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Feasibility Analysis of Marketing Budget in Increasing International Tourist Arrivals to Indonesia Using System Dynamics

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ABSTRACT

This study analyses the relevance of the marketing budget in achieving the target of international tourist arrivals (ITA) to Indonesia post-pandemic. tourism contributed 6.9% to Indonesia's GDP in 2019. However, the COVID-19 pandemic disrupted this growth, leading to a significant decline in international tourist arrivals (ITA) to Indonesia. In 2020, international tourist arrivals dropped by 74.8%, from 16.2 million in 2019 to just 4.05 million. Using system dynamics modelling and Powersim 10 software, this research examines the relationship between marketing budget allocation, destination branding, and international tourist arrivals. The MAPE value of 3.14% indicates that the simulation model has high accuracy and can be relied upon for forecasting international tourist arrivals; the smaller the MAPE value, the more accurate the forecasting results. The results of the model show that the allocated budget is insufficient to meet the established target. It is recommended that the Ministry of Tourism and Creative Economy (Kemenparekraf) consider increasing the marketing budget by 10% annually to achieve the desired target. This budgetary intervention is expected to significantly impact the growth in international tourist arrivals and the resulting foreign exchange earnings.

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1. INTRODUCTION

Tourism is a significant contributor to economic development, generating foreign exchange, creating employment, and promoting regional growth. In Indonesia, the tourism sector accounts for a substantial part of the GDP. According to (Moreno-Luna et al., 2021), tourism contributed 6.9 per cent to Indonesia's GDP in 2019. However, the COVID-19 pandemic disrupted this growth, leading to a significant decline in international tourist arrivals (ITA) to Indonesia. In 2020, international tourist arrivals dropped by 74.8 per cent, from 16.2 million in 2019 to just 4.05 million. This dramatic reduction is a result of various factors, including global travel restrictions, safety concerns, and economic downturns, which severely affected tourism-dependent economies.

Globally, the impact of COVID-19 on tourism was not unique to Indonesia. In Spain, international tourist arrivals decreased by 77%, from 83.7 million in 2019 to just 19.7 million in 2020 (Moreno-Luna et al., 2021). Similarly, Italy experienced a nearly 80% decline in tourism revenue, with significant reductions in both international arrivals and tourism spending (Tourism, 2021). These figures emphasise the vulnerability of the tourism sector to global crises and highlight the need for robust recovery strategies. Post-pandemic, countries such as Spain, Italy, and Japan have adopted aggressive marketing and promotional strategies to regain international tourist confidence. In Spain, a focus on digital marketing and promoting safety protocols was central to its recovery plan (Alonso-Muñoz et al., 2022). Meanwhile, Japan's “Japan Welcomes You” campaign emphasised rebuilding trust and reassuring international travellers of safety, positioning Japan as a safe and culturally rich destination (Horita & Kato, 2020).

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In Indonesia, the government's response to the pandemic's impact on tourism includes various marketing strategies spearheaded by the Ministry of Tourism and Creative Economy. One of the key elements of Indonesia's recovery plan is the strengthening of the "Wonderful Indonesia" brand, which was launched in 2010 to promote the country's diverse tourist destinations. According to Shizhen et al. (2025) found that a positive experience encompassing sensory, affective, and behavioural interactions significantly enhances destination brand equity and tourist loyalty. This suggests that branding strategies should not only focus on visual identity or slogans but also create immersive and emotionally resonant experiences that foster long-term relationships with visitors. The brand focuses on Indonesia's rich cultural diversity, scenic landscapes, and warm hospitality, aiming to re-establish Indonesia as a competitive global tourism destination. However, the pandemic has significantly altered the landscape of international travel, requiring a re-evaluation of marketing strategies and the allocation of promotional budgets.

