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Creative Economy Shocks and Tourism Dynamics

A DSGE Approach

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Abstract

Introduction/Main Objectives: This article introduces the use of Dynamic Stochastic General Equilibrium (DSGE) as a sophisticated macroeconomic approach to analyze the impact of shocks on the relationship between tourism and the creative economy.

Background Problems: Tourism and the creative economy are two interrelated sectors that have a strategic role in supporting sustainable development. The relationship between the two is often difficult to explain with conventional approaches such as panel regression and Structural Equation Modeling (SEM), because these methods tend to be static and are less able to capture the dynamics of global shocks.

Research Methods: The DSGE model was built using secondary data from UNWTO, the World Bank, and the IMF, and includes four main agencies: households, governments, the tourism sector, and the creative sector.

Finding/Results: The estimated results show that the digitalization shock has a significant positive impact by increasing creative output, tourism consumption, and creative GDP contribution in the short and long term. In contrast, the pandemic shock caused a major contraction in tourist arrivals and tourism output, although a gradual recovery occurred over several periods.

Conclusion: The findings of this study have practical implications for policymakers, particularly in designing creativity-based recovery strategies, strengthening creative ecosystems, and encouraging sustainable tourism growth in the digital and post-pandemic era.

Keywords: Creative Economy, Tourism Dynamics, DSGE Model, Global Shocks, Sustainable Development

Introduction

Global tourism in recent years has experienced very significant dynamics, especially after the major shocks caused by the COVID-19 pandemic. The health crisis that has hit the world has not only had an impact on the health and social sectors, but also shaken the foundations of the international economy, including the tourism industry which has been one of the driving forces of economic growth in many countries (Salinas Fernández et al., 2022; Škare et al., 2021). As the pandemic forced mobility restrictions, border closures, and temporary halts of travel activities, the tourism sector experienced an unprecedented contraction (Lee et al., 2023; Saha et al., 2021). However, after the crisis period, the world witnessed a fairly rapid recovery process, marked by a resurgence in international tourists, a resurgence of destinations, and the emergence of new strategies that emphasize more on sustainability and innovation (Aronica et al., 2022; Stackpole et al., 2021; Yakubovskiy & Kyrychenko, 2024). This recovery is not only quantitative in terms of the number of visits, but also qualitative because it involves a transformation of the perspective on tourism as part of the creative economy ecosystem (Ozbay et al., 2022; Yepez & Leimgruber, 2024; Zhao et al., 2023).

The creative economy is playing an increasingly important role in supporting the revival of tourism. This concept refers to economic activities based on ideas, creativity, and innovation, covering sectors such as art, culture, design, culinary, music, film, and digital technology (Ramlall, 2024; Widarni & Bawono, 2021, 2023). In the context of tourism, the creative economy is not only a complement, but also the main motor that is able to create destination differentiation, strengthen local identity, and increase tourist attraction (Triatmanto et al., 2023; Viphindrartin & Bawono, 2025). For example, cultural festivals, art exhibitions, or culinary experiences typical of a region become an attraction that cannot be replaced by other destinations. Furthermore, the integration of the creative economy in tourism also supports the sustainable development agenda, as it encourages the empowerment of local communities, cultural preservation, and the creation of new jobs based on knowledge and creative skills. Thus, the post-pandemic tourism recovery cannot be separated from the role of the creative economy as a catalyst for innovation and sustainability.

Although the relationship between tourism and the creative economy is increasingly recognized, academic research that explores the relationship between the two is still relatively limited, especially in terms of the methodological approach used. Most previous studies have used conventional methods such as panel regression, descriptive analysis, or structural equation modeling to explain the relationship between tourism variables and the creative economy (Gedikli et al., 2022; Liu et al., 2022). This approach does provide a fairly clear picture of the correlations and influences between variables, but it is often unable to capture the long-term dynamics, uncertainties, and impacts of external shocks that are stochastic. In fact, the tourism sector is very vulnerable to global shocks, both in the form of health crises, technological changes, and international policies (Henseler et al., 2022; Sasongko et al., 2021). Therefore, a more sophisticated analytical framework is needed and is able to explain the complex interactions between economic agents in conditions full of uncertainty.

It is in this context that the use of Dynamic Stochastic General Equilibrium (DSGE) becomes relevant and offers a new contribution. The DSGE is a macroeconomic model designed to analyze how the economy reacts to various shocks, taking into account the behavior of economic agents such as households, firms, and governments (Cao et al., 2021; Li, 2022). This model allows simulation of the impact of policies, technological changes, and external shocks on key macroeconomic variables (Keshavarzi & Horry, 2023; Peykani et al., 2023). When applied to the tourism and creative economy sectors, DSGE can help explain how global shocks, such as pandemics or digitalization, affect the interaction between tourism

consumption, creative investment, and economic growth (Chen et al., 2023; H. Zhang & Yang, 2023). With this approach, the research not only stops at the static relationships between variables, but is also able to describe more realistic short-term and long-term dynamics (Salam et al., 2025; L. Zhang et al., 2025).

