of MSMEs. It contributes to the tourism forecasting literature, which has traditionally focused more heavily on macro-level indicators such as aggregate tourist arrivals or overall tourism revenues. By incorporating external factors such as the pandemic and international event policies, this study demonstrates that forecasting models can capture both negative shocks and positive momentum in MSME performance.

Nevertheless, this research is not without limitations. The exogenous variables employed were limited to the pandemic, MotoGP policy, and tourist arrivals. Other macroeconomic factors such as inflation, GDP growth, infrastructure investment, and domestic consumption were not included in the model. These limitations present opportunities for future studies to enrich forecasting models with a broader range of variables and to compare the performance of SARIMAX with machine learning approaches such as Long Short-Term Memory (LSTM) networks or Random Forests.

## **CONCLUSION AND RECOMMENDATIONS**

This study demonstrates that the SARIMAX (1,1,0) model with exogenous variables—namely the pandemic, MotoGP policy, and tourist arrivals—provides a comprehensive projection of MSME sales in the Mandalika SEZ. The analysis confirms that the HoReCa and Fashion & Crafts sectors are the most responsive to tourism growth, while Transport & Services and Agro-based Products exhibit more stable patterns. These findings carry important policy implications: local governments and the Mandalika SEZ Authority (ITDC) should prioritize strengthening the HoReCa and Fashion & Crafts sectors, while also integrating Agro-based Products through farm-to-table initiatives and agro-tourism strategies to enhance their linkages with the tourism industry. Scenario-based planning emerges as a critical instrument for risk mitigation, particularly if tourist growth falls below expectations, by preparing financing access, digitalization programs, and service innovations in the transport

and services sector. From a theoretical standpoint, this study contributes to the tourism forecasting literature by offering a micro-level perspective on MSMEs, complementing previous research that has predominantly focused on macro-level indicators.

Nonetheless, this research is limited to three exogenous variables and does not incorporate other macroeconomic factors such as inflation, infrastructure investment, or domestic consumption levels. Future studies should expand the model by integrating additional variables and considering alternative approaches such as machine learning to improve predictive accuracy. Long-term empirical validation is also essential to ensure that the projections are more representative and can serve as a stronger basis for evidence-based policymaking in the development of MSMEs within super-priority destinations.

## REFERENCES

- Alcalá-Ordóñez, A., Brida, J. G., & Cárdenas-García, P. J. (2024). Has the tourism-led growth hypothesis been confirmed? Evidence from an updated literature review. *Current Issues in Tourism*, 27(22), 3571–3607.
- Anisah, A. L. (2024). The development of Singhasari tourism special economic zone based on economic and financial regulation. *Jurnal Kepariwisata Indonesia*, 18(2), 279–292.
- Aryasih, P. A. (2024). Investigation of tourist satisfaction with the public service quality in Bali tourism area. *Jurnal Kepariwisata Indonesia*, 18(2), 293–310.
- Bi, J.-W., Liu, Y., & Li, H. (2020). Daily tourism volume forecasting for tourist attractions. *Annals of Tourism Research*, 83, 102923.
- BPS. (2024). *Perkembangan Pariwisata April 2024*. BPS NTB. <https://ntb.bps.go.id/id/pressrelease/2024/06/03/989/ntb--april-2024--perkembangan-pariwisata.html>
- Brida, J. G., Cortes-Jimenez, I., & Pulina, M. (2016). Has the tourism-led growth hypothesis been validated? A literature review. *Current Issues in Tourism*, 19(5), 394–430.
- Caraka, R. E., Wardhana, I. W., Kim, Y., Sakti, A. D., Gio, P. U., Noh, M., & Pardamean, B. (2023). Connectivity, sport events, and tourism development of Mandalika's special economic zone: A perspective from big data cognitive analytics. *Cogent Business & Management*, 10(1), 2183565. <https://doi.org/10.1080/23311975.2023.2183565>
- Chandra, S. (2024). The Effect of Online Presence and Service Quality on Business Performance of Tourism MSMEs. *ResearchGate Preprint / Journal Article*.
- Chen, C.-F., Lai, M.-C., & Yeh, C.-C. (2012). Forecasting tourism demand based on empirical mode decomposition and neural network. *Knowledge-Based Systems*, 26, 281–287.
- Cochrane, J. (2010). The sphere of tourism resilience. *Tourism Recreation Research*, 35(2), 173–185.
- Espiner, S., Orchiston, C., & Higham, J. (2017). Resilience and sustainability: A complementary relationship? Towards a practical conceptual model for the sustainability–resilience nexus in tourism. *Journal of Sustainable Tourism*, 25(10), 1385–1400.
- Guerrieri, V., Lorenzoni, G., Straub, L., & Werning, I. (2022). Macroeconomic implications of COVID-19: Can negative supply shocks cause demand shortages? *American Economic Review*, 112(5), 1437–1474.