A critical factor in tourism recovery is the marketing budget allocated for promotional activities. Before the pandemic, Kemenparekraf allocated IDR 740.52 billion for tourism marketing in 2018 to achieve a target of 1.8 million additional international tourist arrivals. However, the budget allocation for 2023 is significantly reduced to IDR 194 billion, to reach 8.5 million international tourist arrivals. This sharp decline in funding raises concerns about the sufficiency of the marketing budget to achieve such an ambitious recovery target. Johar et al. (2022) emphasise the optimisation of marketing expenditures to maximise visitor arrivals and tourism revenue, reflecting strategic investments in enhancing brand equity. Their study adopts a portfolio theory approach to resource allocation, demonstrating that data-informed budgeting can stabilise fluctuations in tourist arrivals while improving economic returns. Similarly, Ruiz-Meza et al. (2024) developed a system dynamics model to analyse the long-term effects of tourism planning and marketing strategies. Their findings confirm that marketing budget allocation directly influences destination brand equity and tourism outcomes. This aligns with Aaker's (Aaker, 2025) conceptualisation of marketing as a fundamental lever in building strong, competitive destination brands. Lin et al. (2024) investigated how brand experience and brand positioning contribute to tourists' intention to revisit. Their findings indicate that a strong brand experience and consistent brand positioning significantly enhance visit intention, which is directly linked to tourist loyalty and repeat visitation. Similarly, Tarigan et al. (2024) found that destination brand experience significantly increases perceived authenticity, visitor satisfaction, and ultimately tourist loyalty. Satisfied tourists who perceive the destination brand as authentic are more likely to return, reaffirming the link between strong branding and repeat visits. In this context, the effectiveness of Indonesia's tourism recovery efforts will depend on the ability to strategically allocate its reduced budget to sustain and strengthen the "Wonderful Indonesia" brand.

In light of these challenges, System Dynamics (SD) modelling provides a useful framework for evaluating the potential outcomes of marketing budget allocation on international tourist arrivals. According to Sterman (2014), SD models can simulate the complex relationships between various factors in a dynamic system, allowing policymakers to assess the long-term impact of different budget scenarios. In a post-pandemic context, SD can help forecast the effects of incremental increases in marketing investment and provide insights into how the allocation of resources influences international tourist arrivals and foreign exchange earnings.

The experiences of other countries provide valuable lessons for Indonesia's tourism recovery. Spain's post-pandemic recovery plan focused heavily on digital platforms, promoting safety measures and building consumer trust through extensive media campaigns. Alonso-Muñoz et al. (2022) highlight the importance of digital engagement, which has become a critical element of tourism marketing in the post-COVID-19 era. Similarly, in Italy, marketing strategies were adjusted to target both domestic and international tourists, with an emphasis on Italy's cultural heritage and culinary experiences (Tourism, 2021). These strategies underscore the need for a flexible and integrated marketing approach, which Indonesia can adapt in its efforts to revitalise its tourism sector.

Japan's "Japan Welcomes You" campaign illustrates the importance of trust-building communication in tourism recovery. By assuring international tourists of Japan's readiness to provide safe travel experiences, the campaign successfully positioned Japan as a reliable destination for post-pandemic travel (Horita & Kato, 2020). This trust-building approach aligns with Saraswati & Afifi (2022) argument that tourism communication

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strategies must prioritise transparency and safety, two critical factors for restoring confidence in international travel. This study aims to evaluate the feasibility of Indonesia's tourism promotion budget using the System Dynamics model to project foreign tourist arrivals. There is an anomaly in the 2023 budget, which is down compared to 2022, but the target for foreign tourist visits in 2023 has increased compared to the number of visits in 2022. In our opinion, the available budget will not be enough to achieve the increase in the target number of foreign tourist visits in 2023 due to the decrease in the budget. The goal of the research is to optimise the marketing budget allocation for tourism promotion in Indonesia.

2. RESEARCH METHOD

2.1. Research Approach

This study adopts a quantitative approach with a System Dynamics (SD) simulation model to evaluate the feasibility of the marketing budget allocated by the Ministry of Tourism and Creative Economy to achieve the target of 8.5 million international tourist arrivals by 2023. This approach was chosen because System Dynamics allows for modelling the complex relationships between various variables within the tourism system, such as marketing budget allocation, destination branding, and tourist arrivals. System Dynamics (SD) is a method widely used to understand and simulate complex dynamic systems where feedback occurs between components of the system (Sterman, 2014).

2.2. Research Design

This research employs a System Dynamics (SD) simulation design to model the system influencing international tourist arrivals to Indonesia. The dynamic system is used to illustrate the feedback loops present in the tourism system and to analyse the long-term impact of marketing budget allocation on tourist arrivals. The model developed for this study integrates key variables such as: 1) the allocated marketing budget used for tourism promotion campaigns; 2) the strength and perception of the destination brand of Indonesia, directly affecting tourists' decision to visit Indonesia (Ruiz-Meza et al., 2024; Tappy & Mandagi, 2023) ; 3) the number of tourists visiting Indonesia, influenced by marketing campaigns and perceptions of the destination; 4) the revenue generated from international tourist arrivals that contribute to Indonesia's economy; 5) The data used in this study includes historical data on Indonesia's tourism marketing budget, international tourist arrivals, and related economic data from reliable sources such as Kemenparekraf, Statistics Indonesia, and global tourism economic reports. This data will be used to build initial parameters for the model (Li et al., 2023); 6) This study uses the Powersim10 software to construct the System Dynamics (SD) model.