The research gap that emerged was the lack of studies that used the DSGE approach in the context of tourism. Most of the tourism literature still focuses on descriptive or conventional econometric analysis, so not many have harnessed the power of dynamic macroeconomic models to explain complex phenomena in this sector. In fact, tourism as a sector that is heavily influenced by external factors requires an analytical framework that is able to capture uncertainty and interaction between economic agents more comprehensively. Thus, this research seeks to fill this gap by introducing DSGE as a new approach in tourism and creative economy studies. The main contribution of this research is to provide a deeper understanding of how global shocks affect the relationship between tourism and the creative economy, as well as how policies can be designed to strengthen the resilience of the sector.

In addition, the use of DSGE in tourism research also has significant practical implications. This model can be used to simulate the impact of government policies, such as investments in the creative sector or incentives for the tourism industry, on economic growth and community welfare. With simulation results based on secondary data from international institutions such as UNWTO, World Bank, and IMF, this study can provide more weighty and evidence-based policy recommendations. This is important because policymakers need an analytical framework that not only explains current conditions, but also predicts the long-term impact of decisions taken. In the context of post-pandemic recovery, the right policies can accelerate the revival of tourism while strengthening the role of the creative economy as a pillar of sustainable development. The DSGE approach provides an opportunity to integrate macroeconomic and microeconomic aspects in a single comprehensive analytical framework, where tourist consumption behavior can be directly linked to the investment decisions of creative economy actors, while government fiscal policies can be analyzed in relation to the growth of the tourism sector. This research is not only relevant for academics interested in macroeconomic theory, but also for tourism and creative economy practitioners who need a deeper understanding of the dynamics of their sectors, thus making DSGE a powerful analytical tool to explain complex phenomena involving many actors and variables. In the academic realm, this research is expected to be able to expand the methodological horizon of tourism studies by introducing more sophisticated and dynamic approaches, providing theoretical contributions in the form of enrichment of literature with models that are able to capture global uncertainty and shocks, as well as practical contributions in the form of policy recommendations that are evidence-based and can support strategic decision-making. Thus, this research not only fills the existing methodological gap, but also provides added value for the development of tourism and the creative economy in the post-pandemic era, with the main objective of analyzing the impact of global shocks on the relationship between the two in a more in-depth and sustainable manner.

The study of creative tourism and the creative economy has grown rapidly in the last two decades, especially after the emergence of awareness that tourism is no longer seen as a mere recreational activity, but as a sector that is able to drive innovation, sustainability, and knowledge-based economic growth. Creative tourism theory departs from the idea that modern travelers are looking for more authentic, interactive, and local culture-based experiences (Aronica et al., 2022; Škare et al., 2021). They are no longer satisfied with just enjoying natural scenery or recreational facilities, but rather want to engage in creative activities such as learning to make crafts, taking traditional culinary cooking classes, or attending local art performances. This concept emphasizes the importance of creativity as the main resource in creating added value for tourist destinations. Meanwhile, creative economy theory highlights the role of idea-based and innovation-based sectors in supporting

economic development (Liu et al., 2022; Yepez & Leimgruber, 2024). The creative economy encompasses various fields such as art, design, music, film, culinary, and digital technology, all of which have great potential to strengthen tourism attraction. The integration between creative tourism and the creative economy produces synergies that can increase the competitiveness of destinations, strengthen cultural identity, and create new economic opportunities for local communities (Salinas Fernández et al., 2022; Viphindrartin & Bawono, 2025; Widarni & Bawono, 2021, 2023).

Previous studies have used a lot of conventional quantitative approaches such as data panels (Gedikli et al., 2022; Triatmanto et al., 2023) and structural equation modeling (SEM) (Saha et al., 2021). Data panels help identify the influence of the creative economy on tourism growth, but they tend to be static and less able to capture long-term dynamics. SEM allows analysis of latent relationships between variables such as creativity, tourist satisfaction, and economic growth, but is limited to cross-sectional survey data. In addition, bibliometrics are used to map research trends (Ozbay et al., 2022), but they are more descriptive without explaining causal mechanisms.

The weaknesses of conventional methods are increasingly visible when faced with global shocks such as the COVID-19 pandemic, which drastically changed tourist consumption patterns, creative investment, and government policies (Henseler et al., 2022; Lee et al., 2023; Stackpole et al., 2021; Yakubovskiy & Kyrychenko, 2024; Zhao et al., 2023). The data panel only shows average relationships, SEM is limited to surveys, and bibliometrics are not able to explain the deep economic mechanisms. Therefore, a more sophisticated approach is needed.

The position of Dynamic Stochastic General Equilibrium (DSGE) becomes relevant. DSGE is able to analyze how the economy reacts to shocks by considering the behavior of economic agents (Cao et al., 2021; Keshavarzi & Horry, 2023; Li, 2022; Peykani et al., 2023). When applied to tourism, DSGE explains how the pandemic or digitalization affects tourism consumption, creative investment, and economic growth (Chen et al., 2023; Ramlall, 2024; Salam et al., 2025; H. Zhang & Yang, 2023; L. Zhang et al., 2025). Its advantage is the integration of macro and micro aspects in a single analytical framework, so that tourist consumption behavior can be linked to creative investment decisions, while fiscal policy is analyzed in relation to tourism growth (Sasongko et al., 2021).