- Gunter, U., & Önder, I. (2016). Forecasting international city tourism demand for Paris: Accuracy of uni- and multivariate models employing monthly data. *Tourism Management*, 53, 123–133.
- Hodijah, S. (2022). Model Development and Optimization of MSMEs Management in Improving the Welfare of the Community Around the Lake Sipin Tourism Area in Jambi City. *South East Asia Journal of Contemporary Business, Economics and Law*.
- Kenji, E. (2024). Impact of COVID-19 Pandemic on the Recovery and Resilience of the Hospitality and Tourism Industry in Southeast Asia. *ResearchGate Preprint / Journal Article*.
- Kibtiah, T. M., & Assgaf, S. N. Z. (2024). Recovery of the ASEAN Economy through a Sustainable Tourism Sector in the Post-COVID-19. *ASEAN Economic and Policy Studies Journal*.
- Kim, S., & Kim, K. (1998). Impact of tourism on local economies: An income multiplier analysis. *Asia Pacific Journal of Tourism Research*, 2(2), 49–56.
- Lee, C.-C., & Song, H. (2012). Tourism demand forecasting using time series, machine learning, and hybrid approaches. *Journal of Travel Research*, 51(5), 593–606.
- Lorenzoni, G. (2009). A theory of demand shocks. *American Economic Review*, 99(5), 2050–2084.
- Oliver, J. J., & Parrett, E. (2018). Managing future uncertainty: Reevaluating the role of scenario planning. *Business Horizons*, 61(2), 339–352.
- Pahrudin, P., Liu, L. W., Royanow, A. F., & Kholid, I. (2023). A LARGE-SPORT EVENT AND ITS INFLUENCE ON TOURISM DESTINATION IMAGE IN INDONESIA. *Tourism and Hospitality Management*, 29(3), 335–348. <https://doi.org/10.20867/thm.29.3.2>
- Patadjenu, S., Silitonga, M. S., & Asropi, A. (2023). Tourism development collaborative governance of Likupang, North Minahasa Regency. *Jurnal Kepariwisataaan Indonesia*, 17(1), 65–76.
- Peng, B., Song, H., Crouch, G. I., & Witt, S. F. (2015). A meta-analysis of international tourism demand elasticities. *Journal of Travel Research*, 54(5), 611–633.
- Prasetyo, A. R., Mariel, W. C. F., Ermawan, G. Y., & Pramana, S. (2024). Big data analytics for forecasting tourism recovery in Bali Island using multivariate time series. *Jurnal Kepariwisataaan Indonesia*, 18(2), 331–350.
- Ramírez, R., & Selsky, J. W. (2016). Strategic planning in turbulent environments: A social ecology approach to scenarios. *Long Range Planning*, 49(1), 90–102.
- Schubert, S. F., Brida, J. G., & Risso, W. A. (2011). The impacts of international tourism demand on economic growth of small economies. *Tourism Management*, 32(2), 377–385.
- Smeral, E. (2017). Tourism forecasting performance considering the instability of demand elasticities. *Journal of Travel Research*, 56(7), 913–926.
- Song, H., & Li, G. (2008). Tourism demand modelling and forecasting—A review of recent research. *Tourism Management*, 29(2), 203–220.
- Tapinos, E. (2012). Perceived environmental uncertainty in scenario planning. *Futures*, 44(4), 338–345.
- UNWTO. (2021). *Tourism and COVID-19: A crisis and recovery*. UNWTO.
- WTTC. (2020). *Economic impact report 2020: Global tourism performance*. World Travel and Tourism Council.
- Yang, H., Song, H., Cheung, C., & Guan, J. (2021). How to enhance hotel guests' acceptance and experience of smart hotel technology: An examination of visiting

- intentions. *International Journal of Hospitality Management*, 97, 103000.
- Yang, Y., Zhang, H., & Chen, X. (2021). COVID-19 and tourism: Dynamic stochastic modeling of shocks and recovery paths. *Tourism Economics*, 27(8), 1875–1896.
- Zhang, F., Sun, X., Liu, C., & Qiu, B. (2024). Effects of urban landmark landscapes on residents' place identity: The moderating role of residence duration. *Sustainability*, 16(2), 761.
- Zhang, F., Yang, L. V., & Sarker, M. N. I. (2024). Resilience and recovery: A systematic review of tourism governance strategies in disaster-affected regions. *International Journal of Disaster Risk Reduction*, 103, 104350.
- Zhang, Song, H., Wen, L., & Liu, C. (2020). Forecasting tourism demand with new hybrid models. *Tourism Economics*, 26(6), 1232–1252.