This model illustrates the relationships between key variables mentioned above, such as marketing budget allocation, destination branding, and international tourist arrivals. The model includes feedback loops that describe the interactions between marketing expenditure, tourist perceptions, and international tourist arrivals. (Sterman, 2014) states that System Dynamics is especially useful for simulating complex relationships and identifying feedback effects within a system, which is highly relevant to the model developed in this research.

a) Based on the model built, simulations are performed to evaluate the impact of various marketing budget allocation scenarios. The scenarios tested include: Scenario 1: The marketing budget remains at the current level (IDR 194 billion in 2023). Scenario 2: A 10% annual increase in the marketing budget. Scenario 3: A more significant increase in the marketing budget, for instance, 20% annually. Each scenario is tested to assess its impact on the number of international tourist arrivals to Indonesia and the resulting foreign exchange earnings.
b) This study also performs sensitivity analysis to test the robustness of the model against changes in external variables that cannot be controlled, such as global economic fluctuations, changes in foreign policies, and shifts in tourist perceptions about safety and travel protocols post-pandemic (Hyunsoo, 2024).
c) The model developed will be validated by comparing the simulation results against historical data on international tourist arrivals and foreign exchange earnings in Indonesia from previous years. If the simulation results are sufficiently accurate, the model will be considered valid and can be used to predict the impact of marketing budget policies in the future (Li et al., 2023)

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The data obtained from the simulations will be analysed using descriptive statistical methods to describe the trends in international tourist arrivals and the impact of each marketing budget scenario. Mean Absolute Percentage Error (MAPE) will be used to measure the accuracy of the model in predicting the desired results (international tourist arrivals) (Hyunsoo, 2024).

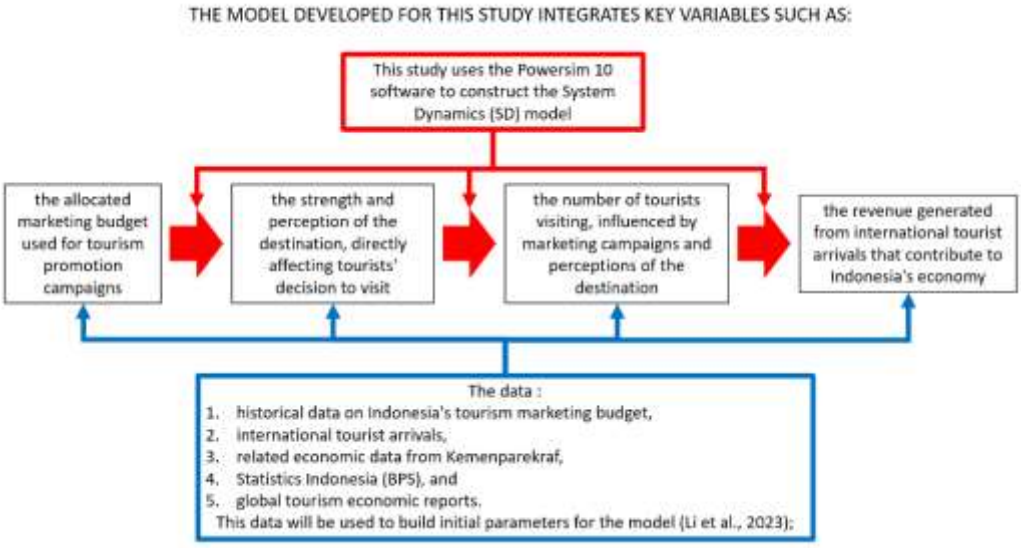


Fig 1. the Model Diagram Flow

3. RESULTS AND DISCUSSIONS

3.1. Result

The optimisation model of international tourist arrivals from the perspective of the marketing communication budget is constructed by considering the relationship between promotional budget allocation, brand strengthening, and ultimately, the number of international tourists and the foreign exchange generated. This model adopts the system dynamics approach proposed by Ruiz-Meza et al. (2024), which demonstrates that the strategic allocation of marketing funds directly enhances destination brand equity, subsequently driving measurable increases in tourist arrivals. Figure 2 illustrates the optimisation model, depicting the relationship between marketing budget allocation, destination branding, tourist numbers, and the resulting foreign exchange. System Dynamics is used to simulate the long-term effects of marketing budget allocation on international tourist arrivals and foreign exchange earned by Indonesia. This model shows that increasing the promotional budget is directly related to an increase in international tourist arrivals, as Li et al. (2023), who argued that larger marketing budgets can accelerate the post-pandemic recovery of the tourism sector.