Thus, while data panels, SEM, and bibliometrics make important contributions, their limitations in capturing the dynamics of global shocks make the results less comprehensive. DSGE offers solutions with a more dynamic and realistic analytical framework, enriching the international literature while supporting the sustainable development agenda through the integration of tourism and the creative economy.

Research Methods

This study uses secondary data from credible international institutions. Tourism data is obtained from UNWTO, including international tourist arrivals, tourism expenditure, and destination indicators. Creative economy and macroeconomic data are taken from the World Bank, including the contribution of the creative sector to GDP, creative investment, and innovation-based development indicators. The IMF provides data related to fiscal, monetary, and external shocks such as the global uncertainty index. The combination of these three sources provides a comprehensive database to build DSGE models that are relevant to the creative tourism context.

The DSGE model used in this study involves four main agents: households, governments, the tourism sector, and the creative sector. Households maximize the intertemporal utility over general consumption and tourist consumption. The creative sector produces outputs based on ideas and innovations that increase tourism productivity. The tourism sector provides tourism services that depend on global stocks of creativity and demand. The government plays a role in fiscal and monetary policies that affect the balance of the system. With this framework, research can simulate the impact of global shocks such as pandemics or digitalization on interactions between sectors.

Parameter estimation was carried out using a Bayesian approach. This method was chosen because it is able to combine prior information from the literature with empirical data, as well as produce a posterior distribution that is more informative than just a point estimate. The estimation process is carried out by utilizing secondary data that has been collected, so that the results reflect real conditions. The main outputs are in the form of elasticity parameters, shock persistence, and short- and long-term effects on tourism and creative economy variables.

Table 1. Variable Description

Variable	Description	Era	Unit Analysis
UNWTO	International tourist arrivals	2010–2025	Million people
UNWTO	International tourist spending	2010–2025	Billion USD
UNWTO	Average length of stay of tourists	2010–2025	Day
World Bank	Contribution of the creative economy to GDP	2010–2025	Percentage (%)
World Bank	Creative sector investment	2010–2025	Billion USD
World Bank	Workforce in the creative sector	2010–2025	Million people
IMF	Fiscal policy (government spending, taxes)	2010–2025	Percentage of GDP
IMF	Monetary policy (policy interest rate)	2010–2025	Percentage (%)
IMF	Global uncertainty index	2010–2025	Table of Contents (0–100)

Table 1 shows that this study uses longitudinal data covering the period 2010–2025, thus allowing for long-term dynamics analysis. Variables from UNWTO provide a direct picture of global tourism performance, such as the number of arrivals, expenses, and length of stay of tourists. Data from the World Bank strengthens the analysis with creative economy indicators, which are the key variables in this study, namely the contribution to GDP, investment, and labor. Meanwhile, data from the IMF serves to capture policy dimensions and external shocks, such as fiscal, monetary, and global uncertainties. The combination of these three sources ensures that the DSGE model built has a strong empirical basis, covering aspects of tourism, creative economy, and macroeconomic policies.

With formula:

Household

Households are assumed to maximize the intertemporal utility of general consumption () and tourist consumption (), with preferences that consider substitutions between consumption categories. Utility functions are written as:

$$U = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{(C_t^{1-\phi} \cdot (C_t^T)^{\phi})^{1-\sigma}}{1-\sigma} - \chi \frac{N_t^{1+\eta}}{1+\eta}\right] \quad \text{.....1}$$

where are the discount factors, the weight of tourist consumption preferences, the elasticity of substitution between consumptions, the parameters of work utility, and labor. Households face budget constraints that connect consumption, savings, and income from wages and profits in the creative and tourism sectors.

Creatice Sector

The creative sector produces outputs based on ideas and innovations that increase tourism productivity. Its production function is in the form of Cobb-Douglas:

$Y_t^K = A_t^K \cdot K_t^{\alpha_K} \cdot L_t^{K\,1-\alpha_K}$ **.....2**

where are creative productivity (which can be affected by digitalization shock), creative capital, and creative workforce. The parameters show the contribution of capital to creative output. This creative output plays an important role as an important input in the tourism sector.

Tourism Sector

The tourism sector produces tourism services that depend on the stock of creativity. Its production functions are:

$Y_t^T = A_t^T \cdot (K_t^T)^{\alpha_T} \cdot (L_t^T)^{1-\alpha_T} \cdot (K_t)^{\gamma}$ **.....3**

Where are tourism productivity (which can be affected by pandemic shocks), tourism capital, tourism workforce, and creativity stocks. The parameters show the extent to which creativity increases tourism output. Thus, the tourism sector relies not only on traditional production factors, but also on creative inputs.

Government

The government sets fiscal and monetary policy through simple rules that affect policy interest rates:

$i_t = \bar{\imath} + \phi_\pi(\pi_t - \bar{\pi}) + \phi_y(y_t - \bar{y}) + \varepsilon_t^i$ **.....4**

where are the policy interest rates, inflation, output-gap, are the policy targets, and policy shocks. These rules allow simulations of how fiscal and monetary policies respond to changes in the tourism and creative economy sectors. To clarify the role of each agent in the model, Table 2 is presented. Agents and Variables of DSGE Models.

Table 2. Agents and Variables of DSGE Models.

Agent	Main Functions	Endogenous Variable	Relevant Shocks
Household	General consumption and tourism, labor	C_t, C_t^T	Tourism consumption preferences
Creative Sector	Production of ideas and innovations	$Y_t^K, , K_t L_t^K$	Digitization shock ()A_t^K
Tourism Sector	Production of tourism services based on creativity	$Y_t^T, , K_t^T L_t^T$	Pandemic shock (), tourism preferences ($A_t^T Z_t$)
Government	Fiscal and monetary policy	$i_t, , T_t G_t$	Policy shock ()ε_t^i

Table 2 illustrates the basic structure of the Dynamic Stochastic General Equilibrium (DSGE) model used to analyze the interaction between creative tourism and the creative economy. Each agent in the model has a key function, endogenous variables that determine behavior, as well as relevant shocks that affect system dynamics. Households play a role as demand centers with the main function of consuming general goods and tourism and providing labor, where the associated endogenous variables are (general consumption), (tourism consumption), and (labor). A relevant shock for households is the preferences of tourism consumption, which can change due to global or cultural trends that affect consumption patterns and demand for creative tourism services.

The creative sector functions to produce ideas and innovations as important inputs for creative tourism, with endogenous variables in the form of (creative output), (creative capital), and (creative workforce). A relevant shock is digitalization (), which increases the productivity of ideas and innovation and strengthens the appeal of destinations through digital content, online promotions, and technology-based experiences. Meanwhile, the tourism sector plays a role in producing creativity-based tourism services with endogenous variables (tourism output), (tourism capital), and (tourism workforce). The relevant shocks are the pandemic () and tourism preferences (), which make the sector highly vulnerable to external shocks. The pandemic suppressed tourist arrivals and tourism output, while tourism preferences determined the direction of demand. The integration of creativity is a resilient factor that helps the sector recover from the pressure.

The government in the model functions to set fiscal and monetary policies, with endogenous variables in the form of (interest rates), (taxes), and (government spending). A relevant shock is the policy shock (), which affects consumption, creative investment, and tourism competitiveness. The government plays the role of a stabilizer of the system, where adaptive policies can strengthen the resilience of the tourism sector to global shocks. Overall, this table confirms that the interaction between agents in the DSGE model provides a comprehensive analytical framework to understand the dynamics of creative tourism in the face of global uncertainty.

Parameter estimation with Bayesian approach

In this study, the parameters of shock elasticity and persistence were estimated using a Bayesian approach that allowed integration between theoretical information from the literature and empirical evidence from secondary data from UNWTO, World Bank, and IMF secondary data. The main goal of this approach is to obtain a posterior distribution that not only provides an estimation point, but also reflects the inherent uncertainty of each parameter. Thus, the estimation results are more informative because they present a range of values that are most consistent with the data, rather than just a single number.

The DSGE model used is first logged-linear around the state of default so that observational variables such as tourism consumption, tourism output, creative economy contribution, service sector inflation, and policy interest rates can be mapped directly into the equation system. The parameters that go into this model are then estimated by Bayesian inference. Prior was determined based on the macroeconomic literature and tourism studies for price and income elasticity, while for the persistence of digitalization shock references from creative technology research were used. Prior is chosen to be informative but not too restrictive, with distributions that correspond to parameter domains, e.g. normal distributions for elasticity and beta distributions for persistence parameters.

To ensure the validity of the results, the Markov chains used in sampling were checked for convergence through various diagnostics. Concise statistics such as R-hat approaching 1, low autocorrelation, and stability of posterior summaries between chains are indicators that

the resulting inferences are not biased due to convergence failures. With this framework, Bayesian estimation not only provides parameter values that are consistent with the data, but also shows a realistic level of uncertainty, so that the results of the analysis are more reliable in explaining the dynamics of tourism and the creative economy under various global shocks. To clarify the prior specification, distribution form, and posterior yield summary, Table 3 is presented which summarizes the estimated core parameters, including shock elasticity and persistence along with a credible interval of 95 percent.

Table 3. Bayesian estimation parameters

Parameters	Prior (red)	Prior Distribution	Mean Posterior	Credible interval (95%)
Elasticity of tourist prices	1.50	Usual	1.62	[1.41, 1.83]
Tourism revenue elasticity	0.80	Usual	0.92	[0.73, 1.04]
Elasticity of tourism output to creativity (γ)	0.30	Beta	0.34	[0.27, 0.40]
Persistence of creative productivity shock	0.70	Beta	0.76	[0.71, 0.81]
Persistence of tourism productivity shock	0.60	Beta	0.65	[0.59, 0.71]
Persistence of global tourism preferences	0.50	Beta	0.57	[0.50, 0.64]

Table 3 shows that the elasticity of tourism prices has a posterior mean above the prior (1.62 vs 1.50), indicating that tourism demand is quite responsive to relative price changes between tourism services and general consumption. The narrow credible interval indicates moderate uncertainty and is consistent with the longitudinal tourism data. The income elasticity is in the range of 0.92, implying that tourism is a normal commodity with a real but not exaggerated income sensitivity; This is in line with the increase in travel volume during the global economic recovery.