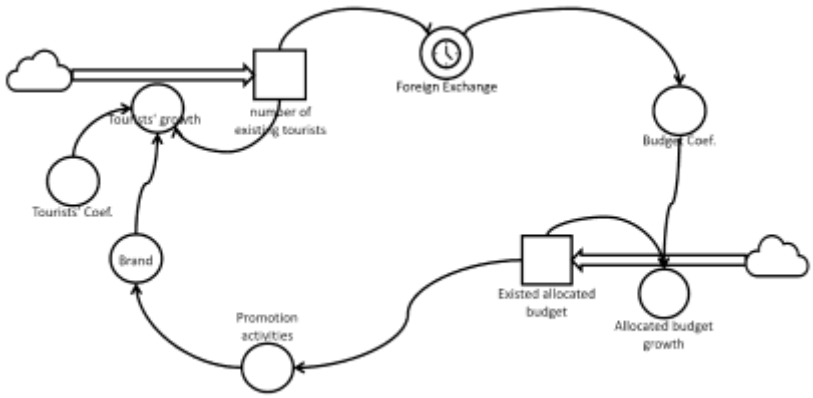


Fig 2. International Tourist Visit Optimisation Model Through Promotion Budget Perspective

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Table 1 presents the relevant budget data used to construct the dynamic model related to optimising international tourist visits. The data reflects a significant decline in budget allocations year on year. Although promotional budgets have decreased, the promotional activities undertaken remain varied. Findings that underscore the importance of adequate marketing investment in effectively introducing the uniqueness of a destination to the international market include the study by (Ruiz-Meza et al., 2024), which demonstrates through a system dynamics model that the strategic allocation of promotional budgets can significantly strengthen destination brand equity and ultimately increase the number of international tourist arrivals. Eddyono et al. (2025) also indicates that the tourism sector, particularly in Indonesia, requires a more holistic, data-driven marketing approach to restore tourist arrivals. This aligns with the simulation results, which show the importance of increasing budget allocation to optimise tourist numbers. In this case, the role of marketing communication driven by adequate budgets is crucial to developing a positive image and boosting international tourist numbers.

Table 1. Budget x Tourist x Foreign Exchange

Year	Budget	Promotions	Brand Awareness	Tourist Arrivals	Foreign Exchange
2015	IDR 627.42B			10.496M	IDR 169.860T
2016	IDR 1.084B			11.519M	IDR 184.072T
2017	IDR 678.02B			14.039M	IDR 225.589T
2018	IDR 740.52B	19 Program		15.810M	IDR 273.856T
2019	IDR 376.08B	14 Program		16.106M	IDR 260.851T
2020	IDR 257.88B	6 Program	63/100	4.052M	IDR 127.721T
2021	IDR 231.61B	7 activities	4.12 Likert Scale	1.557M	IDR 69.003T
2022	IDR 235B	75 activities	2.47 Likert scale	5.471M	
2023	IDR 194B	31 activities		8.5M	

3.1.2. Analysis of Research Results

In this study, the System Dynamics (SD) model developed using Powersim10 software aims to evaluate the impact of marketing budget allocation on international tourist arrivals and foreign exchange earnings in Indonesia. Three budget allocation scenarios were tested to assess their impact on Indonesia's tourism sector: Scenario 1: The marketing budget remains at IDR 194 billion (allocated budget for 2023). Scenario 2: A 10% annual increase in the marketing budget. Scenario 3: A 20% annual increase in the marketing budget.

Table 2. MAPE Calculation

Year	Simulation (St)	Actual (At)	MAPE
2015	10,496,000	10,496,000	-
2016	11,514,112	11,519,000	(0.042)
2017	14,104,787	14,039,000	0.496
2018	15,797,361	15,810,000	(0.080)
2019	16,160,700	16,106,000	0.340
2020	4,040,175	4,052,000	(0.292)
2021	1,616,070	1,557,000	3.794
2022	5,413,834	5,471,000	(1.045)
2023	8,499,720	8,500,000	(0.003)
			3.14%

To ensure the validity of the model, an analysis was conducted using the MAPE (Mean Absolute Percentage Error) approach, which measures the accuracy of the simulation results compared to actual data (Sterman, 2014). The MAPE calculation in Table 2 shows that the value of 3.14% indicates that the simulation model has high accuracy and can be relied upon for forecasting international tourist arrivals, consistent with De Myttenaere et al. (2016) and Long & Shi (2017), who stated that the smaller the MAPE value, the more accurate the forecasting results.