The parameter that captures the contribution of creativity stocks to tourism output has a posterior mean of 0.34, higher than the prior, reinforcing the hypothesis that creative economy integration increases the productivity of the tourism sector. The credible interval [0.27, 0.40] showed a stable effect and was not a statistical coincidence. The persistence of creative productivity shocks indicates that the drive for digitalization and innovation has a lasting effect across periods, driving medium-term impacts on creative output and, through , on tourism.

The persistence of tourism productivity shocks is at a medium level, reflecting that shocks such as the pandemic are fading but not immediate; There is a recovery phase that takes several periods to return to a state of tune. Meanwhile, it shows global tourism preferences are gradually recovering—persistent enough to affect demand pathways, but at a relatively faster normalization pace than productivity.

Overall, the combination of elasticity and shock persistence in this table provides a solid foundation for assessing short-term versus long-term effects. The initial response to price and earnings shocks is evident in and , while the dynamics of systemic adjustment are determined by and mediated by . These findings are consistent with the DSGE framework: creative shocks tend to strengthen the tourism sector through productivity channels, while negative shocks on tourism fade with moderate persistence, allowing for a recovery if fiscal-monetary policies and creative investment are appropriately directed.

Output: Elasticity Parameters and Short-Term vs Long-Term Effects

The main results of the DSGE model estimation using the Bayesian approach are in the form of elasticity parameters that show variable sensitivity to changes in prices, income, and creativity stocks, as well as external shock effects such as digitalization and pandemics. The elasticity of travel demand to prices and income provides an idea of how well travelers respond to changes in travel costs and global income levels. The elasticity of tourism output to creativity stocks shows the contribution of the creative sector in increasing tourism productivity. In addition, the shock of digitalization and the pandemic was analyzed to see their impact on tourism consumption and creative output. The short-term effect is indicated by the initial response of the variables to the shock, while the long-term effect is in the form of convergence towards a new, more stable state of tune. To clarify the results, the following is presented Table 4: Elasticity Output and Shock Effect (Short Term vs Long Term).

Table 4. Bayesian estimation parameters

Parameters / Shock	Elasticity/Impact Value	Short-Term Effects	Long-Term Effects
Elasticity of tourist prices	1.62	A decrease in tourism consumption by **-8%** when prices rose by 5%	Tourism consumption returned to stable with **an adjustment of -3%** from the initial situation
Tourism revenue elasticity	0.92	Tourism consumption increased **+6%** as global revenue rose 5%	Tourism consumption increased **+10%** permanently
Elasticity of tourism output to creativity	0.34	Tourism output rose **+4%** as creativity stocks increased by 10%	Tourism output increased **+12%** sustainably
Digitization shock	Persistence 0.76	Creative output increased **by +7%** and tourism consumption **by +5%**	Creative output survived **+15%** and tourism consumption **+12%**
Pandemic shock	Persistence 0.65	Tourist arrivals down **-30%** and tourism output **-25%**	Gradual recovery, tourism output returns to **-5%** of initial state after 3 years

Table 4 shows that the elasticity of tourism prices () is quite high, with a short-term response in the form of a decrease in tourism consumption of -8% when prices rise by 5%. But in the long term, tourism consumption adjusts and only drops -3% from the initial state, indicating a substitution mechanism or adjustment of preferences. The elasticity of tourism income () of 0.92 shows that tourism is a normal good, with a 5% increase in global income driving tourism consumption up +6% in the short term and +10% permanently in the long term.

The elasticity of tourism output to creativity stock () of 0.34 confirms the important role of the creative sector. An additional 10% of creativity stocks increase tourism output +4% in the short term and +12% in the long term, indicating that creative investment has a sustainable impact. The digitalization shock () with a persistence of 0.76 resulted in a surge in creative output of +7% and tourism consumption of +5% in the short term, as well as a greater long-term effect (+15% of creative output and +12% of tourism consumption), signaling digitalization as a catalyst for sustainable growth.

In contrast, the pandemic shock () with a persistence of 0.65 led to a drastic decrease in tourist arrivals (-30%) and tourism output (-25%) in the short term. However, in the long run, there has been a gradual recovery, with tourism output returning to close to a state of default, although still -5% below the initial level after three years. This suggests that negative shocks are temporary, but recovery takes time and policy support.

Overall, these results confirm that positive shocks such as digitalization have long-term effects that strengthen the creative and tourism sectors, while negative shocks such as the pandemic have a major impact in the short term but can be recovered with the right policies.

The elasticity obtained provides a quantitative picture of the sensitivity of the tourism and creative sectors to changes in prices, incomes, and innovation, while confirming the importance of policy strategies to strengthen the resilience of this sector.

Result

The development of digital technology is one of the external factors that most affect the dynamics of the creative economy and tourism. The analysis of the DSGE model shows that the digitalization shock significantly increases the productivity of the creative sector. This increase is not only seen in the short term through a surge in creative output, but also continues in the long term with a greater contribution to GDP. The positive effects of digitalization are also contagious to the tourism sector, as increased creativity strengthens the attractiveness of culture-based tourist destinations and innovation. Tourism consumption has also increased, both due to easier digital access and because of the increasingly rich tourist experience with a creative touch. To clarify the quantitative results, the following is presented Table 5: The Impact of Digitalization Shock on the Creative Economy and Tourism.

Table 5. The Impact of Digitalization Shock on the Creative Economy and Tourism

Variable	Short-Term Effects	Long-Term Effects
Creative output	7%	15%
Creative GDP contribution	3%	10%
Tourism consumption	5%	12%

Table 5 shows that the digitalization shock has had a strong positive impact on the creative and tourism sectors. In the short term, creative output increased by +7%, which was immediately reflected in the contribution of creative GDP (+3%) and tourism consumption (+5%). This indicates that digitalization directly strengthens the capacity to produce ideas and innovations, while increasing the attraction of creativity-based tourism.

In the long run, the effect of digitalization is getting bigger. Creative output increased by +15%, the contribution of creative GDP increased by +10%, and tourism consumption increased by +12%. These figures show that digitalization not only provides a momentary boost, but also creates a structural transformation that strengthens the role of the creative economy as a key pillar of sustainable tourism development. Thus, digitalization shock can be seen as a catalyst that strengthens the synergy between the creative economy and tourism, while increasing the competitiveness of tourist destinations in the global era.

Table 6. Corporate Resilience and Digital Finance Panel Regression Estimation Findings

Variable	Short-Term Effects	Recovery Rate	Long-Term Effects
International tourist arrivals	-30%	+10% per year	-5% of the initial state after 3 years
Tourism output	-25%	+8% per year	

Table 6 shows that the pandemic shock had a huge negative impact in the short term. International tourist arrivals fell by -30%, while tourism output decreased by -25%. This figure reflects the downturn in the tourism sector due to travel restrictions and declining global demand.

However, the recovery rate that the model shows is quite consistent. Tourist arrivals increased by an average of +10% per year, while tourism output grew +8% per year after the worst phase of the pandemic. However, in the long term, the level of tourism remains slightly below the initial state, with tourist arrivals of -5% and tourism output of -4% after three years. This indicates that even if the recovery occurs, the shock of the pandemic leaves a structural impact that has not completely disappeared.

This interpretation confirms that the pandemic shock is temporary but requires appropriate time and policies for recovery. Government intervention through fiscal and monetary policies, as well as creative sector support, is an important factor in accelerating recovery and mitigating long-term impacts. The following is presented Table 7: Comparison of Digitalization and Pandemic Shock Effects.

Table 7. Comparison of the Shock Effects of Digitalization and the Pandemic

Variable	Digitalization Shock (Long-Term Effects)	Pandemic Shock (Long-Term Effects)
Creative output	15%	-2%
Creative GDP contribution	10%	-1%
Tourism consumption	12%	-3%
Tourist arrivals	8%	-5%
Tourism output	12%	-4%

Table 7 shows the fundamental difference between digitalization shock and pandemic shock. Digitalization has resulted in significant improvements in all key variables. Creative output increased by +15%, creative GDP contribution increased +10%, tourism consumption increased +12%, tourist arrivals increased +8%, and tourism output increased by +12%. This shows that digitalization not only strengthens the creative sector, but also has a positive spillover effect on the tourism sector.

In contrast, the pandemic pressured almost all variables. Creative output fell -2%, creative GDP contribution decreased -1%, tourism consumption decreased -3%, tourist arrivals contracted -5%, and tourism output decreased -4%. Although these negative impacts are considerable, the model shows that the effects of the pandemic are temporary and can be recovered through fiscal, monetary policies, and creative investment support.

This interpretation emphasizes that the digitalization shock is transformational with positive long-term effects, while the pandemic shock is destructive but temporary. Therefore, policy strategies should be directed to maximize the benefits of digitalization while strengthening the resilience of the tourism and creative sectors to be more resilient to negative shocks in the future. The following is presented Table 8. Summary of Elasticity and Shock Effect.

Table 8. Summary of Elasticity and Shock Effect.

Variable	Short-Term Effects	Recovery Rate	Long-Term Effects
Elasticity of tourist prices	1.62	Tourism consumption fell **-8%** while prices rose 5%	Stable tourism consumption down **-3%** from the initial state
Tourism revenue elasticity	0.92	Tourism consumption rose **+6%** while revenue rose 5%	Tourism consumption increased **+10%** permanently
Elasticity of tourism output to creativity	0.34	Tourism output rose **+4%** while creativity stocks increased by 10%	Tourism output rose **+12%** on a sustainable basis
Digitization shock	Persistence 0.76	Creative output up **+7%,** tourism consumption **+5%**	Creative output survives **+15%,** tourism consumption **+12%**
Pandemic shock	Persistence 0.65	Tourist arrivals down **-30%,** tourism output **-25%**	Gradual recovery, tourism output remains **-4%** of initial state

Table 8 shows that the tourism sector is highly sensitive to changes in prices and incomes. The elasticity of tourism prices () shows that price increases are relatively rapid in reducing tourism consumption, although in the long term the decline is more moderate (-3%). In contrast, the elasticity of tourism income () confirms that tourism is a normal good: the increase in global income drives tourism consumption up +6% in the short term and +10% permanently.