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Table 3. Simulation Result Model of Number of Tourists

Year	Tourist BAU	Tourist Simulation
2015	10.496.000,00	10.496.000,00
2016	11.514.112,00	11.579.966,00
2017	14.104.787,20	14.263.479,34
2018	15.797.361,66	16.079.028,83
2019	16.160.700,98	16.577.766,53
2020	4.040.175,25	4.292.398,99
2021	1.616.070,10	1.759.738,30
2022	5.413.834,83	5.913.695,40
2023	8.499.720,68	9.348.423,26
2024	8.584.717,89	9.551.165,18
2025	9.998.167,51	11.249.702,12
2026	13.190.526,07	15.009.503,32
2027	19.442.064,44	22.381.668,32
2028	31.663.127,11	36.915.557,22

Table 3 compares the number of tourists in the BAU model and the policy intervention model, showing that increasing the promotional budget results in a significant increase in tourist arrivals. The study by Ruiz-Meza et al. (2024), which utilizes a system dynamics model, demonstrates that the strategic allocation of promotional budgets directly enhances destination brand equity, which in turn leads to measurable increases in international tourist arrivals. This finding reinforces Aaker's assertion that investment in brand-building is a key element in enhancing the value and attractiveness of a destination. After the model was deemed valid, simulations were run using two scenarios: Business As Usual (BAU) and policy intervention, particularly policies related to the promotion budget. Figure 3 shows the simulation results for the estimated number of tourists under both scenarios. The simulation results indicate that in the BAU scenario, Indonesia will reach 31,663,127 tourists by 2028, while with policy intervention involving a 10% increase in the promotion budget, the number of tourists rises to 36,915,557, an increase of 16.59 per cent.

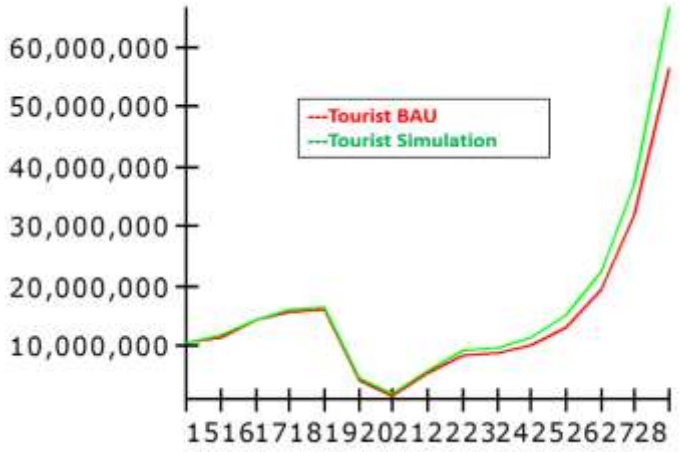


Fig 3. Number of Tourists from the BAU Model Simulation Results and the Intervention Model

Figure 4 shows the increase in foreign exchange that will be obtained from the higher number of tourists. Without policy intervention, foreign exchange earnings in 2028 will reach approximately USD 1.0 trillion, while with policy intervention through increased promotional budget, foreign exchange earnings could increase to USD 1.16 trillion, representing a 16% increase. These findings are consistent with the results of (Florido-Benítez, 2025), who, in their study of eight provinces in Andalusia, found that the strategic allocation of tourism promotion budgets, particularly those leveraging a combination of digital and traditional media, significantly stimulated international tourism demand by enhancing brand differentiation and reducing seasonal

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fluctuations. Similarly, Florido-Benítez (2024) demonstrated that increased regional promotional spending was positively correlated with key tourism performance indicators, including the number of tourist arrivals, average length of stay, and per capita tourist expenditure. These findings support the argument that well-funded destination marketing initiatives not only enhance inbound tourist flows but also increase foreign exchange earnings, thereby reinforcing the economic rationale for sustained investment in tourism promotion.