The elasticity of tourism output to the stock of creativity () emphasizes the importance of the creative economy as a driver of tourism. An additional 10% of creativity stocks increased tourism output by +4% in the short term and +12% in the long term, demonstrating the sustainable effects of creative investment.

The digitalization shock () with a persistence of 0.76 had a strong positive impact, increasing creative output by +7% and tourism consumption by +5% in the short term, as well as producing greater long-term effects (+15% creative output and +12% tourism consumption). In contrast, the pandemic shock () with a persistence of 0.65 had a large negative impact in the short term (-30% of tourist arrivals, -25% of tourism output), but a gradual recovery occurred in the long term although the level of tourism remained slightly below the initial state (-4%).

Discussion

The results show that the tourism sector is highly responsive to changes in prices and incomes, and is significantly affected by external shocks such as digitalization and pandemics. Within the framework of creative tourism theory, creativity is seen as the main driver of destination appeal. Digitalization has been proven to strengthen the creative ecosystem by increasing creative output and tourism consumption, in line with the theoretical prediction that innovation and creativity are able to create destination differentiation. In contrast, the pandemic suppressed tourist arrivals and tourism output, according to theories that emphasize tourism's vulnerability to external shocks. However, the gradual recovery shows that creativity remains a resilient factor that helps the tourism sector bounce back. To clarify the relationship between the research findings and the theoretical framework of

creative tourism, systematic mapping is needed. Creative tourism theory emphasizes that creativity is the main resource in building destination appeal, while the results of the study show how the elasticity of tourism demand as well as the shock effects of digitalization and the pandemic affect the tourism sector. Therefore, before going into further analysis, the following is presented Table 9: Interpretation of Results vs Creative Tourism Theory which summarizes the suitability and differences between the empirical results of the research and the theoretical predictions, so as to provide a more comprehensive picture of the role of creativity in dealing with global dynamics

Table 9. Interpretation of Results vs Creative Tourism Theory

Variable / Shock	Research Results	Creative Tourism Theory Predictions	Suitability/Difference	Reference Basis
Elasticity of tourist prices	Consumption drops significantly as prices rise	Creative tourism is price-sensitive, but creative added is holding back the decline	Appropriate, with an added feel	Gedikli et al. (2022); Triatmanto, Bawono, & Wahyuni (2023)
Elasticity of tourism income	Consumption rises as revenue increases	Creative tourism is considered a normal commodity, increasing along with income	Appropriate	Li (2022); Liu, Kim, & Song (2022)
Digitalization shock	Creative output +15%, tourism consumption +12%	Digital creativity strengthens the appeal of destinations	Appropriately, reinforcing the theory	Cao, Zhang, & Zhang (2021); Yepez & Leimgruber (2024); Zhang & Yang (2023)
Pandemic shock	Tourist arrivals -30%, tourism output -25%	External shock suppresses creative interaction and mobility	Appropriate, confirming vulnerability	Škare, Soriano, & Porada-Rochoń (2021); Aronica, Pizzuto, & Sciortino (2022); Henseler, Maisonnave, & Maskaeva (2022); Ozbay et al. (2022); Lee, Lee, & Wu (2023)
Post-pandemic recovery	Tourism output remains -4% from initial state	Creativity is a resilient factor in recovery	Appropriate, with empirical evidence	Fernández, Martínez, & Martín (2022); Ramlall (2024); Yakubovskiy & Kyrychenko (2024); Zhao et al. (2023)

Table 9 shows that the results of the research are consistent with the theory of creative tourism, while enriching the literature with new empirical evidence. The elasticity of tourism prices shows a decline in consumption as prices rise, but the data panel study confirms that creative added value can hold back the decline. The elasticity of tourism income is in accordance with the theory that creative tourism is a normal good, where consumption increases along with income. Digitalization shock has been proven to strengthen the creative ecosystem, in line with literature that emphasizes the role of digital innovation in expanding the appeal of destinations. The pandemic shock caused a major contraction, according to the findings of many studies on tourism's vulnerability to the global health crisis. However, the post-pandemic recovery shows that creativity plays a resilient factor, helping the tourism sector bounce back even if it is not fully back to its original level. Thus, this table confirms that creativity is not just an additional element, but a strategic foundation in facing global

dynamics and building sustainable tourism competitiveness. Table 10 presents a Comparison of Research Results with Data Panel and SEM Studies.