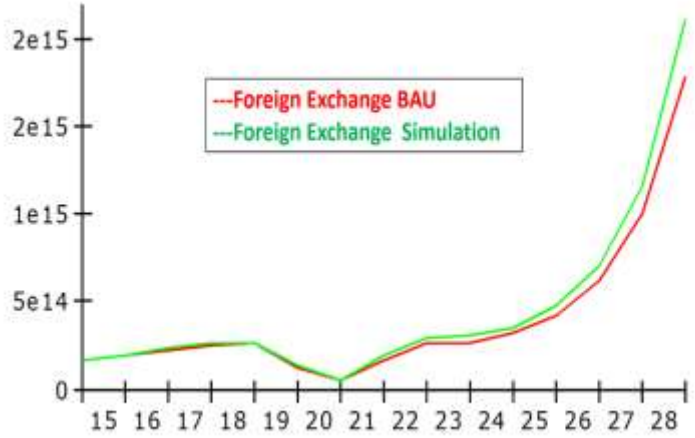


Fig 3. Foreign Exchange Simulation Result Model

3.2 Discussion

Several factors require government policy intervention, as highlighted by Eddyono (2021), who emphasise the importance of innovation-based policies in enhancing the competitiveness of Indonesia's tourism sector. Regarding budget allocation, Eddyono et al., (2021a) argue that the success of improving tourism destination competitiveness is significantly influenced by factors such as efficient budget management and the adoption of information technology to support promotional efforts. In this context, policy interventions that increase promotional budget allocations can reinforce the competitiveness of Indonesia's tourism sector, as demonstrated in this simulation model. Based on the simulation results, it can be concluded that the current marketing budget allocation is inadequate to achieve the ambitious target of 8.5 million international tourist arrivals by 2023. Aaker's Brand Equity Model (Aaker, 2025) underscores that a strong destination brand is largely dependent on sustained promotional investment. Without an increase in promotional budget, the development of the "Wonderful Indonesia" brand will remain suboptimal, thereby limiting tourist arrivals.

The simulation incorporating a policy intervention—in the form of a 10% increase in the promotional budget—shows a significant improvement in projected tourist arrivals. This finding aligns with (Schmitt, 2011) assertion that the success of experiential marketing hinges on adequate financial support. Similarly, (Kotler & Gertner, 2011) emphasize that effective destination marketing requires sufficient budgetary allocations to communicate the distinctiveness of a destination to international markets. Moreover, the increased promotional budget also contributes positively to foreign exchange earnings, as supported by findings from (Eddyono, 2022), who identified a significant correlation between tourism competitiveness, international tourist arrivals, and non-tax state revenue in Indonesia's national parks. Accordingly, a sustained promotional budget policy constitutes a strategic measure to strengthen national tourism competitiveness, boost international tourist arrivals, and support the post-pandemic recovery of Indonesia's tourism industry.

3.3. Policy Implications

Based on these research results, several policy recommendations for Kemenparekraf are: To achieve higher international tourist arrivals, Kemenparekraf needs to consider a gradual increase in the marketing budget, especially for broader and more integrated digital promotions. A larger and sustainable marketing budget allocation will strengthen the Wonderful Indonesia brand and encourage more tourists to choose Indonesia as a tourist destination. Developing more diverse marketing strategies, including utilising influencers, social media campaigns, and international partnerships, will enhance Indonesia's visibility in global markets.

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4. CONCLUSION

Based on the scenario simulations of the optimisation model for increasing international tourist arrivals from the perspective of promotional budget allocation, several important conclusions can be drawn. First, the implementation of marketing communication budget policies aimed at increasing foreign tourist visits requires a significant increase in budgetary allocation to achieve the desired targets. The analysis indicates that without additional investment, it will be challenging to meet the projected growth in tourist arrivals. Second, the optimisation model suggests that a 10 per cent increase in the marketing communication budget is necessary to generate an estimated 17 per cent increase in international tourist arrivals and a corresponding 16 per cent growth in foreign exchange earnings. This illustrates the high leverage effect of promotional spending, emphasising the strategic role of marketing investment in boosting both tourism volume and economic returns. Third, the simulation results show that with policy intervention—specifically, an increase in promotional activity—the number of foreign tourist arrivals is projected to recover to pre-pandemic levels by the year 2026. Under this scenario, Indonesia could reach approximately 15 million international tourist arrivals, restoring the momentum of the tourism sector and contributing significantly to national foreign exchange income. These findings underscore the critical importance of strategic and data-informed budget planning in tourism promotion, particularly in post-pandemic recovery efforts. They also validate the relevance of system dynamics modelling as a decision-support tool for tourism policy design and investment optimisation.

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