Table 10. Comparison of Research Results with Data Panel and SEM Studies

Research Methods	Key Variables	Other Study Results	Results of this study (DSGE)	Basic References
Panel Data	Tourism, economic growth, environmental pollution	Positive relationship between tourism and growth, but vulnerable to external shocks	Showing dynamic adjustment path, digitalization shock strengthening, pandemic shock suppressing	Gedikli et al. (2022); Triatmanto, Bawono, & Wahyuni (2023)
Panel Data	FDI, external debt, human capital	External factors have a significant effect on the economic growth of the region	DSGE emphasizes the role of human capital in strengthening the resilience of creative tourism	Triatmanto, Bawono, & Wahyuni (2023); Widarni & Bawono (2021, 2023)
SEM	Creativity, tourist satisfaction, destination competitiveness	Creativity has a positive effect on satisfaction and competitiveness	DSGE shows creativity as an endogenous variable that influences macro output	Saha et al. (2021); Fernández, Martínez, & Martín (2022)
SEM	The latent factor of tourist satisfaction and loyalty	Significant, but data-driven cross-sectional survey	DSGE is able to model dynamic changes due to global shocks	Ozbay et al. (2022); Aronica, Pizzuto, & Sciortino (2022)
DSGE	Tourism consumption, creative investment, fiscal policy	–	Digitalization shock boosts creative output, pandemic presses but gradual recovery occurs	Ramlall (2024); Zhang & Yang (2023); Zhang et al. (2025); Keshavarzi & Horry (2023); Peykani et al. (2023)

Table 10 shows that data panel and SEM studies make important contributions to understanding the relationship between tourism, economy, and creativity, but both have limitations in capturing the dynamics of global shocks. The data panel emphasizes the average relationships between variables across time and regions, while SEM highlights complex latent relationships. However, both tend to be static and are incapable of modeling uncertainty as well as long-term adjustment paths. This research with DSGE complements these shortcomings by showing how the shock of digitalization strengthens the creative ecosystem and how the pandemic is pressuring the tourism sector, but with a gradual recovery mediated by creativity. Thus, the DSGE is not only consistent with the findings of the data panel and SEM studies, but also enriches the literature with a more realistic dynamic framework to explain the interaction between tourism and the creative economy in the face of global shocks. Table 11 presents the Implications of Creative Investment Policy as a Resilient Strategy.

Table 11. Implications of Creative Investment Policy as a Resilient Strategy

Policy Areas	Creative Investment Strategies	Impact on Tourism	Effects on Resilience	Basic References
Fiscal Policy	Subsidies, tax incentives for the creative sector	Increasing the competitiveness of destinations and tourism consumption	Accelerating post-pandemic recovery	Chen et al. (2023); Salam et al. (2025)
Education Policy	Creative workforce training, innovation-based curriculum integration	Improving the quality of creativity-based tourism services	Strengthening human capital as a support for resilience	Widarni & Bawono (2021, 2023)
MSME Policy	Financial support and digitalization of creative MSMEs	Expanding local creative products as a tourist attraction	Increase local economic resilience	Viphindrartin & Bawono (2025)
Digitalization Policy	Digital infrastructure investment, online creative content promotion	Expanding travelers' access to creative experiences	Strengthening adaptation to technology shock	Cao, Zhang, & Zhang (2021); Yepez & Leimgruber (2024)
Global/Regional Policy	International collaboration in the promotion of culture and tourism	Increase cross-border tourist flows	Strengthening tourism's position in global trade	Yakubovskiy & Kyrychenko (2024); Zhao et al. (2023)

Table 11 shows that creative investment can be translated into a variety of complementary policy areas. Fiscal policies such as subsidies and tax incentives have proven effective in accelerating post-pandemic recovery by boosting tourism consumption. Education policies play a role in strengthening human capital, so that the creative workforce is able to adapt to global changes. Support for creative MSMEs expands local products as a tourist attraction while strengthening the community's economic resilience. Digitalization is becoming an important strategy to expand tourists' access to creative content, while international collaboration strengthens tourism's position in global trade.

Conclusion

This research confirms that the use of the Dynamic Stochastic General Equilibrium (DSGE) framework makes an important contribution to understanding the dynamics of the tourism and creative economy sectors, particularly in the face of external shocks such as digitalization and pandemics, which can often not be adequately explained by traditional empirical approaches such as data panels. The DSGE model allows for the integration of the micro-behaviors of economic agents households, the creative sector, the tourism sector, and governments with complex macro mechanisms, thus being able to capture short-term and long-term interactions simultaneously. The results show that the digitalization shock has a sustainable positive impact, increases creative productivity, increases the contribution of creative GDP, and encourages tourism consumption, while the pandemic shock has a large negative impact in the short term, but is temporary with a gradual recovery. The advantage of DSGE lies in its ability to model shock persistence, elasticity of key variables, as well as convergence pathways to new tuna states, which cannot be captured in their entirety by data panels that tend to be static and only emphasize relationships between variables without taking into account time dynamics and policy transmission mechanisms. Thus, this research not only strengthens the literature on creative tourism and the resilience of the tourism sector, but also provides a stronger methodological foundation for evidence-based policy formulation, especially in the context of creative investment as a long-term strategy to strengthen the competitiveness and resilience of the tourism sector to future global shocks.

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